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DEPARTMENT OF STATE
BUREAU FOR INTERNATIONAL REAFFAIRS
WASHINGTON, D.C. 20523

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

ECUADOR - RURAL ELECTRIFICATION LOAN

AID-ILC/P-917

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A.I.D.
BUREAU OF INTERNATIONAL REAFFAIRS
WASHINGTON, D.C. 20523

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

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AID-DLC/P-917
June 12, 1970

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Ecuador - Rural Electrification Loan

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed \$3,550,000 to the Republic of Ecuador to assist in financing a portion of the foreign costs of Borrower's program of rural electrification.

Please advise us as early as possible but in no event later than close of business on Friday, June 19, 1970, if you have a basic policy issue arising out of this proposal.

Rachel C. Rogers
Secretary
Development Loan Committee

Attachments:

Summary and Recommendations
Project Analysis
ANNEXES I, II, IV, V, VII, IX, X and XI

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ECUADOR - RURAL ELECTRIFICATION LOAN

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June 12, 1970

ECUADOR - RURAL ELECTRIFICATION LOAN

SUMMARY AND RECOMMENDATIONS

1. BORROWER :

The Government of Ecuador (GOE), acting through the Ecuadorean Institute of Electrification (INECEL).

2. LOAN:

(a) Amount: Not to exceed U. S. \$ 3,550,000

(b) Terms: The terms will be 40 years including a grace period of 10 years with interest rate of 2 percent per annum during the grace period and 3 percent per annum thereafter.

(c) Local Cost Component: No local costs will be financed for commodity procurement with the proceeds of this Loan, but a small portion of the Loan may be used to meet local costs of technical assistance.

3. PROJECT DESCRIPTION:

The project consists of the planned expansion of two existing electric cooperatives, six existing electric companies and the organization and development of three new electric cooperatives. In addition to the construction of electric generation, transmission and distribution facilities, technical assistance will be provided to INECEL in organizing and operating a rural electric cooperative department.

The areas or sub-projects selected for inclusion in this project are those where planning has shown that action must be taken within the next three years to provide additional electric generating and distribution facilities to meet the increase in demand for electric service.

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The total estimated cost of this project is \$11,200,000 of which \$7,530,000 is for foreign exchange and \$3,670,000 is for local costs. AID will finance \$3,550,000 of the foreign exchange portion and \$3,980,000 will come mainly from suppliers' direct credit. This suppliers' credit will be for the purchase of several large generating units for the different projects as can be seen in Annex VII, Exhibits 2 through 12. Bids are being received in INECEL for the procurement of five 1,000-KW units in 1970 for the Los Ríos and Milagro Electric Companies for an amount of \$1,100,000. Procurement of the other units will be effected between 1973 and 1976.

4. PURPOSE:

The purpose of the project is to give an impulse to the rural development of Ecuador through rural electrification and to expand and strengthen the cooperative movement, thus achieving an economic development effect as well as social development objectives implicit in the cooperative movement.

5. FINANCIAL PLAN:

Below are summarized the cost and resources of the project. Detailed information is given in Annex VII, Exhibit 1.

Program	Local Costs	Foreign Exchange		Total
		AID	Other	
Rural Elec- trification.				
Construction	3,657,000	3,441,300	3,980,000	11,078,300
Technical Assistance	13,000	108,700		121,700
Total Project Cost	3,670,000	3,550,000	3,980,000	11,200,000

6. ALTERNATIVE SOURCE OF FINANCING

The Mission has received to date formal notifications from the IBRD, EXIMBANK, and IDB as follows:

IBRD: In a letter received by AID dated September 25, 1969, the World Bank stated: "The Bank is not interested in considering for financing either of the two projects in Ecuador indicated in your letter". The referenced projects were rural electrification and agricultural sector.

EXIMBANK: Minutes of meeting held between the Bank and the AID liason group, dated October 6, 1969 stated that: "The nature of this program is such that concessionary financing terms rather than those appropriate for EXIMBANK are required to make project feasible".

IDB: In a letter to AID of December 23, 1969, the Inter-American Development Bank indicated that "The IDB does not expect to undertake financing of such proposal in Ecuador in the near future", when referring to the rural electrification loan.

While alternative sources of financing may be available for the purchase of equipment and materials as such, it is believed, because of the nature of the project which focuses in the development of new and already established electrical companies and cooperatives, that this project is not susceptible to financing from other sources.

7. STATUTORY CRITERIA

All applicable statutory criteria have been met as indicated in the Checklist of Statutory Criteria.

8. VIEWS OF COUNTRY TEAM

The proposed loan, the third AID loan to INECCEL, an institution with which USAID has been associated since 1964, is designed to promote the participation of a large sector of the population in the development process to attain a more equitable distribution of income, to increase private investment at all levels and, on the other hand, to establish a firm basis for the demand of electric energy in this decade, as a previous step for the development of large hydroelectric projects.

The specific objectives will be to provide a strong and expanded rural electrification program by financing generating and distribution equipment and providing technical assistance specially in the formation and development of electric cooperatives. The technical assistance in this field will be provided under loan-financed contract, possibly with the National Rural Electric Cooperative Association (NRECA) or with agencies in Latin American countries which have the necessary experience in rural electric cooperative development.

The socio-economic impact will be felt almost exclusively in the low-income rural areas where this program has been directed. In social development terms, the value of cooperatives as a vehicle of social development does not require elaboration nor does the impact of the availability of electricity on the lines of rural dwellers require emphasis. Indirectly, the loan will assist in meeting economic problems of the country by providing assistance emphasizing development of agricultural and agro-industrial activities having immediate effects on the foreign exchange position of the country.

Since the loan will be disbursed for the procurement of commodities of western hemisphere source and origin-although it is presumed that most of the commodities will be procured in U. S. A.--and for technical assistance possibly from NRECA, no negative effect on

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the U. S. balance-of-payments is expected. Additionally, the installation of electrical equipment will create new markets for related spare parts and other types of machinery and appliances.

It is felt that this loan is important to the continuing growth of cooperatives in Ecuador which has been strongly advocated and supported by the Mission.

As part of the preparation for this loan proposal, USAID/Ecuador carried out an evaluation examining the effectiveness of previous USAID/E assistance to INECEL in the development of electrification projects in rural areas of Ecuador. Finished in February 1970, the report reinforced the opinion of the country team that this is a priority project. Therefore the team recommends the approval of this loan.

9. ISSUES

- a. Related to GOE participation - None
- b. Related to AID/W comments on IRR approval:
 - (1) "Past record of deobligation significant portion prior AID and EXIMBANK loans to INECEL, raised doubts ability INECEL effectively utilize additional financing similar area." Discussion of this question can be found on pages 13 and 15, Section III. B.1 and III. C.1.
 - (2) "Last paragraph, page 15 IRR indicates problem inadequate Cuenca rate structure." See pages 11 and 15, Section III. A.1 and III. C.1.
 - (3) "Proposed projects must be related financing other lenders. AID should be assured efficient utilization other INECEL resources." INECEL has asked IDB

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for a substantial loan of over \$20 million to finance the first stage of the Pisayambo hydroelectric project. The completion of this project, which is several years in the future, will have no bearing on the subprojects under this loan. If, in the future, an adequate integrated system of large power plants and transmission lines is available to furnish cheaper power to any of the areas of our subprojects, substations will be built, generation plants will be transferred to other rural areas where power is not available and the local power companies or cooperatives will purchase the cheaper power.

- (4) "Polish loans raise potential commingling issue." See page 14, Section III. B. 3.
- (5) "Evaluation prior technical assistance AID loans INECEL must be made, with loan paper indicating how many past problems rendering this type assistance will be overcome." See page 15, Section III. C. 2.
- (6) "Thorough planning for loan implementation must be made. Questions of who will perform procurement function, design and supervisory engineering functions must be addressed." See page 59, Section VIII. A.
- (7) "Anticipate feasibility work satisfying section 611 requirements for each loan sub-project will be performed prior submission loan paper AID/W." See Quito 4947, subject Rural Electrification IRR, dated October 23, 1969, which stated: "Feasibility studies satisfying 611 will be performed prior to loan submission. Use of consultant not deemed necessary. INECEL has experienced personnel required for studies and has already collected most of data." As stated hereafter under Engineering Analysis, Section IV. B.1. a review of the studies made by INECEL

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for each of the sub-projects shows that there has been enough engineering, cost and financial projections done to indicate that the projects are feasible, that they are well prepared and the plan of expansion in each case is based on reliable information which results in a well developed program of expansion tailored to each sub-project.

10. LOAN ADMINISTRATION

This project will be executed by INECEL. Detailed plans and specifications including updated feasibility studies for each sub-project will be approved by USAID/Ecuador prior to disbursement of loan funds. Procurement and disbursement will follow procedures outlined in the appropriate manual orders. AID's role, resulting from the qualified INECEL technical and administrative staff, will be limited to the usual monitoring activities, such as reviewing and approving design specifications for equipment and material, construction plans, cost estimates, purchasing of equipment, etc.

11. RECOMMENDATIONS

On the basis of the conclusions of the Capital Assistance Committee that the project is technically, economically and financially justified, it is recommended that a loan to INECEL for an amount not to exceed US \$3,550,000 be authorized subject to the following terms and conditions:

(a) Interest and Terms of Repayment

1. Terms: 40 years with a grace period on repayment of principal of 10 years.
2. Interest: 2 percent per annum during the grace period and 3 percent per annum thereafter.

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(b) Other Terms and Conditions

1. Equipment and materials financed under the loan shall have their source and origin in the United States or in any independent country of the Western Hemisphere south of the United States except Cuba.
2. INECEL will be required to present to AID and to the satisfaction of AID an audit of its operations.
3. INECEL will be required to present to AID and to the satisfaction of AID, a program for implementing the cooperative phase of the project, including the establishment of a section with adequate staff to be responsible for the promotion, organization and administration of rural electric cooperatives. This will include the staffing plan of INECEL and the proposal for utilization of foreign specialists in this field.
4. INECEL will be required to submit to AID updated feasibility studies and engineering data including estimated costs of each subproject.
5. Such other terms and conditions as AID may deem advisable.

Project Committee:

Carl A. Bischoff, Jr., Capital Resources Development Officer,
Chairman
Eugene R. Braun, Cooperatives Advisor
L. Sterling Hedgpeth, General Management Officer
Luis A. Ramos, Electric Engineer
Gene C. McCoy, Controller
Richard J. Greene, Assistant Director for Social Development
Clarence Zuevas, Jr., Economic Advisor

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Reviewed and Approved By:

Robert J. Minges, Mission Director

Drafted By:

Chris L. Schultz, Luis A. Ramos, Bruce M. Berry,
Eugene R. Braun, Clarence Zuvekas, Jr., Mario Gómez
de la Torre.

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AID-DLC/P-917
June 12, 1970

SECTION I

GENERAL DESCRIPTION OF THE PROJECT

The project consists of three main elements: (1) expansion of small existing utility systems; (2) formation of new electric companies or electric cooperatives to provide service in areas not having adequate facilities; and (3) technical assistance to INECEL in developing an electric cooperative section.

1. The existing electric companies and cooperatives have been given assistance during the past six years by AID, Export-Import Bank and INECEL so that now each of these organizations has a sound and well designed electric system. However, since first attention was given to developing a nucleus, the next step is the expansion of those systems to provide additional service to meet the developing demand for electric energy in their respective areas and at the same time provide additional revenues needed to improve their financial situations. The six sub-projects in this category are: Santo Domingo and Daule Rural Electric Cooperatives, and Santa Elena, Esmeraldas, Cuenca and El Oro Electric Companies.
2. In a number of areas there exist small generating plants which serve their immediate area over inadequate distribution lines, their facilities generally in a poor state of repair. In its effort to improve electric service in Ecuador INECEL has studied the possibility of consolidating the various small systems in a likely market area and making electric service available from a reliable central source over well designed distribution lines. This is the procedure followed by INECEL in developing existing systems to provide high-quality electric service in various areas of Ecuador. The five sub-projects in this category are: Quinindé, Tena and Macas Rural Electric Cooperatives, and Los Ríos and Milagro Electric Companies.

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3. The technical assistance will consist mainly of advice to INECEL in the formation of its electric cooperative section and assistance in the organization and early development phases of the new cooperatives.

A summary of the construction project requirements is given in Annex I, Exhibit 1. A description of each sub-project is given in Annex IV and a map showing the location of each of the sub-projects is included as Annex IV, Exhibit 1.

SECTION II

THE BORROWERA. Scope of Authority

The Borrower will be the Government of Ecuador, acting through the Ecuadorean Institute of Electrification (INECEL), a semi-autonomous agency created on May 23, 1961, when the "Basic Electrification Law" was promulgated in Ecuador. According to this law, the Ministry of Industries and Commerce has the responsibility for planning, implementing and supervising¹ electrification programs in Ecuador, and for carrying them out through INECEL.

The need for the creation of this Institute was considered of high priority because of the large deficit of electric energy for the requirements of domestic and industrial demand, and the uneconomic way in which electricity had previously been provided.

INECEL has the following major functions:

1. To elaborate the national electrification plan and to update it regularly by predicting the electrical requirements of the country in accordance with the needs of population, industrial and agricultural growth. Plans are submitted for approval to the Ministry of Industries and Commerce prior to presenting them to the National Planning Board.

Annex II, Exhibit 1 shows a one-line diagram of the large generating plants and the national transmission system proposed for construction during the next 10 years. Generating systems such as Pisayambo, Toachi, Paute and Chimbo, as well as the transmission lines over 138-KV will be owned, operated and maintained by INECEL. Smaller systems are generally the property of electrical enterprises and cooperatives. Annex II, Exhibit 2 shows the existing systems and those proposed for construction.

2. To promote the progressive realization of this plan through the investment of its own capital or other domestic or foreign capital.
3. To encourage the establishment of power companies as private business firms, investing its own resources when necessary.
4. To negotiate loans with national or foreign entities to execute electrification programs according to the economic capability of the country.
5. To operate the electric power firms depending on it, leading to industrial development and betterment of the standard of living of the Ecuadorean people, while adhering to sound financial principles.
6. To contribute to the formation of a cadre of high-level engineers and skilled technicians by granting scholarships, and by setting up courses for workers in specialized fields.

B. Operating Policy

At the request of USAID/Ecuador, INECEL furnished the following statements with respect to its policy towards various aspects of its operations:

1. Policy with Respect to Preparation of Feasibility Studies Ranging from Small Distribution Systems to Large Hydro-electric Developments.

INECEL is at the present time or has been in the past responsible for the execution of feasibility studies for large projects such as Pisayambo, Paute and Toachi. Foreign consulting engineering firms have performed the work required for those studies. INECEL has also done a large amount of the work related to the Toachi project. On the other hand, INECEL usually makes the feasibility studies

and does the design work for most subtransmission and distribution systems in the country, including the power market research needed for the planning of the expansion of lines.

2. Policy with Respect to Financial Assistance to Municipalities, Electric Companies and Cooperatives.

As it is one of the stated functions of INECEL to promote and stimulate the electrical growth within the country, they have accomplished this by providing financial help, when needed, to electric companies and cooperatives, and also by participating as a shareholder in several electric companies. When the assistance is given to electric companies, capital is furnished and a commensurate amount of stock is secured in the company; the financial help to the cooperatives is given in the form of sub-loans, usually in terms similar to those obtained in the loans to INECEL.

INECEL is a shareholder in 16 electric companies and its participation amounts to approximately US\$5,533,300 (S/100,595,000). Loans to two cooperatives amount to US\$385,000 (S/7,000,000). Detailed information is given in Annex II, Exhibit 3.

3. Policy in Establishing Fair Wholesale and Retail Rate Schedules.

The utility companies submit the tariff rate structure for consideration of the General Board for Power Resources of the Ministry of Industries and Commerce. INECEL, according to Article No. 4 of the Basic Electrification Law, gives a report to the Ministry supporting or not the rate structure under consideration. The Ministry, guided by this report, will approve or disapprove the proposed rate structure. At the same time, the tariff section of INECEL has sufficient capacity for assisting the electric companies in the preparation of tariff rate schedules.

4. Policy with Respect to Providing Technical Assistance or Personnel for Operating Entities, and Terms for such Assistance.

From its engineering staff, INECEL provides technical assistance to the electric companies and cooperatives by performing studies, surveys, primary investigations, preparation of specifications and bidding procedures, and by assisting them in the construction, operation and maintenance of facilities. This assistance provided either in the main office in Quito or in the field by INECEL engineers or technicians, is generally granted free of charge until the entity is properly organized and has sufficient experience and personnel to undertake these activities.

C. General Program

The general plan of activities for immediate and long-term future can be divided into two categories: (1) Regional systems, which include projects already initiated or to be developed during 1970-73; and (2) National systems including hydroelectric generating projects of which the two largest are Pisayambo and Paute.

Within the first group there is a total of 28 projects. Their physical installations will amount to 43,000 KW of installed capacity, 79,000 KVA in substations and 1,000 Km. in transmission lines ranging from 13.2 KV to 69 KV; also, distribution lines to serve initially 55,000 consumers are expected to be constructed under this development.

Under the second group, the Pisayambo project, now in its design stage and for which World Bank and IDB financing is anticipated, will provide 148,000 KW for four northern provinces: Pichincha, Cotopaxi, Tungurahua and Chimborazo. Construction will be in three stages over a period of 10 years. Under the established construction schedule, the first stage of 64,600 KW will be constructed between 1971-75, and the preparations and attendant investments for the second stage

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of 83,400 KW will start in 1974. The estimated cost of the first stage is \$27,600,000 and of the second stage \$23,400,000, a total of \$51,000,000. The Paute project, the feasibility study for which is expected to be completed by December, 1970, will provide 1,050,000 KW. The proposal consists of four stages to be constructed over a period of 20 years. Six provinces will benefit from this project: Guayas, Manabí, Los Ríos, Cañar, Azuay and El Oro. The first stage of this development will have an estimated capacity of 315,000 KW and its construction is expected to take place between 1972-1977. The estimated cost of the first stage is \$90,000,000, and of the total project \$296,000,000.

As an indication of INECEL's ability to carry on projects of wide scope, there is attached as Annex I, Exhibit 4 a list of major projects undertaken by INECEL.

D. Organization and Management.

INECEL has a present staff of 377 employees of which approximately 41 percent are classified as technical or professional personnel. Thirty two percent have university degrees or higher education, 32 percent have technical or high school education and 36 percent have less than high school education. The following table gives a complete analysis of the organization in terms of their functions and educational levels:

<u>Functions</u>	<u>Educational Levels</u>				<u>Total</u>	<u>Per- Centage</u>
	<u>University Degree of Higher</u>	<u>Tech- nical</u>	<u>High School</u>	<u>High School</u>		
Technical (Engineers & Econ.)	108	7	36	3	154	40.8
Administrative	9	7	49	-	65	17.2
Skilled and Non-skilled (Labor)	3	5	16	96	120	31.8
Gen. Service	-	-	1	37	38	10.2
Total	120	19	102	136	377	100.0
Percentage	32.0	5.0	27.0	36.0	100.0	

The management staff of INECEL is considered by the Mission to be competent and well trained. INECEL operates under the Ministry of Industries and Commerce, within the framework of a board of directors consisting of the Minister of Industries and Commerce, Technical Director of the National Planning Board, Dean of the Electric Engineering Faculty of the Polytechnic Institute of Quito, a representative for private electric utilities and a representative for the Municipalities. The Director of Energy Resources of the Ministry of Industries and Commerce and the General Manager of INECEL participate in the board's activities but have no vote.

The main functions of the Board of Directors are those of directing the economic and administrative affairs of INECEL, reviewing and approving plans for electrification projects, annually approving budget proposals, balance sheets and activity reports, designating and dismissing inspectors, the General Manager and, at the latter's request, the Assistant Manager, the Treasurer and the Auditor, authorizing loan requests and the formation of new companies, formulating and revising statutes and rules as INECEL may require for smooth functioning, and, generally speaking, making any transactions for which the General Manager does not have full responsibility.

The General Manager of INECEL must be a citizen of Ecuador, He serves for four years and can be reelected. Annex II, Exhibit 5 shows the organizational chart of INECEL as presently constituted.

E. U.S. Technical Assistance to INECEL.

U. S. Technical assistance has been provided to INECEL during the past years under Loans 518-L-023 and 518-H-025 in connection with the formation and operation of the rural electrification cooperative in Santo Domingo de los Colorados and the operation of the electric power company in Santa Elena. Part of this assistance (\$365,000 of the \$700,000 total from Loan 518-H-025) has been provided to INECEL, as a national

institution, to facilitate building a management capability, a modern accounting system and an increased technical capacity. Accordingly, Mr. John Van Rysselberg, a very well qualified employee of the J.G. White Company of New York was secured to work for INECEL as head of the Planning Division. His assistance to the organization during 1965 to 1967 was very useful, particularly in the planning of electric power companies. INECEL also obtained the services of the International Middle West Service Company of Chicago for two years, 1966 to 1968. Its activities were oriented toward modernizing INECEL's accounting system and billing procedures, providing advice and assistance in banking procedures, accounting for electric utility systems, depreciation problems and amortization of capital. Also, under this loan, participant training in the U.S. was provided for two members of INECEL's staff. One employee attended a four-month training in the preparation and analysis of feasibility studies relative to power generating facilities and electrification projects in general and he is now Head of the Foreign Loans Section. Another employee attended a four-month training course in rural electrification and development of rural electric cooperatives. After being the manager of the Santo Domingo Rural Electric Cooperative for two years, he is now Chief of Construction Works in INECEL's Division of Engineering and Construction.

Under the provisions of Loan 518-L-023, several U. S. technicians have come to Ecuador for varying periods of time, and although the major objective of their services has been the development of the Santo Domingo Rural Electric Cooperative, INECEL has generally found the results of their assistance applicable throughout the organization. One technician wrote the construction standards for the Santo Domingo Cooperative which helped INECEL in the preparation of a Manual of Standards for the Construction of Rural Electric Lines for use throughout the country. Another technician provided advice on accounting methods to the personnel of the cooperative. Later, a technician from an electrification cooperative in New Mexico, associated with the National Rural Electric Cooperative Association (NRECA), was assigned to Santo Domingo to provide training in hot-line repairs, i.e. repairs without shutting off power. INECEL

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again was benefitted with this training course since most of its engineers, as well as many electric companies throughout the country, participated directly or indirectly in this course.

Generally speaking, training in highly specialized techniques is the most useful type of training for INECEL's personnel and for the electric companies and cooperatives.

SECTION III

BORROWER'S ACHIEVEMENTS IN ELECTRIFICATIONA. AID Participation Projects.1. Loan 518-H-025.

This loan was granted to INECEL on August 24, 1964, in the amount of \$1,600,000 for "the expansion of generation, transmission and distribution facilities of electric power companies in Cuenca and Santa Elena Península" and for "improving the borrower's (INECEL) capacity to plan and implement the development of electric power systems in Ecuador". Repayment terms are 40 years including a grace period of 10 years with an interest of $3/4$ of 1 percent per annum during the grace period and 2 percent per annum thereafter.

On December 9, 1965, USAID deobligated \$900,000 of this loan which had been assigned to the Cuenca project, in view of the low rate structure of the Cuenca Power Company which was inadequate to cover its operating costs, including depreciation and debt servicing. Of the remaining \$700,000, \$335,000 have been used by the Santa Elena Power Company for the purchase of local and imported materials for the construction of transmission and distribution systems and for the installation of four generating units, purchased with funds from an EXIMBANK loan, for a total capacity of 3,600 KW. A total of 20 Km. of 13.2-KV subtransmission lines have been constructed from La Libertad to Santa Elena and Ballenita, and from La Libertad to Salinas and to the tourist resort of Punta Carnero. Installation of a 5,000-KVA substation and construction of distribution systems in the towns of La Libertad, Salinas, Santa Elena and Ballenita have also been part of Phase "A" of the overall program. The construction program under Phase "B", approved by USAID in Implementation Letter No. 7 of December 27, 1967

and consisting of the installation of 400 KW in the town of Playas and the construction of distribution networks for 1,400 customers in Playas, Anconcito and Punta Blanca, is already underway. As a result of AID assistance through the electrification of the area, a noticeable development both in the industrial and tourist aspects has taken place. The \$365,000 used by INECEL in support of projects such as procurement of technical assistance and purchase of construction and communication equipment and office machines, have helped INECEL's capability to carry out the many electrification programs in which it has been involved.

2. Loan 518-L-023.

This loan for the amount of \$650,000 was signed on August 30, 1964, "for the (i) construction of electric power generation, transmission and distribution facilities, (ii) the procurement of technical assistance, engineering services, materials and equipment and (iii) the extension of consumer credit for the development of the Santo Domingo Rural Electric Cooperative". Repayment terms are 40 years including a grace period of 10 years with an interest of $\frac{3}{4}$ of 1 percent per annum thereafter.

Proceeds from this loan have been used in the purchase of local and imported materials for the construction of the electric power system in the town of Santo Domingo and in rural areas extending some 160 Km. This work was divided into two phases. Phase "A", completed in 1967, consisted of the construction of a 1,380-KW generating plant, installation of a distribution substation and construction of distribution networks for the urban area in Santo Domingo. Phase "B", completed in 1968, consisted of the construction of transmission and distribution lines along the four main approach roads to Santo Domingo (from Quito, Quevedo, Chone and Quinindé) making electric power available to the rural areas adjacent to the four roads.

The distribution networks in the town of Santo Domingo were also expanded. Since the demand for electric energy in the area has increased considerably during the past two years, USAID approved, in Implementation Letter No. 10 dated December 30, 1968, the use of \$110,000 balance of the loan for the construction of Phase "C", to enlarge the power house and to provide additional distribution facilities to the Santo Domingo project by purchasing local and imported commodities and by enlarging the power plant. Works under Phase "C" are also underway.

3. Grants.

During the past several years, INECEL has been the recipient of several AID grants and donations for rural electric cooperatives such as Santo Domingo and Daule. Specifically, they received three diesel-electric groups from government excess stocks, line materials from various USA electrical cooperatives, and AID-financed technical assistance from NRECA in the organization and operation of cooperatives.

B. Non-AID Participation Projects.

1. EXIMBANK Loan.

On September 23, 1964, EXIMBANK granted a loan to INECEL for \$8,000,000 to assist in financing the US dollar cost of US equipment, materials and services approved by EXIMBANK and ECA for the projects. Repayment terms are 20 years including a grace period of 3 years and 5 1/2 percent interest on the unpaid balance. This loan was reduced to \$7.5 million in 1967 and has been fully utilized to the date. Proceeds from this loan were used for the transportation of equipment and materials for the following regional systems: Esmeraldas, Manabí, Santa Elena, Durán, Guayas, El Oro, Ríobamba, and Loja. Contributions from INECEL and from the involved electric companies have amounted to \$1,510,000 for local costs and \$1,230,000 for the

importation of materials, for a total of \$4,900,000.

2. British Government Loan.

The British Government, through the Export Credit Guaranty Department of the British Board of Trade, granted a loan of the equivalent of \$1,680,000 for 20 years at a variable interest rate, to finance equipment of British source and origin. Proceeds from this loan were used for the construction of a 6,000-KW hydro-electric "El Ambi" project in Ibarra and for the purchase of materials and construction of the transmission line from Ibarra to Tulcán and other towns in northern Ecuador. This loan has been fully disbursed. INECEL has been granted in 1970 another loan of approximately \$500,000 for the importation of materials to expand "El Ambi" system.

3. Polish Government Loan.

The Polish Government granted INECEL, in January, 1969, the equivalent of \$ 5 million line of credit to finance the purchase of diesel-electric plants of Polish manufacture. This is a 10-year, 6 percent credit with repayments to be made in Ecuadorean agricultural products such as coffee, bananas and cacao. The credit would finance 80 percent of the cost of equipment with INECEL paying the balance of the cost plus ocean freight. INECEL has programmed \$ 2 million of this credit for use during 1969/1970 to purchase four 3,400-KW diesel-electric units made by the H. Cegielski-Dolmen factory. All four units will be located in Manta, Manabí province. It is our understanding that INECEL is not satisfied with the contract, as the four engines are of an old design and extremely heavy, and that they will not enter into more contracts under this line of credit. Since none of the sub-projects considered in this A.I.D. loan are located in the Manabí province, it is concluded by the Mission that no comingling will exist with the Polish loan.

C. Country Team Views.

1. Past Loans.

The IRR, as presented to AID/Washington in Sept. 1969, referred to the deobligation of \$900,000 from Loan 518-H-025, as mentioned under A.1. before. The approval of the IRR contained a reservation as to the ability to INECEL to effectively utilize additional financing in similar areas. The deobligation of \$900,000 did not result from the inability of INECEL to utilize the funds but the unwillingness of the Cuenca Power Company (CPC) to comply completely with the conditions precedent to the loan, specifically the following two:

- a) Paragraph 3.2 (c) (ii): "an agreement between the Borrower and sub-borrower for the sub-project providing for a sub-loan on the following terms and conditions: The sub-loan shall bear interest at the rate of five and one half (5-1/2) percent per annum on the disbursed balance of the sub-loan".
- b) Paragraph 3.2 (d): "Evidence of arrangements for supplying electric power to consumers in the Sub-Project area at rates which will be adequate to cover the sub-borrower's cost, including depreciation and debt service, and of providing such power".

A complete summary of the problem can be found in Implementation Letter No. 3, dated December 9, 1967, which was the document used to deobligate the \$900,000.

Briefly, regarding (a) above, the CPC would not accept the difference in loan interest rates, that is 2 percent for the borrower and 5-1/2 percent for the sub-borrower. As INECEL was the beneficiary with this interest rate structure, they had planned to provide the CPC with free technical assistance, to purchase additional shares of stock and to provide miscellaneous services free of charge. In spite of all these incentives, the CPC did not

accept the terms of the loan.

With respect to providing power at adequate rates as stated in (b) above, it became apparent after 15 months of negotiations with the CPC, that the power company would not raise these rates. Therefore, AID/Ecuador deobligated the \$900,000. The remaining part of the loan has been successful and as of this date all funds have been fully committed.

No problem is envisioned in the acceptance by the CPC of the interest rates implied in this loan proposal. As to the rate structure of the company, a well-directed policy has been followed to revise sales rates, for the different types of consumption, to more adequate figures. An increase of about 20% of the former rates has been made since 1965.

AID/Washington questioned in the IRR approval, the ability of INECEL to utilize additional loan funds as a result of the reduction of \$2.5 million from the \$8 million EXIMBANK, as mentioned under B. 1. above. As is the case with the EXIMBANK and previous AID loans, they were predicated upon preliminary feasibility studies. When the EXIMBANK loan request was updated in 1967, it was determined that only \$5.5 million would be required. Previously, INECEL had submitted to the EXIMBANK a feasibility study for the Manabí thermal generating power plant at an approximate cost of \$7,000,000 so that, when they found the excess of \$2.5 million, they wrote to EXIMBANK requesting that this money be deobligated and applied to the Manabí project. On March 31, 1967, EXIMBANK confirmed the deobligation as follows: "We will reduce the amount of the credit from \$8 million to \$ 5.5 million without prejudice to use it when making a separate application for financing the Manabí steam plant when engineering studies have been completed and more precise cost figures are available".

In view of the above facts, it is the Mission's belief that INECEL has effectively utilized the loan funds received and that the deobligations that occurred should not constitute an obstacle in the consideration of this loan.

2. Monitoring Problems.

Several problems which caused delays in the monitoring of the loans have been encountered during the past five years: the AID, EXIMBANK and British Government loans granted to INECEL were approved on the basis of preliminary feasibility studies. No final design had been prepared and specifications for equipment and construction of lines were not available at the time of the signature of the loan agreements. The case is different now with the proposed loan since INECEL has all specifications for construction readily available. In 1965 INECEL completed the preparation of standards for construction of lines and substantial disbursement of these loans started only in 1968.

These loans were devoted mainly to the purchase of equipment and materials such as diesel-electric units, substation equipment, line material for transmission and distribution systems, trucks, office and communication equipment, etc., the diesel-electric units being the only expensive items. Bidding procedures used by INECEL to effect these purchases involved the preparation of specifications for each item of generation, transmission or distribution facilities. This was done at the time that each item was needed for construction, requiring, therefore, the preparation of many sets of specifications and a large number of bidding invitations to accomplish the purchase of materials.

Since A.I.D. loans were granted to INECEL through the Government of Ecuador, banking procedures have been supervised and effected by the Central Bank of Ecuador, i.e. all letters of commitment issued under the A.I.D. loans have been approved by the Central Bank and all

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transportation procedures such as price, insurance, consular letters, etc. have been transacted with the Central Bank. This kind of paper work has proved to be very time-consuming. Fortunately, in the case of the EXIMBANK loan, only the First National City Bank has effected the opening of letters of credit under INECEL's request without having to submit documents to the Central Bank. In some instances, some A.I.D. procedures, such as bidding publications, have also been the cause of delays.

On the other hand, under the two A.I.D. loans, letters of commitment were opened for small amounts during the loan periods since it was considered at the beginning of the loans that it was the best way to utilize loan funds. The policy of requesting commitment at the time when materials were needed caused consequent delays.

These problems have been discussed with INECEL officials and steps to eliminate them have been proposed as follows:

- a) Bidding invitations should be made to purchase materials in large quantities to cover the needs of as many subprojects as possible, i. e. one bidding for distribution transformers, cables, insulators, line hardware, and other standard electrical materials in bulk; another bidding for diesel-electric units and substations according to the specifications required by each sub-project.
- b) Since purchase will be made in bulk, only the necessary letters of commitment and letters of credit will be opened to reduce as much as possible the banking procedures. INECEL's past experience in this field will be very helpful.

A better understanding by INECEL of the reimbursement procedures followed by AID and US commercial banks will

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be helpful. Having detailed information of payments made by AID as well as monthly status of disbursements will greatly expedite INECEL's accounting.

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SECTION IV

ENGINEERING ANALYSISA. Detailed Description of the Project.

In view of the shortage of electric power in the country, especially in rural areas, it is not possible for the several electric companies or cooperatives to purchase electric power in bulk. The provision of diesel-electric power is the only solution for most of the electric enterprises considered under this loan with the exception of 2 hydroelectric sub-projects in the Oriente. It is expected that in the early 1980's cheaper power will be available as a result of hydroelectric developments but with no negative effects on this project.

The project can be divided into three major categories: Rural Electric Cooperatives; Electric Companies; and Technical Assistance. A map showing the location of each sub-project is included as Annex IV, Exhibit 1. A description of each sub-project and the main aspects of the technical assistance to INECEL follows:

ELECTRIC COOPERATIVES1. SANTO DOMINGO Rural Electric Cooperative

This cooperative was organized in 1963 and developed mainly with the assistance of AID Loan 518-L-023 although AID grants and materials donated from electric cooperatives in the United States helped the cooperative during its first years of operation. The cooperative presently serves the town of Santo Domingo de los Colorados and the nearby towns of La Palma, La Concordia, Las Delicias, El Carmen and Puerto Ila and the rural establishments along the four main roads leading out of Santo Domingo for a distance of about 40 Km. in each direction. At the present time the cooperative is serving about 2,100 members with a maximum demand of 1100 KW. The system is served by its own diesel-

electric generating plant of 1,380 KW capacity. A new 1000-KW unit is on order and will be installed in 1970 to not only meet increased demand but also to replace one of the existing 460-KW units severely damaged.

The proposed program of expansion of this cooperative provides for the installation of one 1,500-KW diesel-electric generating unit in 1972 and another of the same capacity in 1976, the construction of 100 Km. of 34.5 KV line between Santo Domingo and Quevedo, the construction of 30 Km. of 7.6/13.2 KV distribution line to serve 3,000 additional consumers in Santo Domingo and along existing distribution lines, the installation of one 1,500-KW diesel-electric generating unit in 1972 and another of the same capacity in 1976, and the installation of three 1,900-KVA substations to serve 13.2-KV distribution lines between Santo Domingo and Quevedo. A map of the area and details of the proposed expansion program are given in Annex IV, Exhibit 2.

It is estimated that the proposed expansion program will cost \$1,410,600 of which \$1,028,100 is for foreign exchange costs and \$382,500 is for local costs. AID is being requested to provide \$582,600 of the foreign exchange costs.

2. DAULE Rural Electric Cooperative

This electric cooperative was organized in 1965 with the assistance of AID. However, no AID funds have been available to the cooperative to assist in the construction of its system. The service of the cooperative is now limited to the towns of Daule and Nobol but the cooperative service area includes the towns of Palestina, Santa Lucía, Petrillo, Lomas de Sargentillo, Isidro Ayora and Pedro Carbo. With the assistance of INECEL the cooperative has installed two 200-KW diesel-electric generating units in Daule and another 350-KW unit has been purchased and scheduled for operation in 1970. The distribution system operates at the generator

voltage of 2,400 volts although the lines are designed to operate at 13.2 KV. The existing lines were financed with local funds along with some donated materials from electric cooperatives in the United States.

The proposed construction consists of the installation of one 500-KW diesel-electric generating unit in 1972 and one 1,000-KW unit in 1975, the installation of 2,350 KVA in substation to allow operation of the distribution lines at 13.2 KV., construction of 68 Km. of 13.2 KV distribution lines from Daule to Palestina and from Pedro Carbo to Nobol and Petrillo. Also, 35 Km. of 7.6/13.2 KV distribution lines will be constructed to provide service to 3,500 consumers in the towns and rural areas.

The study made of the potential market indicates that this area could have a rapid development in agricultural and industrial fields. A map of the area and details of the proposed construction are shown in Annex IV, Exhibit 3.

It is estimated that the proposed construction will cost \$833,800 of which \$547,500 is foreign exchange and \$286,300 is local cost. AID is being requested to provide loan funds for \$244,400 of the foreign exchange costs.

3. QUININDE Rural Electric Cooperative

It is proposed to form a rural electric cooperative to serve the town of Quinindé and surrounding area. Although a cooperative has not yet been organized, enough exploratory work has been done to give strong indications that the people in the area would have the initiative and ability to organize and develop a cooperative.

The service area of this cooperative is located between Esmeraldas and Santo Domingo, an area expected to expand greatly during the next 10 years because of development of timber industries and the oil fields in northeastern Ecuador.

The only electric service at this time is in the town of Quinindé where a 22-year old 60-KW generator provides limited service over a 220-volt distribution system.

Preliminary studies and investigations have developed a plan for providing electric service to the towns of Quinindé, Malimpia, Puebloviejo, La Unión and La Concordia over 63 Km. of 13.2-KV lines supplied from one 160-KW diesel-electric generating plant to be built as soon as the cooperative is organized. The load projections indicate that another 100-KW generating unit will be required in 1974. A total of 6 Km. of 7.6/KV distribution lines will be constructed to serve 620 consumers by 1980 and 330 KVA in substation will be installed to allow its operation. A map of the area and details of the proposed construction are given in Annex IV, Exhibit 4.

The estimated cost of the electric facilities is \$294,100 of which \$163,200 is foreign exchange and \$130,900 is local costs. AID is being requested to provide \$125,500 of the foreign exchange costs.

4. TENA Rural Electric Cooperative

The formation of an electric cooperative is seen as the solution to providing electric service to an area in the Oriente which has much promise for economic development. There is the possibility of developing large oil reserves as well as the timber industry in the area. Electricity along with the planned road construction will give an impulse to agricultural production and commercial enterprises. The initial area for cooperative development includes the towns of Tena, Puerto Napo, Archidona and Cotundo. Approximately 1,000 consumers will be served in this area by 1980.

All the towns in the cooperative service area now have electric generating plants, but the plants are very small and in very poor operating conditions. The distribution systems operate at 110/220 volts, are in poor repair and

will need to be completely replaced. INECCEL now has under study a hydroelectric plant on the Misahualli River which, if found to be feasible, will be able to produce 500 KW. The first stage of 200 KW could provide power to the proposed cooperative system in 1973. In order to give immediate service to the area it is proposed to install an 85-KW diesel-electric generating plant at Tena and a 20-KW unit at Puerto Napo. These two units are now at the sites and will provide service until 1973 when power from the Misahualli hydroelectric plant is available. The immediate construction program for which AID loan funds are requested provides for the installation of 410 KVA in substation capacity, construction of 4 Km. of 7.6/13.2 KV distribution systems to serve a total of 400 consumers in 1971, a 13.2-KV line 44 Km. in length from Cotundo to Tena, Napo and Misahualli, and the installation of the first stage of 200 KW at the Misahualli hydroelectric plant. Additional 6 Km. of distribution lines for 660 new consumers will be constructed by 1980. A map of the area and details of the construction are given in Annex IV, Exhibit 5.

It is estimated that the proposed program of construction will cost \$303,800 of which \$558,400 is foreign exchange and \$145,400 are local costs. AID is being requested to provide loan funds for \$139,600 of the foreign exchange costs.

5. MACAS Rural Electric Cooperative.

The formation of a rural electric cooperative is proposed in the Upano Valley, a very promising area in the Oriente now undergoing a pilot colonization program financed by the IDB. It is expected that this colonization program will bring some 30,000 people into the area who will be potential members of the electric cooperative. Although basically an agricultural area, it is expected that industries such as sugar refineries, fruit canning, meat processing plants, saw mills and others will develop in the near future.

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The electrical installations at the present time are very inadequate and the installed capacity is insufficient to cover the existing demand. In the four main towns of Macas, Sucúa, Méndez and General Plaza there is a total installed capacity of 78 KW of which only one 20-KW and one 10-KW diesel-electric units are in a reasonably good operating condition. These units operate at 230 volts over distribution systems which have to be rebuilt in their entirety.

The proposed construction of electrical facilities can be resumed as follows: Addition of a 78-KW hydroelectric plant in Macas and construction of 4 Km. of 7.6/13.2 KV distribution lines in the main towns during 1970 to give immediate service to 350 consumers in this area; construction of a 4,000-KW hydroelectric plant in the site called Huambimini located between the towns of Sucúa and Huambi (the first two 500-KW stages will be completed in 1972 and 1974 respectively and will provide sufficient energy to meet the demand up to 1980); installation of 1460 KVA in substation to allow operation of distribution line at 13.2 KV; construction of 100 Km. of 13.2-KV transmission lines to interconnect the towns of General Proaño, Macas, and Sucúa in the north, and Huambi, Logroño, Méndez and General Plaza in the south and to provide service to cooperative members along the roads; 7.6/13.2 KV distribution lines for 300 additional consumers in 1972 and for 2,280 new consumers up to 1980 will be constructed in a total length of 25 Km. A map of the area and details of the proposed development are given in Annex IV, Exhibit 6.

This project has an estimated total cost of \$1,346,300 of which \$638,200 are for local costs and \$708,00 are for foreign exchange portion.

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ELECTRIC COMPANIES1. SANTA ELENA Electric Company

This company provides service in the counties of Salinas and Santa Elena, the major towns being Salinas, Santa Elena, La Libertad, Ballenita, Punta Carnero and Anconcito. The system is served from a 3600-KW diesel-electric generating plant in the town of La Libertad. The present system demand is about 1800 KW but apartment buildings, new hotels and a fishery now under construction will increase the system demand by about 5000 KW. The service area includes tourist resorts, fisheries and canning factories, as well as other commercial and industrial developments.

The proposed expansion will provide electric service to the northern area of the Santa Elena Peninsula through the construction of a 2400-KW power plant at Colonche, installation of 3,000 KVA in substation capacity, and the building of 46 Km. of 13.2-KV transmission lines from that plant to Palmar and then north to Ayangué, San Pedro and Manglaralto and south from Palmar to Monteverde, San Pablo and Punta Blanca. Immediate plans call for the construction of 44 Kms. of 7.6/132 KV distribution lines for 2380 consumers until 1973, and for 2040 new consumers until 1980. Headquarters of several governmental institutions for the development of the area such as INERHI (Instituto Ecuatoriano de Recursos Hidráulicos), which is in charge of irrigation programs, are established in the town of Colonche. This is an area of good agriculture and livestock potential. New tourist and industrial developments and housing projects are planned for immediate construction. A map of the area and details of the proposed construction are given in Annex IV, Exhibit 7.

It is estimated that the cost of the facilities proposed for the 1970-80 expansion in the Santa Elena area will be \$1,050,700 of which \$281,700 will be local costs and \$769,000 will be foreign exchange. AID is being requested to finance \$392,100 of the foreign exchange costs.

2. ESMERALDAS Electric Company

This company is located in the city of Esmeraldas, on the northwest coast of Ecuador, and provides service to over 3,000 consumers mainly in the urban area. The installed capacity of the system is 2820 KW which is expected to be sufficient to cover the demand up to 1972 when new distribution systems for 2,000 consumers will be in operation. Installation of a 4,000-KVA step-up substation, purchased with EXIMBANK funds, will be effected in 1970 and the purchase and installation of an additional substation of 1,500 KVA will be made in 1973.

Between 1971-73, the power plant in Esmeraldas will be expanded by 2,400 KW to provide electric service to 2000 consumers in the rural areas of Esmeraldas. The towns of Atacames and Súa, and the other small villages located along the Esmeraldas-Atacames road such as Campo Alegre, Bocana and Castelnovo will be annexed to the system through a 13.2-KV transmission line if the power demand justifies it. Several small industries are also expected to be served from the system. From 1970 to 1980 a steady construction program of 90 Km. of 7.6/13.2 KV distribution lines for 9,000 new consumers will take place. Annex IV, Exhibit 8 includes a map of the area and the main details of the proposed construction program.

Total investment in facilities will amount to \$860,800 of which \$374,000 will be for local costs and \$486,800 for foreign exchange. AID is being requested to finance \$313,000 of the foreign exchange costs.

3. LOS RÍOS Electric Company

This company will be responsible for the execution of the Babahoyo sub-project which will provide service to the city of Babahoyo, capital of the Los Ríos province, and to the

towns of Juján, Barreiro, San Juan, Puebloviejo, Catarama and Ventanas. Presently, only Babahoyo is served from a 1360-KW diesel-electric plant. Of the generating units in the plant, only a 500-KW unit is still in good condition and will be part of the new program; the others will be retired from service as soon as new equipment is installed. Average demand was 1415 KW in 1969 and it is estimated an average yearly increase of 11.2 percent for the next 10 years. This estimate is based on the agricultural and industrial potential of the area, rich in tropical products such as banana, rice, coffee and cacao.

Under the proposed expansion program 2,000 KW will be installed in Babahoyo in 1970, 1,000 KW in 1973 and 1,000 KW in 1976 under suppliers' credit, 80 Km. of transmission lines will be built, including 34 Km. of 69-KV line from Babahoyo to Puebloviejo, and a total of 46 Km. of 13.2-KV lines from Babahoyo to Barreiro and Juján and from Puebloviejo to Ventanas, Catarama and San Juan. The program also contemplates the construction of 80 Km. of 7.6/13.2 KV distribution lines for 8,000 consumers and a total of 8,000 KVA in substation to serve off the 69-KV and 13.2-KV lines. A map of the area and construction details are given in Annex IV, Exhibit 9.

The estimated cost of these facilities is \$2,069,000 of which \$1,500,000 are for local costs and \$1,506,000 for foreign exchange; AID is being requested to finance \$320,700 of the foreign exchange costs.

MILAGRO Electric Company

This is a newly established electric utility with headquarters in the town of Milagro. It will acquire the existing facilities and provide reliable service. Most of its physical installations are old and obsolete, and will be removed under the present program. The system is served from a 1412-KW diesel-electric plant located in Milagro and from three small units

located in the towns of Yaguachi and Naranjito, for a total system capacity of 1782 KW. The present demand is 1500 KW, but it is expected that large industrial loads will be added as soon as the new equipment is in service. The two largest sugar mills in the country, namely Valdéz and San Carlos, are among these.

Under the proposed development, three 1,000-KW diesel-electric generating units will be installed in 1971 and one 1,500-KW unit in 1976 under suppliers' credit. The system will be expanded through the construction of 27 Km. of 13.2-KV transmission lines which will be built from Milagro eastward to Mariscal Sucre and Naranjito, and westward to Chobo and Yaguachi. A total of 30 Km. of 7.6/13.2 KV distribution lines for 3,000 new consumers will be ready in 1971 and construction of 60 Km. for 6,300 additional consumers is planned for the period 1971-1980. 6400 KVA in substation will be installed to allow operation of the distribution lines at 13.2 KV. This area is most suitable for tropical products and farming, and for the establishment of rice and coffee mills. A map of the area and details of the proposed development is shown in Annex IV, Exhibit 10.

Investments for the complete 10-year project will amount to \$1,825,100 of which \$424,700 are estimated for local expenditures and \$1,400,400 for foreign exchange. AID is being requested to finance \$177,200 of the foreign exchange costs. Disbursements during 1970-73 are expected to reach \$1,187,700.

5. CUENCA Electric Company

The construction program under this project will be devoted primarily to serving the rural area of the city of Cuenca, by providing electric service to several small towns such as Saymirín and Sayausí in the north and Baños, Tarqui, Portete, Cumbe and Girón in the south. These towns have good agricultural and industrial potential and are the center of the tourist activity in the area.

The electric service in most of these towns is unreliable and the old distribution systems are due for immediate replacement. In Girón, one 40-KW diesel-electric unit installed in 1964 with PL-480 proceeds is in operation and a new 75-KW unit will be installed in 1970 with SDAA funds; Sayausí is presently served through a 2.3-KV line which is becoming operationally impracticable due to the establishment of new consumers in the area with the consequent power demand increase. Only 3 Km. of 6.3 KV transmission line are already constructed from Cuenca to Baños having to be extended in 5 Km. to connect Baños to the new system.

The main elements of this development are the construction of 40 Km. of a 22-KV bus-ring surrounding Cuenca and reaching as far as the town of Girón, the installation of 475 KW in Cuenca to supply power to the system, its expansion through the construction of 18.9 Km. of 6.3 KV transmission line to reach all the above named towns, the installation of several small substations for a total capacity of 1,200 KVA, and the construction of a total of 9 Km. of 7.6/13.2 KV distribution lines to serve 250 consumers in 1972 and 700 additional ones by 1980. A map of the area and details of the construction program are given in Annex IV, Exhibit 11.

The proposed program will cost \$394,800 of which \$138,900 is for local costs and \$255,900 is for foreign exchange. AID is being requested to provide loan funds in the amount of \$246,600 of the foreign exchange costs.

6. EL ORO Electric Company

The construction of the Santa Rosa-Zaruma sub-project will be under the auspices of the El Oro Electric Company, an electric utility established in 1964. The main objective of this development is to interconnect several towns of this area with a 34.5 KV transmission line. Presently, the city of Machala is served from an APD vessel of 4,500 KW

capacity anchored at Puerto Bolívar; a 34.5-KV line extends from Machala to Pasaje and Santa Rosa to provide these towns with electric service. Isolated from this main system, the towns of Piedras, Piñas and Zaruma with a total population of about 20,000 are served from very old hydro and diesel-electric plants over inadequate distribution systems. These plants also serve a gold and silver mining operation located near the town Zaruma which will also be benefited with this new development.

The proposed expansion program includes the construction of 60 Km. of 34.5-KV transmission line from Santa Rosa to Zaruma, the installation of one 1,100-KVA substation at 34.5/13.2 in Piñas and one 4,000-KVA substation at 34.5/13.2 in Zaruma, and the construction of 24 Km. of 7.6/13.2 KV distribution lines in Piñas and Zaruma to serve 2,450 consumers in 1972. From 1973 to 1980 a steady construction program of 35 Km. of distribution lines for 3,500 new consumers will take place. This construction program is justified by the proposed installation of a 6,000-KW plant in Machala in 1971.

Annex IV, Exhibit 12 includes a map of the area and details of the proposed construction program.

Investments for the period 1970-80 amount to \$689,300 of which \$291,400 are for local costs and \$397,900 for foreign exchange. AID is being requested to finance \$191,500 of the foreign exchange costs.

TECHNICAL ASSISTANCE AND TRAINING

Since one of the primary functions of this loan is the cooperative movement and because INECEL has had limited experience in this field, it is felt necessary that technical assistance be provided under the loan. INECEL has demonstrated that it has engineering capability to perform the design and engineering supervision

of the sub-projects. In the field of electric cooperative development and organization, INECEL is deficient. In carrying out the electric cooperative aspect of this loan, INECEL's efforts will be concerned with the problems arising from an expanded cooperative program such as organization, administration and operation of rural electric cooperatives, construction, power use advice, consumer charges and member relations. Loan funds in the amount of \$108,700 are being provided to finance a program of technical assistance to INECEL.

It is expected that the technical assistance will consist of: (1) the use of qualified technicians from the United States or other Latin American countries during the initial phase of the organization and development of the cooperatives. This assistance will call for full-time or short-term specialists, as needed, who will assist INECEL in the training of managers and directors, and in such subjects as accounting, member relations and power use; (2) the training, in the United States or other Latin American countries which have successful cooperatives, of technicians of INECEL's cooperative staff or persons associated with the electric cooperatives, in the various aspects of electric cooperative management and operation; and (3) the purchase of the necessary radio communication equipment, tools and vehicles required for the proper operation of the cooperatives associated with INECEL. AID funds in the amount of \$30,000 will be used for this purpose.

INECEL has agreed that it will establish a section to be responsible for the promotion, organization and administration of the electric cooperatives. It is not expected that more than two or three persons will be required to staff this office since the entire staff of INECEL will be available for detail assignments; nevertheless, evidence will be submitted by INECEL that such staffing will be done, and a program for implementing the cooperative portion of the loan will be approved by USAID/Ecuador prior to disbursement of loan funds.

B. Engineering Analysis

1. Studies

A continuing activity of INECEL is the coordinating and carrying out of programs of electrification in Ecuador. This began with the overall plan for development of Ecuador made by the National Planning Board for which the electric energy section was completed in 1963. Since that time the electric energy section has been revised and updated, the latest revision being that of August, 1969 for the period 1969-85. The request for AID loan funds is based on the regional studies which INECEL made for the latest 15-year program. In these areas of Ecuador electric service is available in degrees varying from almost non-existent to satisfactory. These studies evaluate the ability of the existing entities to adequately serve the areas, the projection of demands for electricity and plans for the installation of generation, transmission and distribution capacity to meet those demands. The areas being considered in this loan are those which all sectors concerned with the economic development of Ecuador believe to be of most importance at this time. A review of the studies made by INECEL for each of the sub-projects shows that there has been enough engineering, cost and financial projections done to indicate that the projects are feasible, that they are well prepared and the plan of expansion in each case is based on reliable information which results in a well developed program of expansion tailored to each sub-project. AID is being requested to provide loan assistance for most of the foreign exchange costs of the 1970-73 part of the next 10-year program of expansion.

2. Engineering Services

INECEL has a well-qualified engineering staff and is capable of performing the engineering services for the sub-projects. INECEL has demonstrated its ability to perform these types of services on previous AID and EXIMBANK financed projects.

The sub-projects in this loan are supported by feasibility studies prepared as a part of the long-range plan for the development of Ecuador. Detail plans have not been prepared although sufficient engineering has been done to allow satisfactory cost estimates to be developed and to indicate the feasibility of the proposed expansion program. The nature of this type of programming is such that it is not practical to develop final detailed designs until immediately preceding the execution of each sub-project. A provision of the loan agreement will require INECEL to submit final plans and specifications including updated feasibility studies, plan of financing and plan for construction to AID for approval prior to initiation of action involving AID funds.

3. Organization of New Electric Cooperatives

INECEL will be responsible for the organization of the new cooperatives proposed as sub-projects. INECEL will utilize, when necessary, the technical assistance of U. S. or Latin American Consultants in this field. Inasmuch as no work has been done towards organizing any of the new cooperative entities it is reasonable to expect that at least one year will be required to organize the cooperatives and that definite action toward construction on those systems will not be started until early 1972. However, because of the small size of each of the systems of the new cooperatives, the construction should be completed without difficulty within the time limit of the loan. In addition to the organization of the new cooperatives, INECEL will also provide technical assistance to these cooperatives.

4. Construction of Sub-projects

Construction of the major lines, substations and generation plants will be done by contracts. This has been the practice of INECEL and has proven satisfactory. Because of the small

size of the sub-projects, only local contractors will be interested in bidding. INECEL has followed the practice of advertising for bid proposals and has found this to be satisfactory. Since 1960, several local engineering companies have developed and improved their capabilities in the construction of power houses, transmission and distribution lines, installation of generating units, and also in the construction of power plants. Most of these contracting companies started with small capital and personnel, and have expanded sufficiently to be able to carry on INECEL's electrification programs in Ecuador.

The larger systems have small construction and maintenance crews that are capable of constructing short extensions and making service connections.

It is expected that as soon as final plans for each sub-project are completed, construction will be started soon thereafter.

5. Materials

Poles, crossarms and minor items of hardware such as crossarm braces, bolts, washers, etc., are available locally. During the last six years INECEL has developed standards for concrete poles that allow competitive bidding by local manufacturers. Locally manufactured hardware items have also been found to be satisfactory.

The balance of the materials and equipment such as conductors, transformers, meters, major hardware items, substation and power plant equipment must be obtained outside of Ecuador. INECEL has improved its procurement procedures so that the causes of many of the delays noted in previous projects have been corrected.

As has been the case in other electric cooperative projects in Latin America, there is the possibility of purchasing rebuilt 3-KVA and 5-KVA distribution transformers from rural electric cooperative sources in the United States at substantial savings. These sizes of rebuilt transformers are no longer used on the rural systems of U. S. electric cooperatives but after complete rebuilding to equivalent to new transformers, can be used to advantage on the Latin American systems. In addition to the utilization of rebuilt transformers in the smaller sizes, there is also the possibility of the electric cooperatives receiving donations of outgrown materials from electric cooperatives in the U. S., as has already been done on the Santo Domingo and Daule electric cooperatives.

6. Construction Standards

Line construction standards were developed as a part of previous AID loan projects. The standards were adopted from those of the Rural Electrification Administration of the U. S. Department of Agriculture. With the use of these standards the lines will be built according to utility practice in the U. S.

INECEL has also developed standards for substations and small generating plants. These standards, which meet utility practice in the U. S., have been used by INECEL in its construction work throughout Ecuador. The electric line standards and standards for substations and small generating plants have been reviewed by AID and have been found to be satisfactory.

7. Technical Feasibility

Each of the sub-projects has been planned to increase the capacity of existing systems or to replace inefficient units

by consolidating service areas to form one viable system. Thus, reliable electric service is provided to an area from an efficient central generating station over well designed distribution lines. Annex IV, Exhibits 13 through 15 show the System Requirements, Power and Energy Sources for three sample projects named Esmeraldas Electric Company, Santo Domingo Rural Electric Cooperative and Macas Rural Electric Cooperative. The first two are established enterprises and the third one is a proposed pilot project in eastern Ecuador. The load projections have been based on previous statistics, and in the case of new developments where statistical information has been insufficient, the load and demand projections have been based on economic studies and historical data of growth in similar areas. Costs of generating power and costs for materials and construction have been obtained from operating data of existing facilities and from recent construction and material procurement contracts. On the basis of the preliminary design and the resulting financial projections, the sub-projects appear to be well planned and no difficulty should be encountered in developing final design data for feasible sub-project.

8. Financial Projections

The financial projections for the period 1970-80 have been made using experience to date on the existing enterprises, or in the case where there has been no experience, applying information and data from comparable operations. Revenues are based on the average retail rates now in effect or that will be placed into effect on each system. Cost of power has been estimated by using costs now being incurred on systems using power plants of similar characteristics to those in the system being considered. Proper consideration has been given to administration costs and to operation and maintenance costs of the electric facilities. The financial projections made at this time will be revised as each sub-project is brought to final design and at

that time the economic feasibility can be definitely established. Statement of Operations and Cash Flow charts with projections until 1980, for the Esmeraldas, Santo Domingo and Macas sub-projects, are shown under Annex VII, Exhibits 13 through 18.

9. Retail Rates

Retail rates for electric service in Ecuador are established by each operating entity. Each rate schedule is developed to provide revenue sufficient to meet operating costs and debt service and at the same time provide a retail rate in keeping with the economic ability of the area to pay such rates. The retail rate schedules of each operating entity is subject to the approval of the Ministry of Industries and Commerce. INECEL, according to Article 4 of the Electrification Law, reviews for the Ministry of Industries and Commerce the retail rate schedules submitted by the operating entities and makes recommendations to the Ministry supporting or not supporting the proposed rate schedule. The Ministry, on the basis of INECEL's recommendation, will either approve or disapprove the proposed rate schedule.

INECEL has a Rate Section which can assist the operating entities in the preparation of rate schedules. It is to be expected that the retail rate schedules for the operating entities in which INECEL has a direct responsibility will be developed to provide adequate revenues without discouraging use of electricity. When INECEL presents the final design and supporting financial projections as a part of the feasibility study of a sub-project, USAID/Ecuador will consider the applicability of the retail rate schedule. Annex IV, Exhibit 16 gives a tabulation of average retail rates.

10. Technical Assistance and Training

INECEL lacks proficiency in the organization and development of electric cooperatives. Accordingly, INECEL proposes to establish a section which will be devoted to the electric cooperative program. The cooperative section of INECEL will not be large since engineering, accounting and adminis-

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trative services can be made available from already functioning sections of INECEL.

Assistance in developing the electric cooperative section will be given by consultants who are specialists in the electric cooperative program and have special knowledge of the organization and development of electric cooperatives. As needed, short term specialists can be called upon to provide assistance in specific areas such as training of directors and managers, development of member relations and power use programs, and assistance in accounting practices.

INECEL has recognized the need for foreign consultant advice and has agreed to utilize the services of consultants from the U. S. or other Latin American countries who have the necessary experience in the promotion of electric cooperatives. From past experience, INECEL will insist that any consultant for this assistance must have a working knowledge of Spanish. A most important factor in developing the abilities of those involved in the electric cooperative program in Ecuador is training in the U. S. or other Latin American countries in the various aspects of electric cooperative management and operation.

Provisions are also being made to assist INECEL in the purchase of radio communication equipment, tools and vehicles for the operation of the several rural electric cooperatives.

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SECTION V

ECONOMIC JUSTIFICATION

A. Place of Project in Ecuador's Development

Ecuador has one of the lowest standards of electrification in Latin America. Until the early 1960's, when INECEL was founded, electrification programs lacked any overall planning and the relatively small amounts of capital which were devoted to electrification were inefficiently used. Even though large improvements have been made in the electrification sector since 1961, the installed capacity and produced energy per inhabitant is still very low. As of December 1968, the installed capacity was somewhat higher than 250,000 KW and the generation per capita was approximately 120 kwh/inhabitant/year. Annex V, Exhibit 1 shows in detail the installed capacity and generation per capita in Ecuador.

Compared to other Latin American countries, Ecuador occupies one of the lowest places in the generation of electric energy per inhabitant, as shown in the following table:

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PER-CAPITA ELECTRICITY GENERATION IN 24 LATIN AMERICAN
COUNTRIES

COUNTRY	1958		1962 ^{2/}		1968	
	Kwh/inh/yr.	Rank	Kwh/inh/yr.	Rank	Kwh/inh/yr.	Rank
Argentina	471	5	558	3	717	6
Bolivia	113	16	121	14	135	19
Brazil	299	9	361	7	410	12
Chile	509	1	625	2	769	5
Colombia	209	14	284	9	356	14
ECUADOR	78	20	96	16	124	20
Paraguay	49	22	54	18	92	23
Perú	210	13	273	10	388	13
Uruguay	509	3	546	4	688	7
Venezuela	555	2	738	1	984	3
Costa Rica	328	8	383	6	476	10
Cuba	397	7	456	5	543	8
El Salvador	91	19	111	15	156	18
Guatemala	62	21	82	17	116	21
Haití	23	24	23	20	24	24
Honduras	44	23	51	19	74	22
México	268	11	336	8	458	11
Nicaragua	109	17	135	12	213	16
Panamá ^{1/} República	459	6	263	11 ^{3/}	930	4
Dominicana	100	18	135	13	187	17
Guayana	130	15	4/	-	4/	15
Jamaica	274	10	4/	-	538	9
Suriname	237	12	4/	-	1,176	1
Trinidad-Tobago	481	7	4/	-	1,048	2
LATIN AMERICA	295		280 ^{2/}		451	

SOURCE: Economic Commission for Latin America (CEPAL)

^{1/} Includes the Canal Zone

^{2/} Does not include Guayana, Jamaica, Surinam and Trinidad-Tobago

^{3/} Does not include the Canal Zone

^{4/} Data not available

Electricity for the major urban areas is being provided by reliable power companies and the demand growth of energy will be taken care of through larger programs such as Pisayambo and Paute, which will be developed in the future. Little has been done for rural areas and for smaller urban centers adjacent to these urban areas. Thus, this loan is designed to fill an important gap by providing better service to rural areas and small towns, and also by increasing their productive potential. A significant income-distribution effect will take place as it becomes possible for some processing operations such as banana packing, fruit and fish canning, fish meal manufacturing, etc., to be carried on closely to commodity sources. Income derived from value added during processing will thus accrue to rural areas rather than to the few large urban areas where industry is presently concentrated. Many of the activities that could be initiated or expanded with rural electrification will have a favorable balance-of-payments and employment impact.

B. Contribution of Project to the Agricultural Development and to Other Productive Sectors of the Economy.

The lack of rural electrification has slowed the socio-economic development of the country and has tended to limit agricultural production and promote the migration of people to larger cities. Areas with good economic potential in agriculture and suitable for the establishment of agriculture-related small industries have not been exploited to the maximum due to the lack of electricity. The major efforts made to date in rural electrification have been successful, as described in Section III. A., but a further move is necessary to meet present needs and to enable Ecuador to take advantage of the opportunities for agricultural and industrial development in rural areas which can result, over time, in the establishment of a significant reliable source of demand for large-scale hydroelectric projects to be initiated in the near future.

The possibility does exist in having the Comisión de Valores making loans to INECEL for local costs of some of the sub-

projects mentioned in this document. This will have a double effect, that of easing the budgetary position of INECEL and of assuring that adequate amounts of electric power will be available for industrial projects for which the Comisión de Valores has made loans.

C. GOE Debt Service Capacity

As the GOE's fully responsible for repayment of this loan, and for MOV, its debt service capacity is analyzed in this section. Ecuador's debt-service/commodity-export ratio has averaged only 10.3 percent during the period 1965-1969, as indicated by the data in the following table:

<u>Year</u>	<u>Debt Servicing</u>		<u>Total</u>	<u>Commodity Exports</u>	<u>Debt Service</u>
	<u>Amortization</u>	<u>Interest</u>			<u>as a % of</u>
					<u>Commod. Exps.</u>
1965	10.0	4.6	14.6	180.7	8.1
1966	10.8	5.3	16.1	186.5	8.6
1967	11.7	6.0	17.7	200.4	8.8
1968	16.8	7.4	24.2	210.7	11.5
1969 (e)	18.6	8.0	26.6	188.1	14.1

(e) Estimate

Source: Banco Central del Ecuador, Memorias Anuales and unpublished data.

The rise in this ratio in 1968 was attributable primarily to an increase in amortization payments by both government and non-government entities, but the 1969 rise--to 14.1 percent--is a reflection primarily of a fall in export earnings. Exports are expected to continue to be sluggish through 1972, after which they should rise substantially as a result of petroleum exports beginning in 1973.

Meanwhile, the burden of debt-servicing in the near future seems

to be quite modest, as shown by the following table which estimates debt-servicing requirements on the public debt outstanding as of December 31, 1968.

Public Debt Servicing, 1969-1979^{1/}
(millions of dollars)

<u>Year</u>	<u>Interest</u>	<u>Amortization</u>	<u>Total</u>
1969	8.0	17.0	25.0
1970	8.2	18.9	27.1
1971	8.0	21.6	29.6
1972	7.1	20.5	27.6
1973	6.4	20.8	27.2
1974	5.5	19.8	25.3
1975	4.8	18.2	23.0
1976	4.2	16.4	20.6
1977	3.5	16.1	19.6
1978	2.9	10.9	13.8

^{1/} Interest and amortization on foreign public debt outstanding (including undisbursed loans) as of December 31, 1968. Repayment terms for loans totalling \$6.4 million are not available.

Source: IMF, Ecuador - 1969 Article XIV Consultation (February 4, 1970), Part II, Table 34, p. 62. (Based on data from the IBRD and the Banco Central del Ecuador).

The contracting of new loans, of course, will add to debt-servicing requirements, but if Ecuador places primary reliance on borrowing from official rather than private sources, the additions to debt servicing should be quite modest in the medium run because of the favorable grace periods offered by official lenders.

As a result of improved export performance after 1973, and if only modest additions are made to debt servicing, the debt-service/commodity-export ratio, after a slight increase in 1971

and 1972, should fall to about 10.5 percent in 1974:

<u>Year</u>	<u>Total Debt Servicing</u>	<u>Commodity Exports</u>	<u>Debt Service as of % of Commod. Exps.</u>
1970	29.0	210.0	13.8
1971	32.0	205.0	15.6
1972	32.0	205.0	15.6
1973	33.0	250.0	13.2
1974	33.0	315.0	10.5

Source: USAID estimates

Ecuador has traditionally had a good record for meeting its loan repayment obligations and no special problems with the dollar repayment of the proposed loan are anticipated.

D. Balance of Payments

Indirectly, the loan will promote the objective of balance-of-payments improvement by making possible productivity increases in certain relevant agricultural and industrial activities for which little or no electric energy is now available. The medium and long-range benefits will increase, after effects of introducing electricity to agricultural areas are felt.

The loan can be expected to have a significant impact on the income distribution of the country as more people take advantage of the benefits derived from having electricity available, accruing to the newly developed areas in terms of increasing production and diversification of crops. For instance, the quality of cocoa should be greatly improved by better fermentation and drying methods. For the drying of cocoa it is necessary to have a source of power at a reasonable cost. With the availability of electricity

the hulling of corn and feed mixing will be possible at the farm or neighborhood level, making the feed for livestock much lower in cost.

E. Impact on U. S. Economy

As most of the equipment and materials which will be purchased under this loan are expected to be of U. S. source and origin, it is the Mission's belief that the loan will have a favorable impact on the U. S. economy. The installation of U. S. equipment will make necessary the purchase of related spare parts, etc., from the suppliers and will create new markets for other electrical equipment and related appliances as well, thus having a favorable impact on the U. S. economy.

SECTION VI

SOCIAL IMPLICATIONSA. Rural Development Programs of AID in Ecuador.

The planned expansion of the two existing electrification cooperatives and the creation of three additional cooperatives in other rural areas of the country is a part of the overall program of USAID and the GOE for the development of rural Ecuador.

Among the on-going rural development programs in the areas to be served by the cooperatives are the following:

1. Road Construction.

Population movements near Santo Domingo de los Colorados have illustrated the close relationship between new transportation facilities and electric power development. As the roads to Esmeraldas, Chone and Quevedo were finished new settlers moving into the adjacent areas clustered along the highways and in several cases small communities sprang up almost overnight. These developments led to the successful extension of the Santo Domingo power lines 160 Kms. along these three highways. Similar population movements are expected in relation to the projected improvement of the road from Ambato in the sierra to the area of Tena and on to the oil fields and also along the road underway from Guenca to the area of Sucúa and Macas.

2. Colonization.

Complementary to the development of highways is the participation of USAID and GOE agencies in the stimulation of colonization projects. While the USAID does not contemplate any major planned colonization effort in the near

future, it is working with CREA and Peace Corps in the Upano Valley in the formation of settlers' cooperatives, and also with Federation of Shuara indians in their efforts to stabilize land patterns and to prepare the indians for more effective participation in encroaching civilization. As these colonization projects develop it becomes more and more essential to have necessary support services available. These services such as government land offices, technical assistance personnel, banks, agricultural inputs, consumer goods outlets etc. will remain for sometime along the major roads and in the developing population centers where their effectiveness will be facilitated by the availability of electric power.

3. Other Cooperative Activity.

In each of the areas contemplated for rural electrification cooperative development under this loan other kinds of cooperative activity have been carried out.

The National Federation of Credit Coops (FEGOAC) with advisory support by CUNA International has member cooperatives in each area and provides supervision for more effective extension of credit increasingly concentrating on loans for production purposes.

All areas have agricultural cooperatives, many obtaining credit from the National Development Bank (BNF) and Cooperative Bank. These cooperatives are involved in provision of farm supplies at reasonable cost, assistance in crop production and marketing.

In the Daule area several of the existing coops are part of the rice cooperative program supervised by the CLUSA/AID contract.

The existence of these organizations to a degree insures a better market for cooperative electric power but primarily provides some background in cooperative structure for potential members of the new organizations.

4. Proposed Loans.

The areas to be served by electrification cooperatives under this loan will also receive benefits from other USAID Loans. The proposed loan for agricultural production and diversification provides major assistance for crop programs in the Santo Domingo and Daule areas. The proposed Land Sale Guarantee loan will concentrate in an area including the Daule rice basin. Both of these loan programs will receive indirect but significant support from more readily available electric power.

B. Rural Electrification Cooperatives and Social Change

1. Electric Power and Social Change.

Access to electric power in rural areas contributes in many ways to accelerate the process of social change and modernization. While perhaps not by itself a determining factor and difficult to measure and evaluate, there is an undeniable linkage between electric power and change. Several areas of human activity can be identified as most susceptible to these influences:

- a) Available electric power can provide elements that increase the comfort and enjoyment of rural life, and significantly eliminate some of the most obvious disadvantages of country living. As the differences between the standards of living of rural and urban areas are minimized, so are some of the problems caused by migration to urban areas. The drain of valuable human resources away from the rural areas is lessened and the problems of unemployment, overcrowded housing, crime, etc. in the cities are less serious.
- b) Electric power in small towns and rural areas provides constructive alternatives and opportunities in the area of cultural development and education. Improved

illumination facilitates studying, carrying out of evening adult literacy programs and other educational activities. It should not be overlooked that in the equatorial latitudes with darkness always falling before 7:00 p.m., evening illumination is a year around problem.

- c) Rural electrification accelerates the upward spiral of increased aspirations and consumption as the campesino brings into his home the iron, refrigerator, TV set and as the family goes to the movies, beauty parlor and other newly available services.
- d) Electrical power has a significant impact on the extension of various professional services in the rural area. Doctors, dentists, lawyers and other essential skills for improved rural living can be more readily attracted from the cities as an improved standard of living is possible. In addition, electric power is essential for the specialized equipment necessary for adequate professional services.

In summary we can quote the conclusions on the social benefits of electrification described in the February 1970 evaluation of USAID rural electrification programs:

" Rural electrification, as experiences with it in more developed countries have shown, can, in the long run, have a substantial effect on the development of natural resources and the national economy. Its more immediate effect, however, is on human resources. This is tantamount to saying that the social benefits of electrification are more obvious in the early stages of an electrification program than are its economic benefits.

"(In the USAID evaluation)... one of the questions which the interviewer asked the occupants of the private residences in each of the three areas which he studied was the following:

"Has your life changed socially and culturally as a

consequence of the availability of electricity?" In Santo Domingo 70%, in Daule 75% and in Santa Elena 70% of the persons interviewed answered that electricity had indeed brought noticeable, important social and cultural conveniences to their lives.

"Answers to an inquiry about what electrical appliances the new users of electricity had acquired revealed rivalry for first place between radios and electric irons, with radios definitely winning. Most of the people who reported that their lives had changed socially and culturally as a consequence of the availability of electricity added a comment about listening to radio programs, thus indicating a basic interest in feeling themselves linked with the world beyond their neighborhoods.

"Some of the people in Daule and Santa Elena remarked proudly that they now had the same conveniences as those enjoyed by the people in Guayaquil".

2. Social Development Implications of Cooperative Electrification.

The provision of basic services such as potable water, transportation and electric power has been found to be so critical in the development of society that various kinds of controls are necessary to avoid problems which result from private administration of these functions. Cooperative electrification provides an excellent safeguard in that the generation and distribution of power is controlled by the consumers.

Electricity is a commodity uniquely suited for cooperative management. It can be used in the quantity desired or needed by anyone. Measurement, delivery, costs and other features are very specific and capable of and requiring careful management. While there are many complexities in electrification and a high level of professional competence is necessary to handle technical aspects, the commodity as generated, distributed and

used by members is simple and lends itself to management by cooperatives.

Being a commodity usable and almost immediately seen as essential by all, electricity lends itself to community action. It is valid to identify this product with total community needs. As such, electrification cooperative organization has the potential to become much more than a device to provide power; it can become a vehicle for the stimulation of community solidarity, a training ground for democracy through the necessary meetings, discussions, and decision making process. The cooperative can bring together the campesino, small towns people, and government representatives in a situation calling for close cooperation with results immediately visible from the joint efforts or failure to cooperate.

The experience in other countries has shown that electrification cooperatives have led to the formation of other types of community action such as ice plants, freezer installations, potable water, telephone service and street paving.

As an alternative to state owned power companies, cooperatives can minimize impersonal, bureaucratic structures and facilitate more rapid and effective service.

As an alternative to private power, the well conceived and managed cooperative provides better service at more reasonable rates.

The provision of electric power brings to a rural area a resource unique in its potential for changing community life. When power is provided through a proven social institution--the cooperative--this potential for change has the best chance to contribute to the formation of an increasingly responsive and responsible democratic society.

SECTION VII

FINANCIAL ANALYSISA. Financial Plan and Sub-Projects' Costs.

The plans of INECEL for developing these sub-projects have been based on a 10-year program of expansion. INECEL estimates the 10-year program will cost \$11,200,000 of which \$7,530,000 is foreign exchange cost and the balance of \$3,670,000 is local currency cost. The part of the 10-year program that will be completed in the period 1970-73 is estimated to cost \$8,451,800 of which \$5,673,800 is foreign exchange and \$2,778,000 is local costs; the AID loan assistance amounts to \$3,550,000 of the foreign exchange required during this three-year program. The local contribution of \$3,670,000 represents 31 percent of the total cost of the 10-year project. Calculations have been made based on INECEL's experience in construction, using normally accepted engineering costs. A provision of the loan agreement will require INECEL to give assurance of the availability of local currency to carry out the sub-projects as programmed. INECEL will have sub-loan agreements with each enterprise which are satisfactory to AID, including reasonable tariffs for the sales of power, provisions for bill collection, proper management, etc. A summary of the costs for the ten-year and three-year programs is given in Annex VII, Exhibit 1. Annex VII, Exhibits 2 through 12, give a summary of estimated costs for each sub-project.

B. Financial Analysis of INECEL.1. Financial Position

Financially, INECEL is a sound organization. Its base income comes mainly from taxes on the sale of electric energy and taxes on several other consumer items plus a government budget allotment. The tax on the sale of

energy amounts to S/0.05 per Kwh sold for industrial, commercial or domestic use. In 1968 INECEL received \$1,235,000 and \$1,321,000 in 1969 from the tax on the sale of energy. Fixed annual contributions are \$240,000 from taxes on consumer items and \$1,000,000 from taxes on imports; it also receives 20 percent of a "Reconstruction Tax" which amounts to about \$140,000 and a government budget allotment which varies from \$200,000 to \$450,000. INECEL also receives appropriations from the government which vary from year to year according to the project to be implemented. On May 6, 1970, Congress passed a Law No. 70-09, "National Fund for Electrification", to be used exclusively for the studies, financing and execution of projects related to generation and transmission of electric energy.

This Fund will originate from the following sources:

- a) A yearly contribution of \$1,100,000 from the National Budget for the Pisayambo Project.
- b) A yearly contribution starting in 1971 of 50 percent of the taxes from the mining exploitation with the exception of those coming from hydrocarbons.
- c) Fifty percent during 1973 and 1974, and 35 percent from then on, of the annual proceeds from transportation rights of oil from the northeastern region.

The National Fund for Electrification will be administered by INECEL .

The Comparative Balance sheets show the financial condition of INECEL for the past 4 years. See Annex VII, Exhibit 13, pages 1 thru 3.

INECEL is showing good growth in its financial operations each year. Net income from the last three years have been \$1,798,000 in 1969, \$1,889,000 in 1968 and \$1,169,000 in 1967. However, the major part of net income is due to

non-operating sources, specially taxes on consumer services and products earmarked for INECEL. Losses from operations have been incurred each year but they have been decreasing. This is normal considering that INECEL first realized income from operating sources in the mid 1960's.

INECEL's expansion program is dependent to a large extent on subsidies from the Government of Ecuador. The GOE has recognized the need for expansion in the electrification field and this can be seen from the anticipated large allotments of \$3,090,000 in 1970 and \$1,242,000 in 1971. Further allotments are anticipated to be received in INECEL during the following years.

INECEL as an institution responsible for the development of electric systems in Ecuador, provides technical assistance, generally free of charge, to electric companies and cooperatives. INECEL also makes feasibility studies for large hydroelectric projects financing large portions of the cost from its own resources. For example, INECEL budgeted \$235,190 for a feasibility study of the Paute Project, \$174,440 for Pichayambo and \$398,850 for Toachi, and budgeted others on a smaller scale. These are works of national scope and interest which are financed by subsidies received from the Government of Ecuador.

2. Analysis of Financial Statements.

INECEL's main source of income is derived from tax revenues which amounted to approximately 75 percent of the total income during each of the past 3 years. The financial analysis for the years 1967 through 1969 shows a noticeable improvement, and so does the projection through 1975. However, as stated previously, this is mainly due to increased tax revenues combined with a decrease in losses from operations.

Annex VII, Exhibit 14, contains the income statements

from 1967 to 1969. The financial projections for 1970 to 1975 are given in Annex VII, Exhibit 15, pages 1 and 2.

3. Financial Conclusions.

As it is predicted that INECEL's revenues in terms of net income will increase as shown in the cash flow statement of Annex VII, Exhibit 15, pages 1 and 2, it is felt by the Mission that, according to the information provided by INECEL, this institution has sufficient financial resources to carry out the proposed project and that loan repayment prospects are sound.

C. Financial Analysis of Sub-Projects.

INECEL prepared feasibility studies for each of the eleven proposed sub-projects. Three have been selected for analysis in this paper: Esmeraldas, Santo Domingo and Macas.

The Esmeraldas sub-project is representative of an established company, the Santo Domingo sub-project is representative of an established cooperative, and the Macas sub-project is representative of a new cooperative. Financial statements are shown in Annex VII, Exhibits 16 through 21.

The Esmeraldas Company was formed in March, 1963 with a subscribed capital of \$451,044 and has received an Eximbank Loan in the amount of \$670,000. This company is the most profitable of the three presented. It should show a profit beginning in 1971. Assuming the data presented by INECEL will be accurate, its debt servicing capacity is solid. Its cash flow and cash balance at the end of each year is adequate and starting 1975 its cash position starts showing a substantial increase each year thereafter. INECEL sub-loan terms to companies such as this are not as generous as those made to cooperatives. Loan terms will be twenty years, 5-1/2%, including a three-year grace period; however, the financial statements indicate that this will not be a handicap.

The Santo Domingo Electric Cooperative was formed in November, 1963 with a capital of \$44,536 paid in by members. It has received \$276,563 worth of equipment donated by U. S. rural electric cooperatives, an AID loan in the amount of \$650,000 and an INECCEL loan in the amount of \$100,000. Although it will probably not show a profit until 1975 its cash position will never be in danger and beginning in 1974 the year-end cash balance starts showing substantial increases each year. The sub-loan terms will be forty years, ten-year grace period, 2 percent interest during the grace period and 3 percent thereafter.

The Macas Electric Cooperative will be formed from capital contributed by member municipalities in the amount of \$88,000, \$394,000 contributed by INECCEL and \$119,460 from local members. The sub-loan terms will be the same as those for the Santo Domingo Cooperative. Historically, growth of new electric cooperatives is slow and the financial statements indicate that profitability will not occur until 1979; however, the cash position as projected appears to be adequate.

Operating revenues, the major source of income on the above three sub-projects, were calculated on the basis of MWH sales from demand projections based on economic studies and historical data of growth gathered from similar projects. Depreciation expense, a major item of operating costs, is based on the useful life of the asset installed. For example, diesel-electric units have a lifetime of 15 years while a hydroelectrical unit will have a useful life of 35 years. The Macas sub-project will have a hydroelectric installation and its depreciation expense is low in relation to the other sub-projects because of the longer useful life of the unit installed.

It is felt that the financial statements may be a little conservative. Past experience, in the Santa Elena and Santo Domingo areas, has shown that once electricity is made available the demand is much greater than anticipated.

D. Loan Administration.

The technical and social aspects of rural electrification projects proposed by INECECEL have been considered in detail and it is the Mission's belief that preferential terms with long amortization period should be granted.* Most rural electrification projects involve high initial investments particularly in the case of a formation of a new electric company or cooperative and they will not start showing net profits until after 5 to 7 years of operation.

Soft terms have been given in previous loans for electrification in Ecuador and also R.E.A normally gives 35 years amortization on principal, including a 5-year grace period, to rural electric cooperatives in the U. S. Furthermore, any concessionary terms that are given to INECECEL will have a direct effect in their financial operations and consequently in the electrification programs which they have undertaken.

Sub-loan terms for the cooperatives will be similar to those of AID to INECECEL while the sub-loan terms to the electric companies will be calculated at 20 years including a 3-year grace period on principal and a 6 percent interest rate.

According to the above it is recommended that the loan terms to INECECEL be of 40 years including a 10-year grace period with an interest rate of 2 percent per annum during the grace period and 3 percent per annum thereafter. All the financial projections and loan servicing studies for each of the sub-projects have been based on these terms.

*Since INECECEL is also assuming the role of an intermediate credit institution for this project the concessionary terms for the AID loan of 2% per annum during the grace period and 3% per annum thereafter is justified to permit a reasonable spread for changes by INECECEL to its borrowers. Also, because of the social implications of rural electrification cooperatives, as described previously, concessionary terms to INECECEL will be passed on to the cooperative enterprises being promoted under this loan in accordance with M.O. 1052.1

SECTION VIII

IMPLEMENTATION PLANA. Project Execution1. Sub-project Approval.

USAID has determined that INECEL is capable of analyzing the needs for electric generation and distribution facilities in an area and also of designing a new system or extensions to existing systems to supply the electrical needs of the area. Therefore, prior to disbursement of loan funds for any sub-project, INECEL will submit to USAID for approval updated economic and feasibility data for each sub-project. This data will include design specifications for equipment and material, construction plans and schedules, cost estimates and a 10-year financial analysis.

2. Project Construction.

INECEL will provide engineering, consulting and supervisory services for the construction of each sub-project. INECEL will be responsible for the procurement of equipment and materials and the construction contracts required for each sub-project, following procedures established by AID. Contracts for equipment and materials and construction of the facilities will be subject to USAID approval prior to execution.

3. Technical Assistance and Training.

INECEL will submit to USAID for approval a program for the promotion and organization of electric cooperatives. This submission will include the INECEL staffing plan, proposal for utilization of foreign specialists in this field and general plan and schedule for development of each new cooperative.

As need for training arises a program will be submitted to USAID for approval.

4. Reporting.

INECEL will submit quarterly reports of progress on all sub-projects in accordance with AID requirements.

5. USAID Monitoring Responsibilities.

The monitoring of the construction phase of the project will be carried out by the USAID Engineering Division with back-up by AID/W when required. The cooperative establishment phase will be monitored by the USAID Institutional Development Division, with back-up provided under the technical assistance from NRECA or any other Agency from Latin America.

6. Disbursement of Funds.

a) Target Dates.

It is anticipated that CP's will be met by December, 1970. Placement of orders should commence during the first quarter of 1971 and the first major disbursement near the end of C. Y. 1971. Terminal date for request of commitment documents will be June 30, 1973 and terminal disbursement date will be set for Dec. 31, 1973.

b) Disbursement Procedures.

As it is expected that most of the proceeds of the loan will be utilized for U. S. procurement, disbursement under the loan will be made under Letters of Commitment to be opened in a U.S. Bank chosen by INECEL. Since the CP's to the first disbursement will be the only conditions to make the loan funds available, only one or two Letters of Commitment will be issued subject to future amendments.

c) Procurement Procedures.

INECEL is familiar with AID procurement requirements. No problem is envisaged as to marking, source and origin, and shipping requirements, as the Letter of Credit requests will contain specific instructions to the U. S. suppliers.

B. Necessary Loan Conditions and Covenants.

1. INECEL must submit a program for AID approval, prior to disbursement of loan funds, for implementing the cooperative portion of this loan, including the establishment and staffing of a section in their organization responsible for the promotion, organization and administration of electric cooperatives. This will include the INECEL staffing plan, proposal for utilization of foreign specialists in this field and general plan and schedule for development of each new cooperative.
2. INECEL must submit final plans and specifications, including updated feasibility studies, plan of financing and plan for construction for each sub-project to AID for approval prior to initiation of action involving loan funds on the sub-project. The submission will include the applicable retail rate schedule.
3. INECEL must submit to AID for approval all contracts for equipment and material and construction of facilities prior to disbursement under those contracts.
4. INECEL must give adequate assurance to AID of the availability of local currency, foreign exchange, and necessary supplier's credit to carry out the sub-projects as programmed.
5. INECEL shall submit to AID and to the satisfaction of AID an audit of its operations.

SUMMARY OF CONSTRUCTION PROJECT REQUIREMENTS

Sub-Projects	Generation (KW)		Distribution Substation (KVA)	Transmission (KM)		Distribution Systems
	Diesel-Electric	Hydro-Electric		13.2 KV	Other	
<u>Cooperatives</u>						
1. Santo Domingo	3,000	--	5,700	--	100 (34.5 KV)	30 Km-3,000 consumers
2. Daule	1,850	--	2,350	68	--	35 Km-3,500 consumers
3. Quinindé	260	--	330	63	--	6 Km- 620 consumers
4. Tena	105	200	410	44	--	10 Km-1,060 consumers
5. Macas	78	1,000	1,450	100	--	29 Km-2,930 consumers
<u>Companies</u>						
1. Santa Elena	2,400	--	3,000	46	--	44 Km-4,420 consumers
2. Esmeraldas	2,400	--	5,500	--	--	90 Km-9,000 consumers
3. Los Ríos	3,000	--	9,200	46	34 (69 KV)	80 Km-8,000 consumers
4. Milagro	4,500	--	6,400	27	--	90 Km-9,300 consumers
5. Cuenca	550	--	1,220	--	40 (22 KV) 19 (6.3 KV)	9 Km- 950 consumers
6. El Oro	--	--	5,500	--	60 (34.5 KV)	59 Km-5,950 consumers
TOTAL	18,143	1,200	41,060	394	253	482 Km-48,730 consumers

UNCLASSIFIED

MAP OF ECUADOR

COLOMBIA

LARGE GENERATING PLANTS AND TRANSMISSION GRID

LEGEND

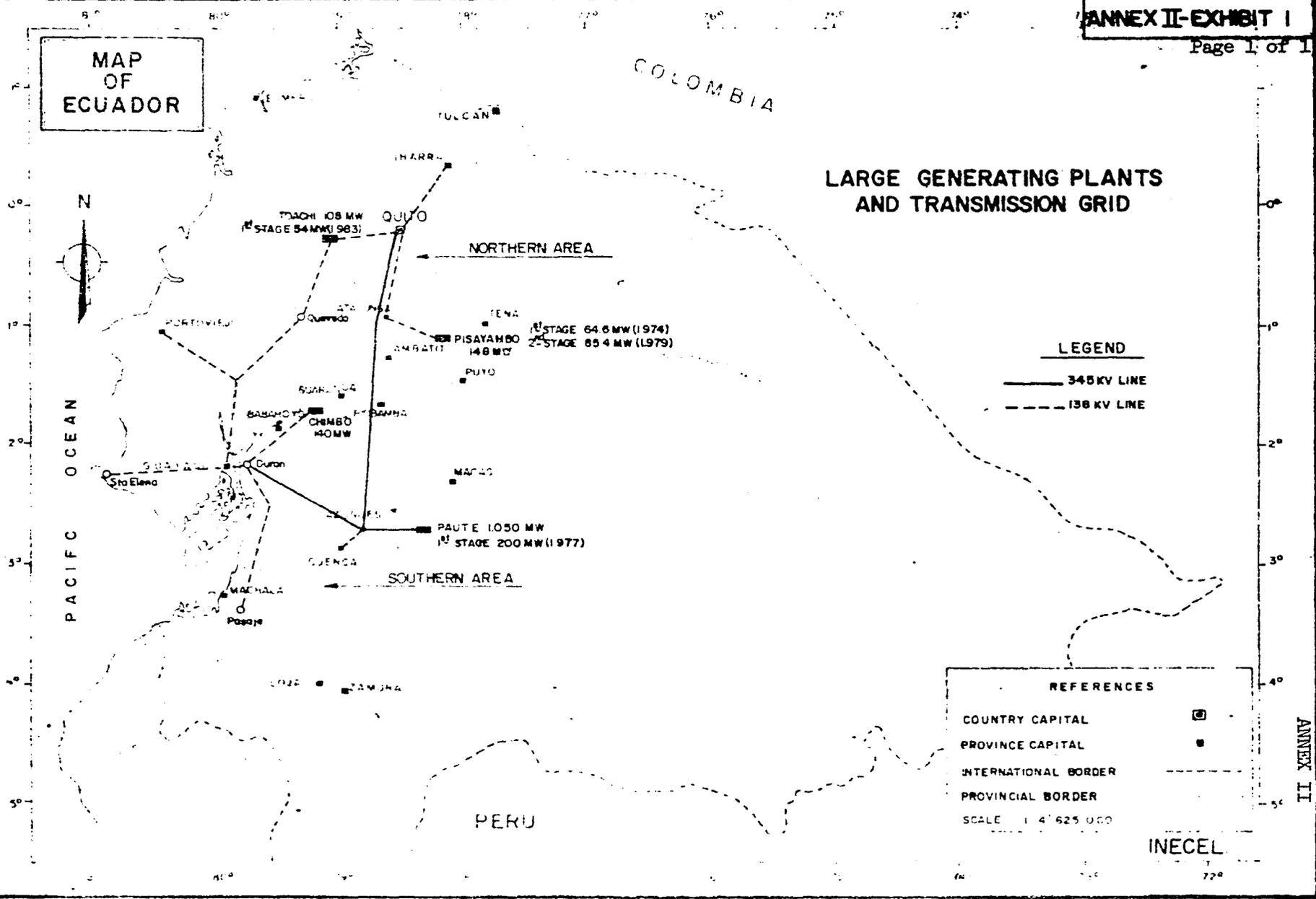
- 345 KV LINE
- - - 138 KV LINE

REFERENCES

- COUNTRY CAPITAL 
- PROVINCE CAPITAL 
- INTERNATIONAL BORDER 
- PROVINCIAL BORDER 
- SCALE 1:4'625'000

INECEL

770

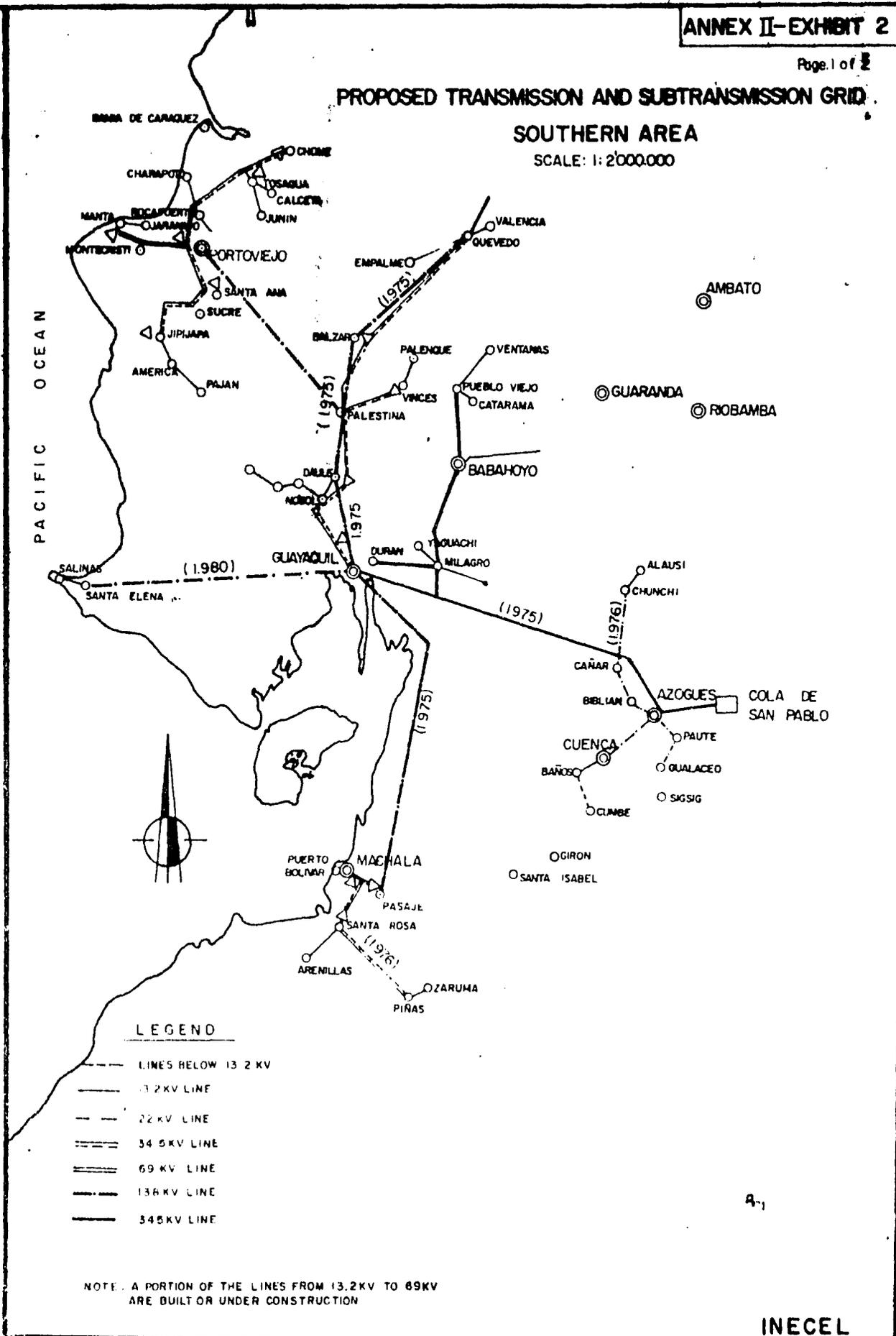


ATD-DIC/P-917
ANNEX II

PROPOSED TRANSMISSION AND SUBTRANSMISSION GRID

SOUTHERN AREA

SCALE: 1:2'000'000



PACIFIC OCEAN

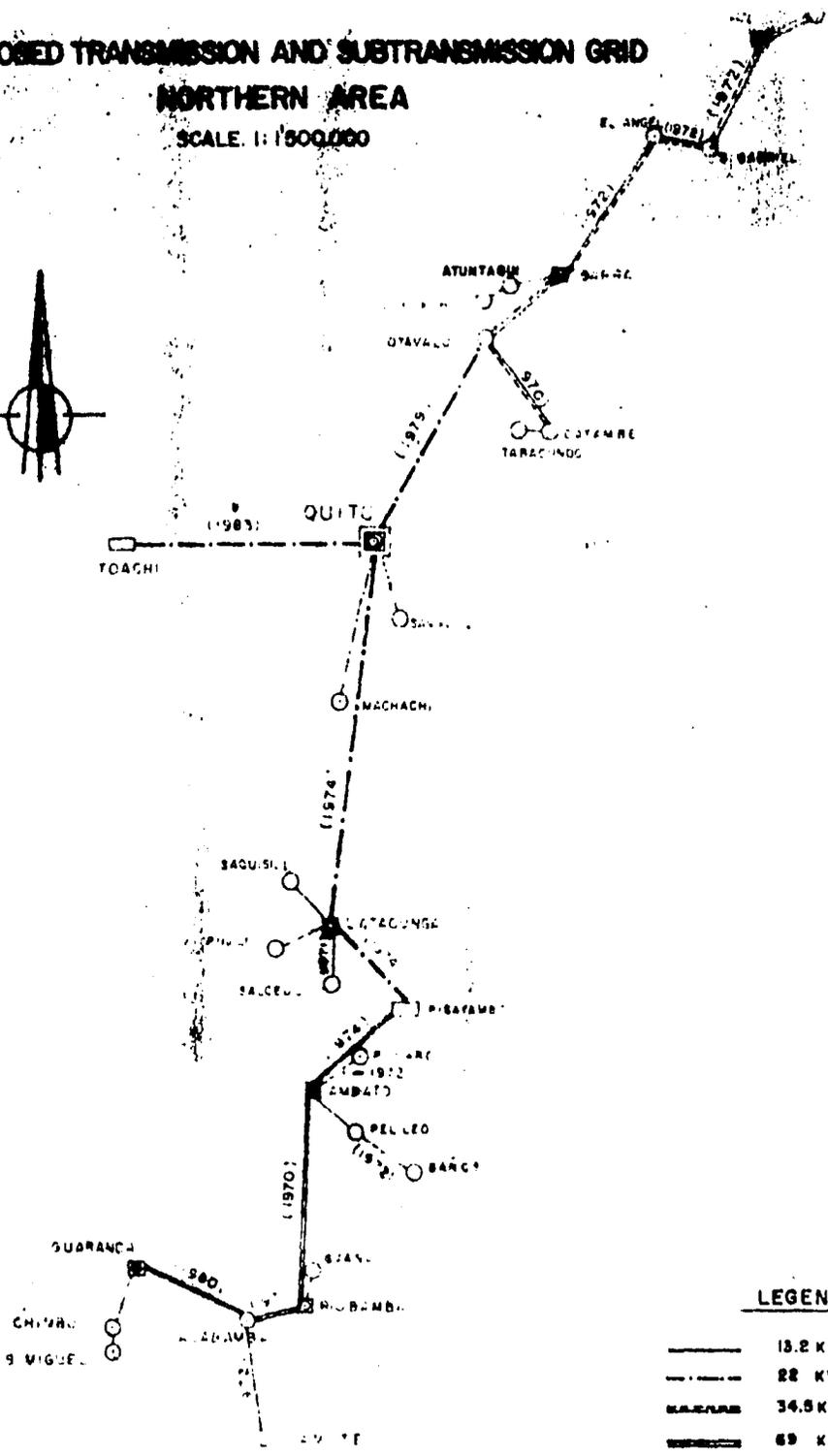


- LEGEND**
- LINES BELOW 13.2 KV
 - 13.2 KV LINE
 - - - 22 KV LINE
 - ==== 34.5 KV LINE
 - ===== 69 KV LINE
 - 138 KV LINE
 - 345 KV LINE

NOTE: A PORTION OF THE LINES FROM 13.2KV TO 69KV ARE BUILT OR UNDER CONSTRUCTION

A-1

**PROPOSED TRANSMISSION AND SUBTRANSMISSION GRID
NORTHERN AREA**
SCALE: 1:1500,000



LEGEND

- 13.2 KV LINE
- 22 KV LINE
- ===== 34.5 KV LINE
- ===== 69 KV LINE
- 138 KV LINE

NOTE: A PORTION OF THE LINES FROM 13.2 KV TO 69 KV ARE BUILT OR UNDER CONSTRUCTION

INECEL PARTICIPATION IN ELECTRIC COMPANIES
December 31, 1969

Company	Subscribed Capital (\$000)	INECEL's Share (\$000)	Capacity Installed (KW)
ALAUSI	220.0	55.0 (25.0%)	265
AMBATO	5,645.2	56.5 (1.0%)	5,780
BOLIVAR	585.1	192.5 (32.9%)	990
CUENCA	2,149.7	636.3 (29.6%)	7,280
EL ORO	660.1	110.2 (16.7%)	5,750
ESMERALDAS	451.0	225.5 (50.0%)	2,820
IBARRA	2,750.3	1,861.9 (67.7%)	1,340
LOJA	1,567.7	366.8 (23.4%)	1,200
LOS RIOS	157.3	60.6 (38.5%)	1,360
MILAGRO	1,100.0	330.0 (30.0%)	1,660
MONTUFAR	134.8	11.0 (8.2%)	300
PORTOVIEJO	330.3	137.6 (41.7%)	1,150
QUEVEDO	550.0	110.0 (20.0%)	1,000
RIOBAMBA	2,695.3	1,185.9 (44.0%)	6,430
SANTA ELENA	330.0	55.1 (16.7%)	3,600
TULCAN	935.1	138.4 (14.8%)	1,320
TOTAL	20,261.9	5,533.3 (27.3%)	42,245

MAJOR PROJECTS UNDERTAKEN BY INECEL

- ALAUSSI. - Construction of a 265-KW first stage of the hydroelectric power plant of Nízag. Construction of the transmission line Nízag-Chunchi, and distribution lines for the towns of Alausí, Chunchi and Huigra.
- AMBI. - Construction of an 8,000-KW hydroelectric power plant and 5.2 Km. of 34.5-KV transmission line to Ibarra. Construction of 44 Km. of transmission line Ibarra-Cayambe, and distribution systems for the towns of Ibarra, Cayambe and Otavalo.
- ARCHIPIELAGO DE COLON. - Installation of one 324-KW diesel-electric unit in San Cristóbal Island and another unit of the same capacity in Santa Cruz Island. Construction of the corresponding distribution lines.
- CAÑAR. - Construction of a 360-KW hydroelectric power plant, and distribution systems for the towns of Cañar and El Tambo.
- CHIMBO. - Construction of the first and second stages of the hydroelectric power plant of Chimbo for a capacity of 650 KW. Construction of 5.5 Km. of 13.2-KV subtransmission lines to the towns of Chimbo, Asunción and La Magdalena, and distribution lines for the towns of Guaranda, Chimbo, Asunción and La Magdalena.
- DAULE. - Construction of a 400-KW diesel-electric power plant. Construction of 7 Km. of 13.2-KV subtransmission lines from Daule to Nobol and distribution systems of Daule, Nobol and Santa Lucía.
- DURAN. - Construction of a 1,350-KW diesel-electric power plant and distribution lines in the town.
- EL ORO. - Installation of transformer facilities for the supply of power from a 4,500-KW APD vessel located in Puerto Bolívar. Construction of 38 Km. of 34.5-KV transmission lines from Machala to Santa Rosa and distribution systems for the towns of Machala, Santa Rosa, Arenillas, El Guabo and La Iberia.

ESMERALDAS. - Construction of a 2,820-KW diesel-electric power plant. Construction of subtransmission lines in Esmeraldas and surrounding rural areas.

GUALACEO. - Construction of a 400-KW hydroelectric power plant, and the corresponding distribution system in the town.

LOJA. - Construction of a 2,400-KW hydroelectric power plant. Construction of 20 Km. of 22-KV transmission line from Loja to Catamayo, and distribution lines in this town.

MANABI. - Installation of transformer facilities for the supply of power from a 4,500-KW APD vessel located in Manta. Construction of 32 Km. of 69-KV transmission lines from Manta to Portoviejo, 11,500 KVA in substation capacity, and distribution systems in Manta and Portoviejo. Construction of the 34.5 KV provincial grid, and distribution systems for the main towns of the province.

QUEVEDO. - Construction of a 2,000-KW power plant in Quevedo. Construction of 48 Km. of 13.2-KV subtransmission lines from Quevedo to the towns of Valencia and Velasco Ibarra and distribution systems in the mentioned towns.

RIOBAMBA. - Construction of a 5,300-KW first stage of the Alao hydroelectric generating project. Construction of 17 Km. of 69-KV transmission line from Alao to Riobamba, 9 Km. of 13.2-KV subtransmission line from Riobamba to Guano, and distribution lines for the city of Riobamba.

SANTA ELENA. - Construction of a 3,600-KW diesel-electric power plant. Construction of 20 Km. of 13.2-KV subtransmission line from La Libertad to Salinas and from La Libertad to Santa Elena and Ballenita and distribution systems in these towns.

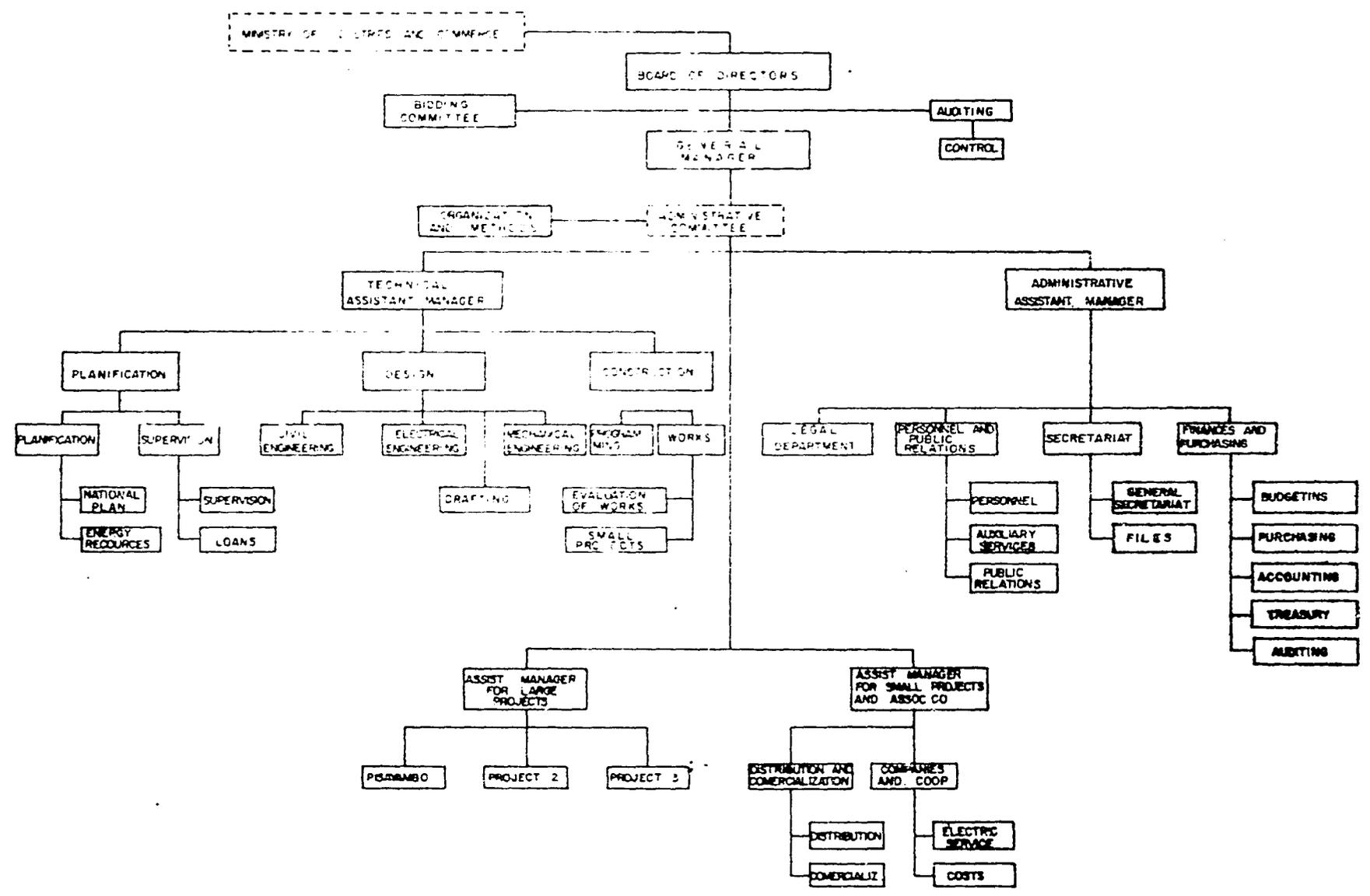
SANTO DOMINGO. - Construction of a 1,380-KW power plant and extension of the same to house an additional 1,000-KW unit.

Construction of 15 Km. of 13.2 KV subtransmission lines along the four existing roads to this town and distribution lines in Santo Domingo and nearby villages.

TULCAN. - Construction of 2.5 Km. of 13.2-KV line as a part of the transmission line Tulcán-Ipiales.

ZAMORA. - Installation of a 53-KW hydroelectric plant and construction of distribution systems in the town of Zamora.

ORGANIZATIONAL CHART OF INECEL



MAP OF ECUADOR

ANNEX I-ENHET I

COLOMBIA

RURAL ELECTRIFICATION LOAN PROPOSED PROJECT

PACIFIC OCEAN

PERU

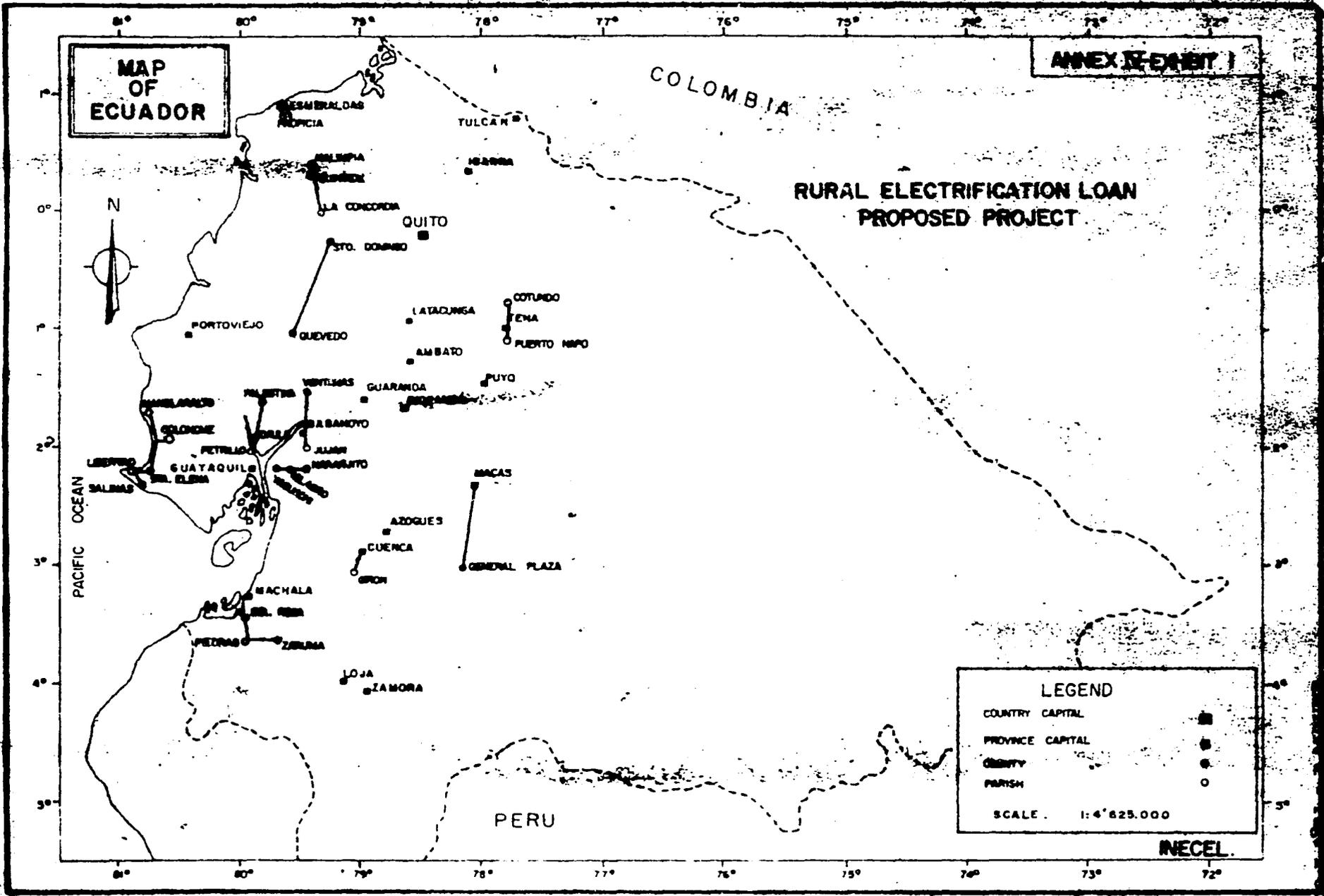
LEGEND

- COUNTRY CAPITAL
- PROVINCE CAPITAL
- CITY
- PARISH

SCALE 1:4'825.000

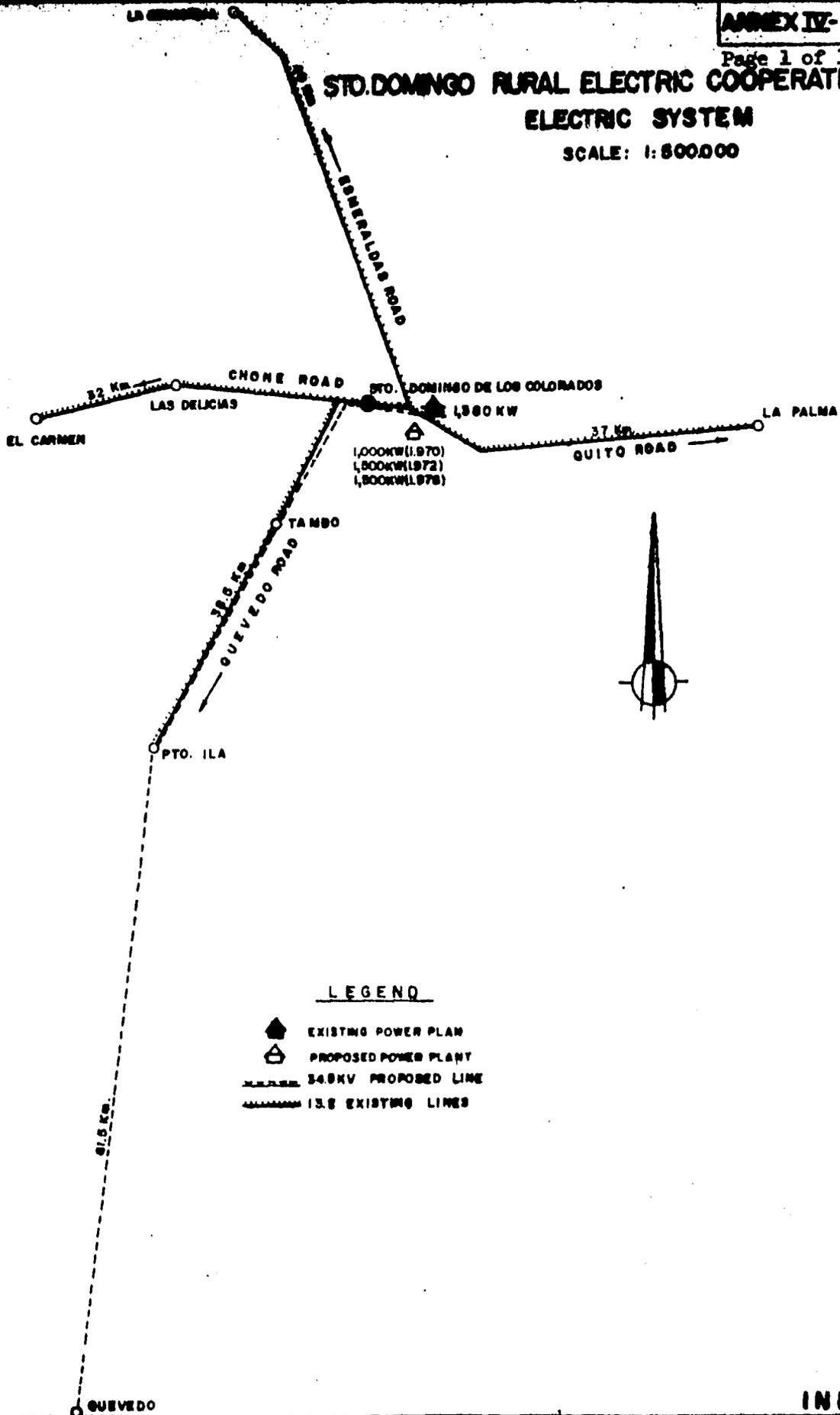
INECEL

ADM-DIG P-917



STO. DOMINGO RURAL ELECTRIC COOPERATIVE ELECTRIC SYSTEM

SCALE: 1:500000

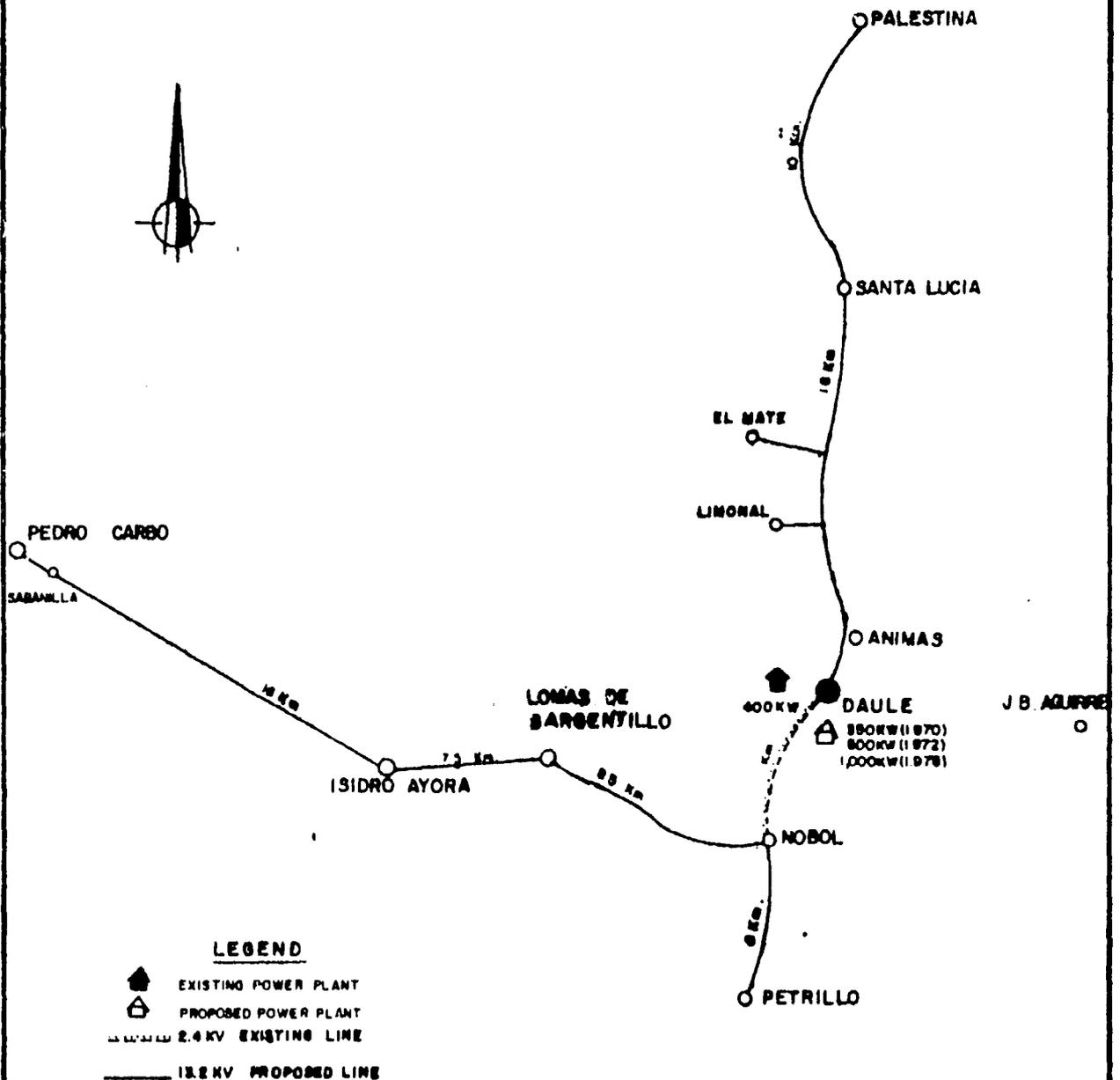


LEGEND

-  EXISTING POWER PLANT
-  PROPOSED POWER PLANT
-  34.5KV PROPOSED LINE
-  13.8 EXISTING LINES

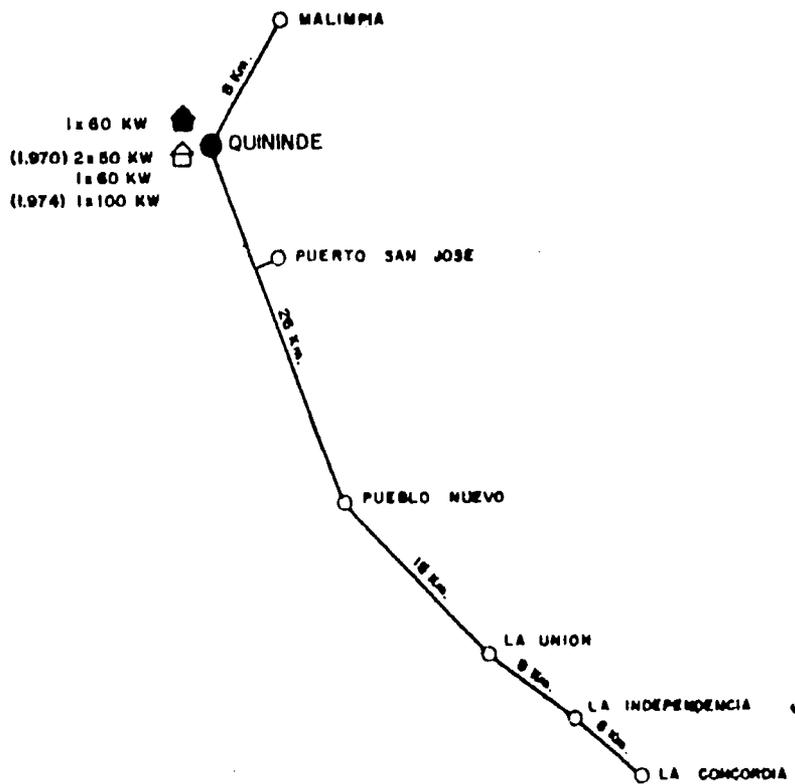
DAULE RURAL ELECTRIC COOPERATIVE ELECTRIC SYSTEM

SCALE: 1:300,000



QUININDE RURAL ELECTRIC COOPERATIVE ELECTRIC SYSTEM

SCALE: 1:400,000

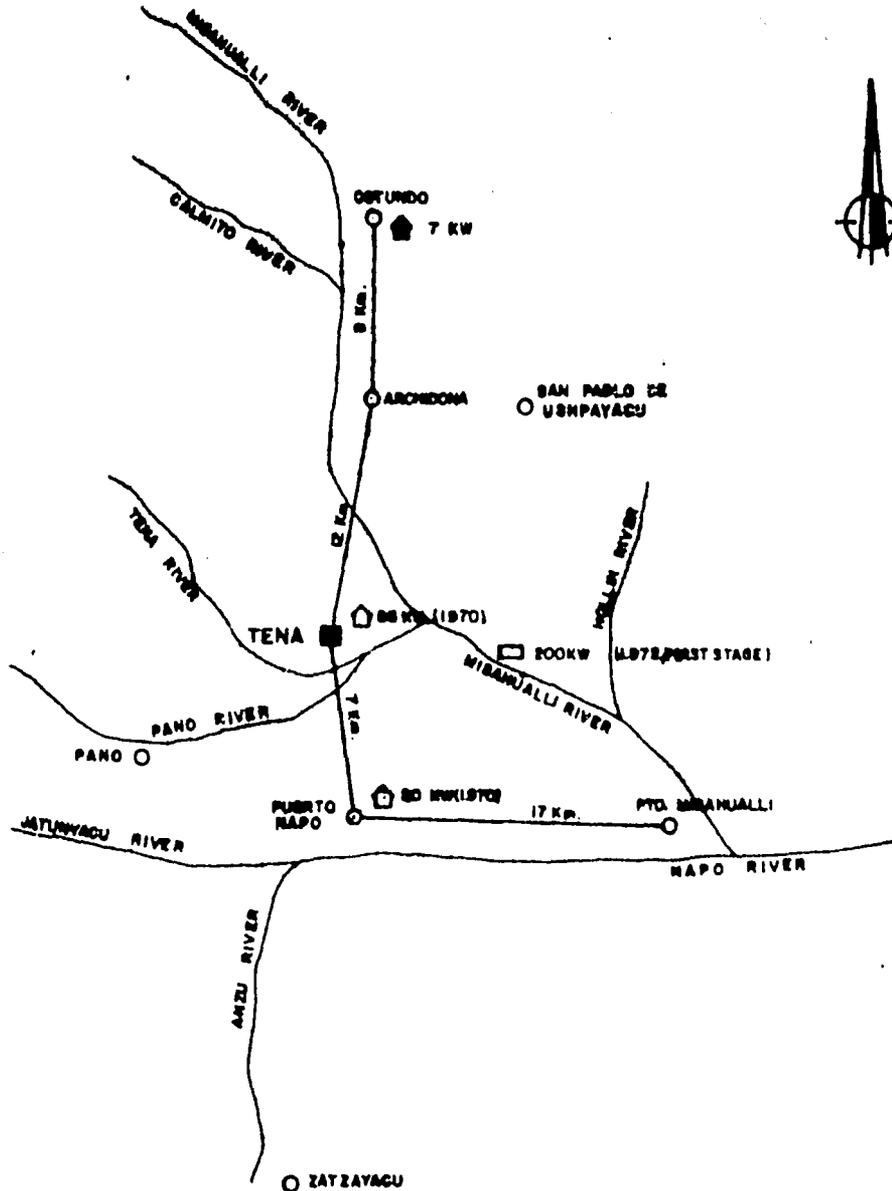


LEGEND

-  EXISTING POWER PLANT
-  PROPOSED POWER PLANT
-  13.2 KV PROPOSED LINE

TENA RURAL ELECTRIC COOPERATIVE ELECTRIC SYSTEM

SCALE 1:400,000

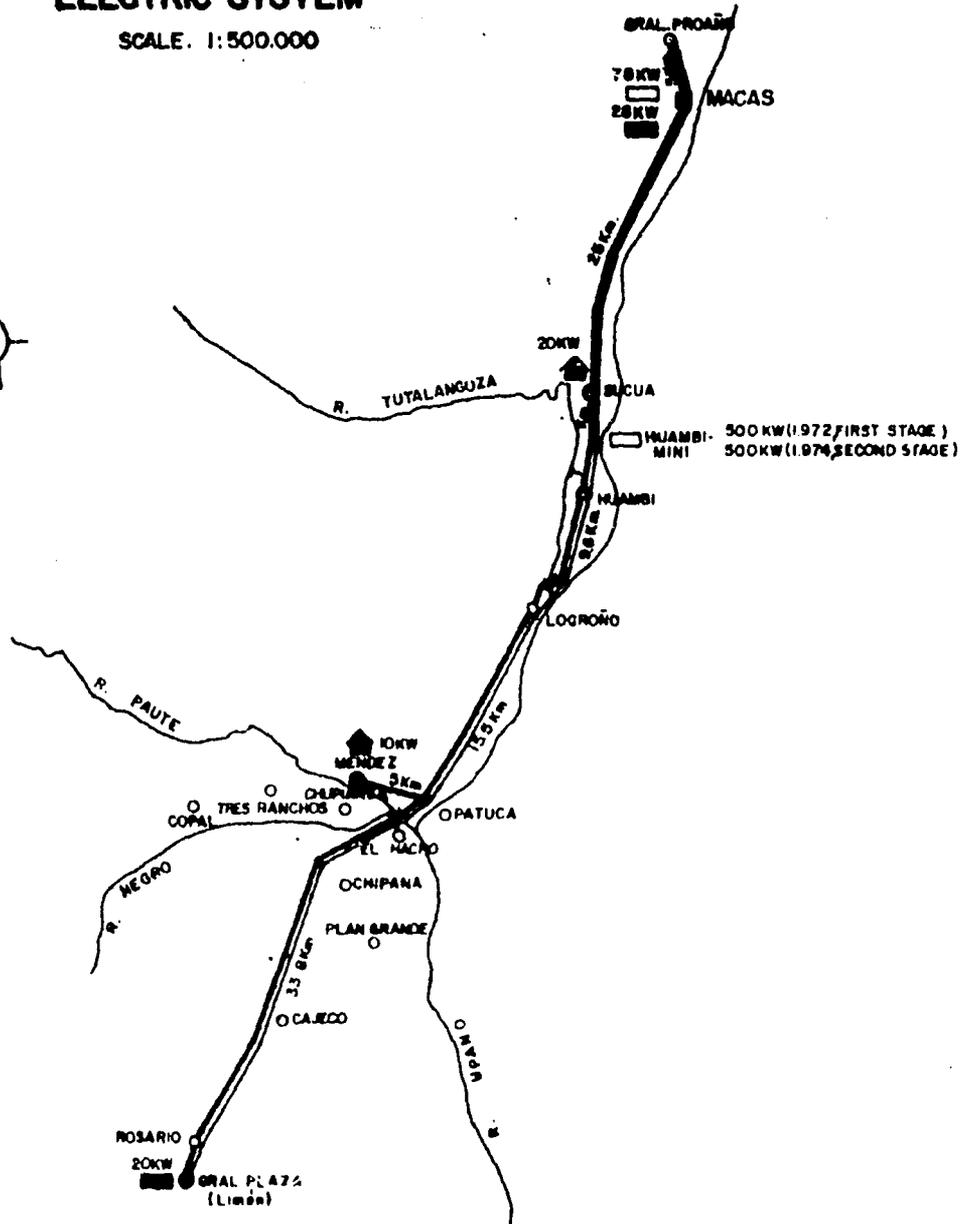


LEGEND

-  EXISTING POWER PLANT
-  PROPOSED POWER PLANT
-  PROPOSED HYDROELECTRIC PLANT
-  13.2 KV PROPOSED LINE

MACAS RURAL ELECTRIC COOPERATIVE ELECTRIC SYSTEM

SCALE: 1:500,000

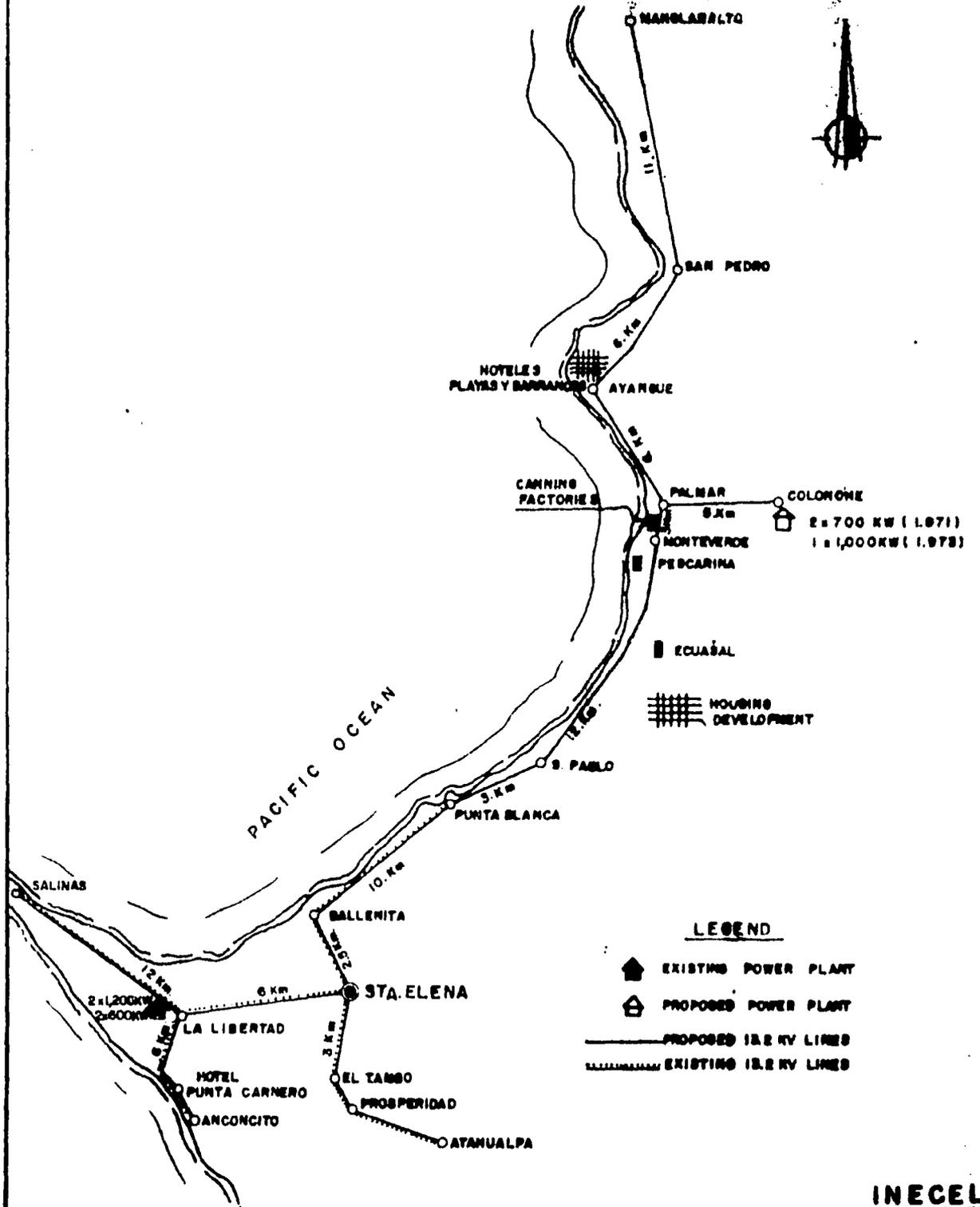


LEGEND

- EXISTING DIESEL ELECTRIC POWER PLANT
- EXISTING HYDROELECTRIC POWER PLANT
- PROPOSED HYDROELECTRIC POWER PLANT
- 13.2 KV PROPOSED LINE
- ROAD

SANTA ELENA ELECTRIC COMPANY ELECTRIC SYSTEM

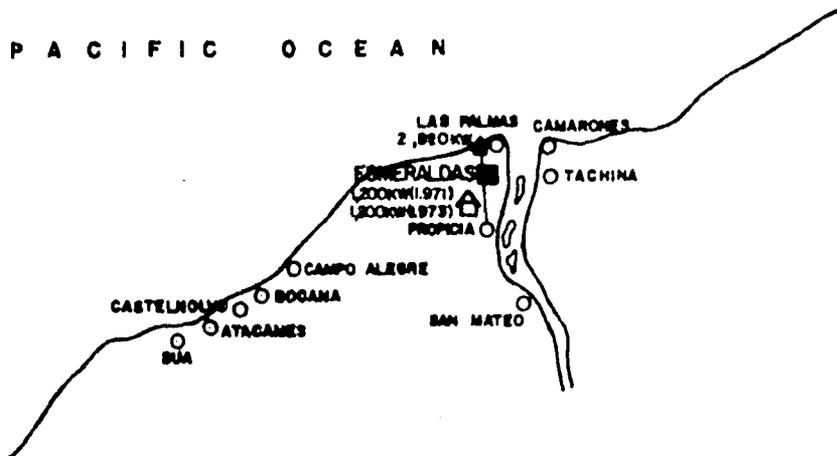
SCALE: 1:250,000



ESMERALDAS ELECTRIC COMPANY
ELECTRIC SYSTEM
SCALE 1:500.000



P A C I F I C O C E A N

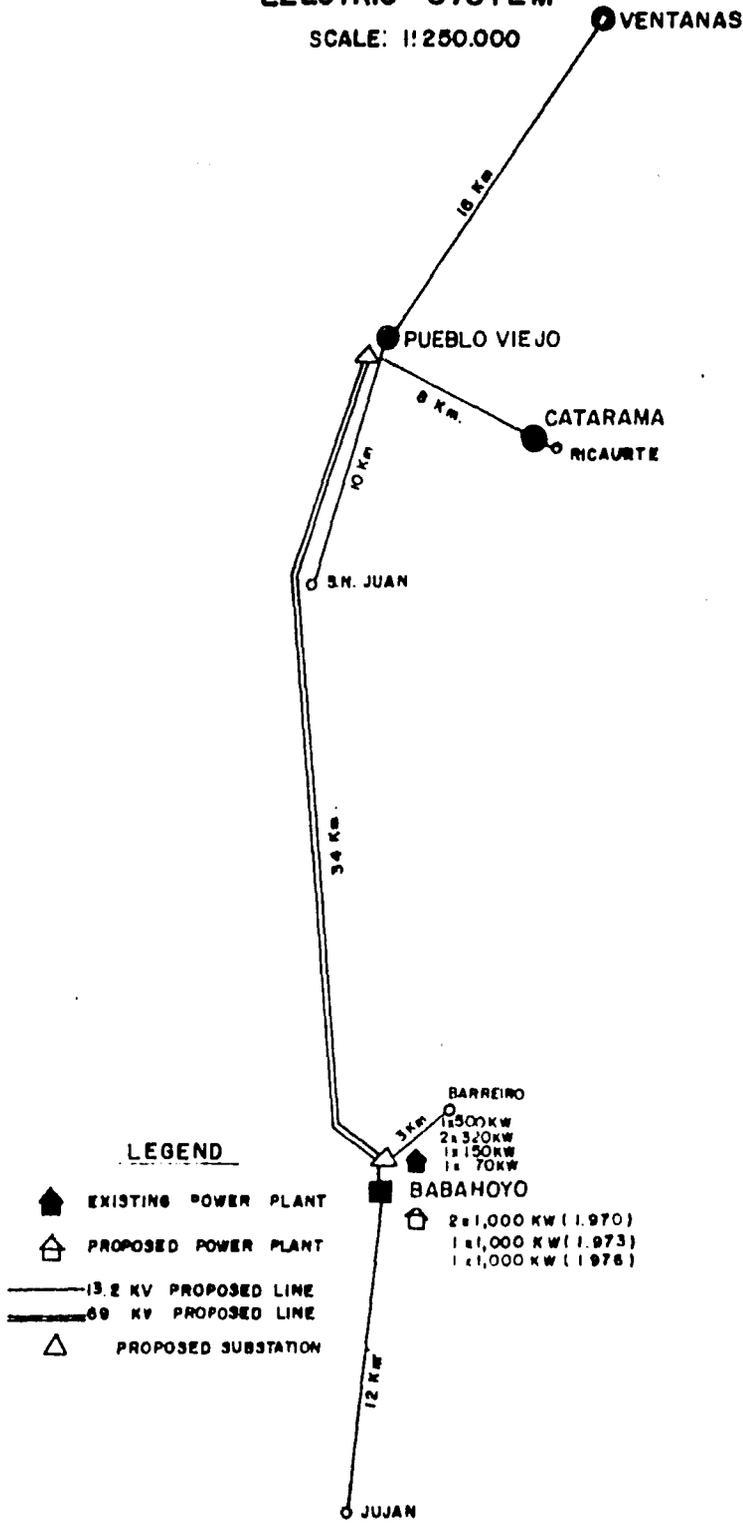


LEGEND

-  EXISTING POWER PLANT
-  PROPOSED POWER PLANT

LOS RIOS ELECTRIC COMPANY ELECTRIC SYSTEM

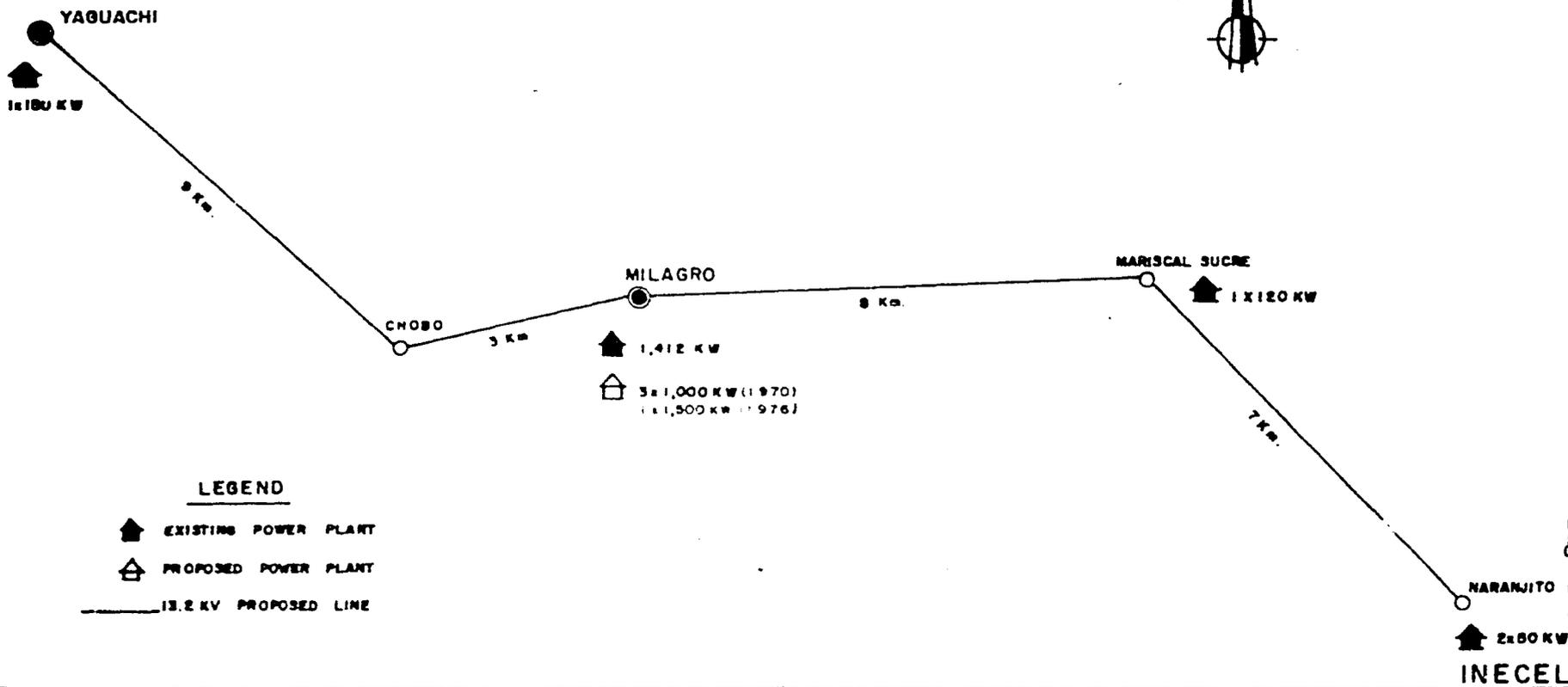
SCALE: 1:250,000



MILAGRO ELECTRIC COMPANY

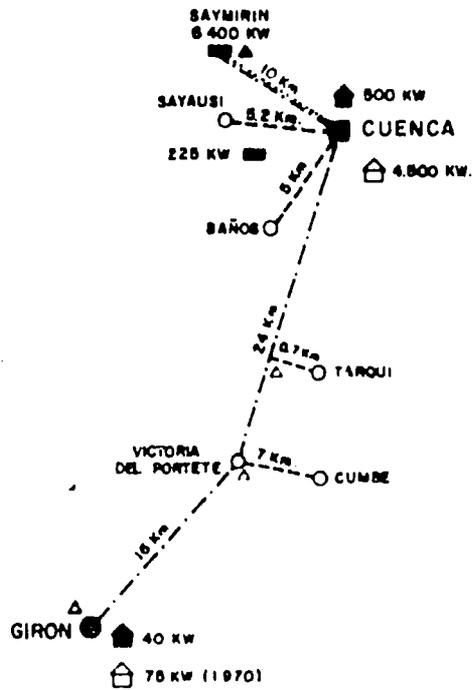
ELECTRIC SYSTEM

SCALE: 1:100,000



CUENCA ELECTRIC COMPANY RURAL ELECTRIC SYSTEM

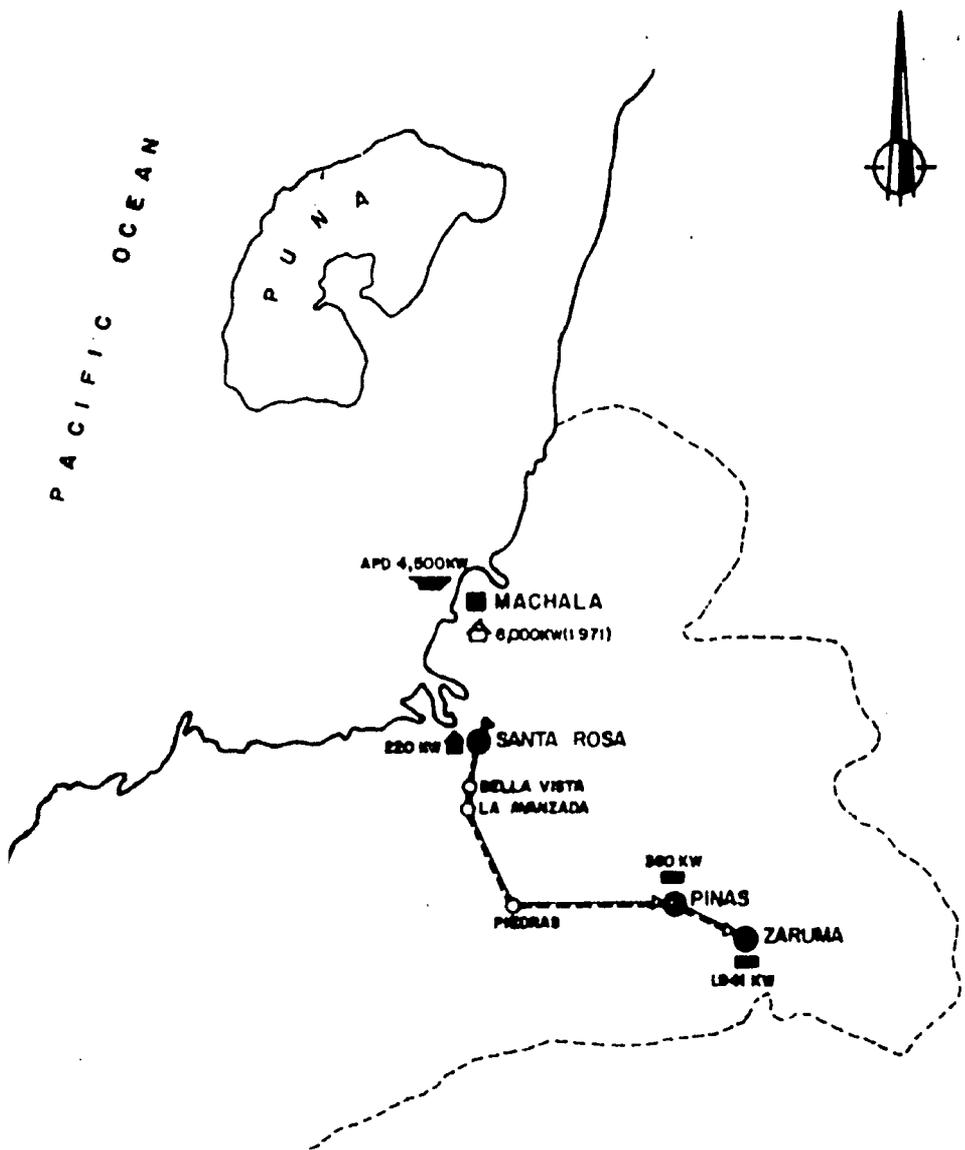
SCALE 1:500,000



LEGEND

- EXISTING HYDRO-ELECTRIC POWER PLANT
- ▲ EXISTING DIESEL ELECTRIC POWER PLANT
- ◻ PROPOSED DIESEL-ELECTRIC POWER PLANT
- 22 KV EXISTING LINE
- - - 22 KV PROPOSED LINE
- 6.3 KV EXISTING LINE
- - - 6.3 KV PROPOSED LINE

**EL ORO ELECTRIC COMPANY
ELECTRIC SYSTEM**
SCALE 1:1'000,000



LEGEND

- EXISTING HYDRO-ELECTRIC POWER PLANT
- ◆ EXISTING DIESEL-ELECTRIC POWER PLANT
- △ PROPOSED DIESEL-ELECTRIC POWER PLANT
- 24.8 PROPOSED LINE

ESMERALDAS ELECTRIC COMPANY

SYSTEM REQUIREMENTS - POWER AND ENERGY SOURCE

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	(%)
1. System Demand, KW														
Total Demand		1390	1600	1920	2140	2380	2640	2940	3280	3620	3920	4350	4900	11.5
System Losses (2%)		28	32	38	43	48	53	59	66	72	78	97	98	-
Net System Demand		1418	1632	1958	2183	2428	2693	2999	3346	3692	3998	4447	4998	-
2. System Energy, MWH														
Total MWH Sales	2712	3150	3810	4880	5650	6560	7550	8730	9860	11150	12240	13900	15850	15.8
a. Res. & Commercial Consumption		2256	2600	3100	3660	4330	5140	6120	7070	8160	9040	10470	12170	16.5
b. Industrial Consumption		397	500	900	990	1090	1200	1320	1420	1530	1650	1780	1920	15.4
c. Street Light Consumption		497	710	880	1600	1140	1210	1290	1370	1460	1550	1650	1760	12.0
Transm. & Dist. Losses (%)		1760	1880	2190	2310	2430	2520	2610	2780	2960	3060	3260	3480	-
		35.9	33	31	29	27	25	23	22	21	20	19	18	-
Net MWH Supplied		4910	5690	7070	7960	8990	10070	11340	12640	14110	15300	17160	19330	13.3
System Load Factor (%)		40.3	40.5	42.0	42.5	43.0	43.5	44.0	44.0	44.5	44.5	45.0	45.0	-
3. Power Sources, KW														
Installed Capacity	1320	2820	2820	2820	2820	4020	4020	4020	5220	5220	5220	5220	5220	-
Less Total Reserves		1430	1220	900	680	1640	1380	1080	1940	1600	1300	870	320	-
Net System Demand		1390	1600	1920	2140	2380	2640	2940	3280	3620	3920	4350	4900	-

SANTO DOMINGO RURAL ELECTRIC COOPERATIVE
SYSTEM REQUIREMENTS - POWER AND ENERGY SOURCES

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	(%)
1. System Demand, KW														
Total Demand	940	1090	1240	1580	1810	2050	2330	2620	2970	3380	3850	4400	5020	15.0
System Losses (2%)	19	22	25	32	36	41	47	52	59	68	77	88	100	-
Net System Demand	959	1112	1265	1612	1846	2091	2377	2672	3029	3448	3927	4488	5120	-
2. System Energy, MWH														
Total MWH Sales	2548	2980	3440	4230	4900	5670	6540	7550	8640	9880	11340	13020	14960	16.0
a. Res. & Commercial Consumption	1670	1920	2220	2830	3300	3850	4470	5200	6050	7030	8190	9530	11100	17.0
b. Industrial Consumption	230	300	350	400	450	500	550	600	670	740	830	940	1060	13.8
c. Street Light Consumption	648	760	870	1000	1150	1320	1520	1750	1920	2110	2320	2550	2800	13.0
Trans. & Dist. Losses	762	890	970	1080	1250	1320	1440	1570	1770	2020	2320	2670	3060	-
(%)	23.2	22.9	22.0	20.3	19.7	18.9	18.0	17.2	17.0	17.0	17.0	17.0	17.0	-
Net MWH Supplied	3310	3870	4410	5310	6100	6990	7980	9120	10410	11900	13660	15690	18020	14.8
System Load Factor (%)	40.2	40.5	40.5	38.3	38.5	39.0	39.1	39.7	40.0	40.2	40.5	40.7	41.0	-
3. Power Sources, KW														
Installed Capacity	1380	1380	2380	2380	3880	3880	3880	3880	3880	5380	5380	5380	5380	-
Less Total Reserves	440	290	1140	800	2070	1830	1550	1260	910	2000	1530	980	360	-
Net System Demand	940	1090	1240	1580	1810	2050	2330	2520	2970	3380	3850	4400	5020	-

MACAS RURAL ELECTRIC COOPERATIVE
SYSTEM REQUIREMENTS - POWER AND ENERGY SOURCES

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	(%)
1. System Demand, KW														
Total Demand		305	334	364	394	434	480	529	592	667	761	881	1030	11.7
System Losses (2%)		6	7	7	8	9	10	11	12	13	15	18	21	-
Net System Demand		311	341	371	402	443	490	540	604	680	776	899	1051	-
2. System Energy, MWH														
Total MWH Sales		401	465	531	608	699	810	980	1083	1268	1497	1788	2160	16.5
a. Res. & Commercial Consumption		252	290	336	392	458	537	632	755	909	1106	1363	1702	18.9
b. Industrial Consumption		45	49	53	58	64	77	83	92	100	110	121	132	10.2
c. Street Light Consumption		104	126	142	158	177	196	215	236	259	281	304	325	10.9
Transm. & Dist. Losses (%)		133 24.9	146 23.9	159 23.0	173 22.2	190 21.4	210 20.6	231 19.9	259 19.3	293 18.8	338 18.4	398 18.2	474 18.0	-
Net MWH Supplied		534	611	690	781	889	1020	1161	1342	1561	1835	2186	2634	15.6
System Load Factor (%)		20	20.9	21.6	22.6	23.4	24.3	25.1	25.9	26.7	27.5	28.3	29.2	-
3. Power Sources, KW														
Installed Capacity		78	156	156	628	628	1078	1078	1078	1078	1078	1078	1078	-
Less Total Reserves		(227)	(178)	(208)	234	194	598	549	486	411	317	197	48	-
Net System Demand		305	334	364	394	434	480	529	592	667	761	881	1030	-

AVERAGE RETAIL RATES IN 1968 (dollar/Kwh)^{1/}

1.	ALAUSI Electric Company	\$ 0.030
2.	AMBATO Electric Company	0.021
3.	BOLIVAR Electric Company	0.032
4.	CUENCA Electric Company	0.020
5.	DAULE Rural Electric Cooperative	0.051
6.	DURAN Electric System	0.034
7.	EL ORO Electric Company	0.056
8.	ESMERALDAS Electric Company	0.053
9.	IBARRA Electric Company	0.032
10.	LOJA Electric Company	0.028
11.	MANTA Electric System	0.033
12.	MONTUFAR Electric Company	0.019
13.	SANTA ELENA Electric Company	0.063
14.	PORTOVIEJO Electric Company	0.047
15.	RIOBAMBA Electric Company	0.015
16.	QUEVEDO Electric Company	0.052
17.	SANTO DOMINGO Rural Electric Cooperative	0.044
18.	TULCAN Electric Company	0.022
19.	QUITO Electric Company	0.027
20.	EMELEC Electric Company	0.032

^{1/}- Total revenues divided by total Kwh Sales
(Source: INECEL)

ECUADOR - Installed Capacity and Generation Per Capita

PROVINCE	No. of Plants	Installed Capacity (KW)	Generated Energy (KWH)	Number of Inhabitants			Capacity Per Capita (KW/Inhab.)	Generation Per Capita (Kwh/inhab./yr.)
		(1)	(2)	Rural	Urban	Total		
Esmeraldas	167	5,670	4,480	104,262	59,323	163,585	34.6	27.4
Manabí	152	11,600	19,220	612,089	156,423	768,512	15.1	25.0
Guayas (Guayaquil)	186	96,390	299,390	488,050	803,845	1,291,895	74.6	207.9
Los Ríos	100	4,860	5,050	252,205	75,799	328,004	14.8	15.4
El Oro	76	8,470	15,980	113,902	104,761	218,663	38.6	73.1
COASTAL REGION	681	126,990	344,120	1,570,508	1,200,151	2,770,659	45.8	124.2
Carchi	14	2,310	5,130	81,589	32,739	114,328	20.0	44.8
Imbabura	34	13,830	9,990	145,594	59,464	205,058	67.3	43.7
Pichincha (Quito)	105	69,880	227,010	271,204	508,360	779,564	89.5	290.5
Cotopaxi	35	4,960	12,756	201,498	26,530	228,028	21.8	55.8
Tungurahua	22	5,580	19,590	170,107	79,808	249,915	22.3	78.3
Bolívar	28	1,350	1,900	152,005	17,613	169,618	7.9	11.2
Chimborazo	57	9,560	17,590	281,233	71,050	352,283	27.1	49.9
Cañar	23	3,960	1,850	114,895	16,049	130,944	30.3	14.1
Azuay	32	8,940	33,650	225,553	83,747	390,200	22.9	108.9
Loja	82	3,770	4,480	293,313	62,555	355,868	10.6	12.6
CENTRAL REGION	432	124,160	333,940	1,936,802	957,915	2,894,806	42.8	115.2
Napo	30	290	(3)	32,315	2,440	34,755	8.3	--
Pastaza	32	320	(3)	16,415	3,206	19,621	16.3	--
Morona-Santiago	31	160	(3)	30,315	6,222	36,537	4.4	--
Zamora-Chinchipe	4	123	(3)	13,796	2,626	16,422	7.5	--
ORIENTAL REGION	97	893	--	92,841	14,494	107,335	7.5	--
Archipiélago de Colón	1	54	(3)	3,300	--	3,300	16.4	--
TOTAL COUNTRY	1,211	252,997	--	3,603,540	2,172,560	5,776,100	43.6	app. 120

(1) Actual Physical Installations, (2) Total Electricity Generated, (3) Data not available.

SOURCE: INECEL and National Planning Board

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ANNEX VII, EXHIBIT I

SUMMARY OF ESTIMATED COSTS (\$ 000)

Sub-projects	1970-80 Program				1970-73 Program			
	Local Costs	Foreign AID	Exchange Other	Total	Local Costs	Foreign AID	Exchange Other	Total
<u>Cooperatives</u>								
1. Santo Domingo	382.5	582.6	445.5	1,410.6	285.7	582.6	9.9	878.2
2. Daule	286.3	244.4	303.1	833.8	201.3	244.4	15.4	461.1
3. Quinindé	130.9	125.5	37.7	294.1	87.0	125.5	33.4	245.9
4. Tena	145.4	139.6	18.8	303.8	128.8	139.6	18.2	286.6
5. Macas	638.2	708.1	--	1,346.3	595.7	708.1	--	1,303.8
SUB-TOTAL	1,583.3	1,800.2	805.1	4,188.6	1,298.5	1,800.2	76.9	3,175.6
<u>Companies</u>								
1. Santa Elera	281.7	392.1	376.9	1,050.7	226.7	392.1	320.6	939.4
2. Esmeraldas	374.0	313.0	173.8	860.8	202.9	313.0	5.5	521.4
3. Los Ríos	563.0	320.7	1,185.3	2,069.0	433.7	320.7	849.8	1,604.2
4. Milagro	424.7	177.2	1,223.2	1,825.1	271.0	177.2	739.5	1,187.7
5. Cuenca	138.9	246.6	9.3	394.8	124.9	246.6	9.3	380.8
6. El Oro	291.4	191.5	206.4	689.3	207.3	191.5	122.2	521.0
SUB-TOTAL	2,073.7	1,641.1	3,174.9	6,889.7	1,466.5	1,641.1	2,046.9	5,154.5
Technical Assistance	13.0	108.7	--	121.7	13.0	108.7	--	121.7
TOTAL	3,670.0	3,550.0	3,980.0	11,200.00	2,778.0	3,550.0	2,123.8	8,451.8

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SANTO DOMINGO RURAL ELECTRIC COOPERATIVE

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 Program				1970-73 Program			
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
1. Generation								
1-1500 KW Diesel-electric Generating Plant	41.3	330.0	-	371.3	41.3	330.0	-	371.3
1-1500 KW Diesel-electric Generating Plant	13.8	-	330.0	343.8	-	-	-	-
2. Substations								
1-1900 KVA 2.4/34.5 KV	8.3	33.6	-	41.9	8.3	33.6	-	41.9
1-1900 KVA 2.4/13.2 KV	7.2	-	29.2	36.4	-	-	-	-
1-1900 KVA 34.5/13.2 KV	8.3	33.6	-	41.9	8.3	33.6	-	41.9
3. Transmission								
100 Km. 34.5 KV line Santo Dominge-Quevedo	209.0	176.0	-	385.0	209.0	176.0	-	385.0
4. Distribution								
30 Km. 7.6/13.2 KV distribution lines, 3000 total consumers	82.5	9.4	73.1	165.0	9.4	9.4	-	18.8
5. General Plant	6.6	-	13.2	19.8	5.0	-	9.9	14.9
6. Studies and Design	5.5	-	-	5.5	4.4	-	-	4.4
TOTAL	382.5	582.6	445.5	1,410.6	285.7	582.6	9.9	878.2

DAULE RURAL ELECTRIC COOPERATIVE

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 Program			1970-73 Program				
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
1. Generation								
1-350 KW D-E Generating Unit (Installation only)	26.4	-	-	26.4	26.4	-	-	26.4
1-500 KW Diesel-Electric Generating Unit	13.8	110.0	-	123.8	13.8	110.0	-	123.8
1-1000 KW Diesel-Electric Generating Unit	24.8	-	220.0	244.8	-	-	-	-
2. Substations								
1-500 KVA 2.4/13.2 (Installation only)	2.2	-	-	2.2	2.2	-	-	2.2
1-450 KVA 2.4/13.2	1.7	7.2	-	8.9	1.7	7.2	-	8.9
1-640 KVA 2.4/13.2	2.8	9.9	-	12.7	2.8	9.9	-	12.7
1-750 KVA 2.4/13.2	3.0	-	11.6	14.6	-	-	-	-
3. Transmission								
68 Km. 13.2 KV Line Daule-Palestina, Nobol- Petrillo and Nobol-P. Garbo	102.9	84.2	-	187.1	102.9	84.2	-	187.1
4. Distribution								
39 Km. 7.6/13.2 KV Distribution Lines, 3500 Total Consumers	96.3	24.8	71.5	192.6	40.2	24.8	15.4	80.4
5. General Plant	6.9	8.3	-	15.2	6.9	8.3	-	15.2
6. Studies and Design	5.5	-	-	5.5	4.4	-	-	4.4
TOTAL	286.3	244.4	303.1	833.8	201.3	244.4	15.4	461.1

QUININDE RURAL ELECTRIC COOPERATIVE

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 Program				1970-73 Program			
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
<u>Generation</u>								
2-50 KW and 1-60 KW Diesel-Electric Generating Plant	8.3	35.2	-	43.5	8.3	35.2	-	43.5
1-100 KW Diesel-Electric Generating Unit	2.8	22.0	-	24.8	2.8	22.0	-	24.8
<u>Substations</u>								
1-200 KVA 2.4/13.2 KV	0.6	3.3	-	3.9	0.6	3.3	-	3.9
1-130 KVA 2.4/13.2 KV	0.6	2.2	-	2.8	0.6	2.2	-	2.8
<u>Transmission</u>								
63 Km. 13.2 KV Line Malimpia-Quinindé-La Concordia	95.4	45.7	32.2	173.3	55.8	45.7	32.2	133.7
<u>Distribution</u>								
6 Km. 7.6/13.2 KV Distribution Lines, 620 total consumers	17.1	11.6	5.5	34.2	12.8	11.6	1.2	25.6
<u>General Plant</u>	3.3	5.5	-	8.8	3.3	5.5	-	8.8
<u>Studies and Design</u>	2.8	-	-	2.8	2.8	-	-	2.8
TOTAL	130.9	125.5	37.7	294.1	87.0	125.5	33.4	245.9

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TENA RURAL ELECTRIC COOPERATIVE

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 Program				1970-73 Program			
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
1. Generation								
1-200 KW (First stage) Hydro-electric generating plant	55.0	55.0	-	110.0	55.0	55.0	-	110.0
1-85 KW and 1-20 KW D-E units (Install. only, equipment already purchased)	1.5	-	-	1.5	1.5	-	-	1.5
2. Substation								
1-150 KVA 220V/13.2 KV	0.5	1.8	-	2.3	0.5	1.8	-	2.3
1-260 KVA 2.4/13.2 KV	1.0	4.0	-	5.0	1.0	4.0	-	5.0
3. Transmission								
44 Km. 13.2 KV Line Cotundo-Tena-Napo, Cotundo-Misahualli	54.4	66.6	-	121.0	54.4	66.6	-	121.0
4. Distribution								
10 Km. 7.6/13.2 KV Distribution Lines, 1060 Total consumers	29.2	11.0	18.2	58.4	13.4	11.0	18.2	42.6
5. General Plant	2.0	1.2	0.6	3.8	1.6	1.2	-	2.8
6. Studies and Design	1.8	-	-	1.8	1.4	-	-	1.4
TOTAL	145.4	139.6	18.8	303.8	128.8	139.6	18.2	286.6

MACAS RURAL ELECTRIC COOPERATIVE

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 Program				1970-73 Program			
	Local Costs	Foreign Exchange		Total	Local Costs	Foreign Exchange		Total
		AID	Other			AID	Other	
1. Generation								
1-4000 KW Hydroelectric Generating Plant, Power House and Civil Works	322.0	138.0	-	460.0	314.2	138.0	-	460.0
1-500 KW (first stage) Generating Unit	35.6	165.0	-	200.6	35.6	165.0	-	200.6
1-500 KW (Second stage) Generating Unit	22.5	165.0	-	187.5	22.5	165.0	-	187.5
1-78 KW Diesel-Electric Generating Unit (Installation only, equipment already purchased)	-	-	-	-	7.8	-	-	-
2. Substations								
1-110 KVA 230/4160 volts (inst. only, equip. already purchased)	0.4	-	-	0.4	0.4	-	-	0.4
1-96 KVA 4.16/13.2 KV	0.4	1.5	-	1.9	0.4	1.5	-	1.9
1-625 KVA 4.16/13.2 KV	2.4	9.6	-	12.0	2.4	9.6	-	12.0
1-625 KVA 4.16/13.2 KV	2.4	9.6	-	12.0	2.4	9.6	-	12.0
3. Transmission								
100.9 Km. 13.2 KV Line Gral. Proaño-Macas-Sucúa- Méndez-Gral. Plaza	152.7	124.9	-	277.6	152.7	124.9	-	277.6
4. Distribution								
25 Km. 7.6/13.2 KV Distribution Lines, 2930 total consumers	70.6	80.6	-	151.2	28.1	80.6	-	108.7
5. General Plant	16.3	13.9	-	30.2	16.3	13.9	-	30.2
6. Studies and Design	12.9	-	-	12.9	12.90	-	-	12.9
TOTAL	638.2	708.1	-	1,346.3	595.7	708.1	-	1,303.8

SANTA ELENA ELECTRIC COMPANY

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 Program				1970-73 Program			
	Local Costs	Foreign Exchange		Total	Local Costs	Foreign Exchange		Total
		AID	Other			AID	Other	
1. Generation								
2-700 KW Diesel-Electric Generating Plant	46.7	308.0	-	354.7	46.7	308.0	-	354.7
1-1000 Diesel-Electric Generating Unit	16.5	-	220.0	236.5	16.5	-	220.0	236.5
2. Substation								
1-1750 KVA 4.16/13.2 KV	6.6	26.9	-	33.5	6.6	26.9	-	33.5
1-1250 KVA 4.16/13.2 KV	4.9	-	19.2	24.1	4.9	-	19.2	24.1
3. Transmission								
46 Km. 13.2 KV Line Manglaralto-Palmar- Punta Blanca	69.4	24.7	32.4	126.5	69.4	24.7	32.4	126.5
4. Distribution								
44 Km. 7.6/13.2 KV Dist. Lines, 4420 total cons.	121.6	24.2	97.6	243.4	66.6	24.2	41.3	132.1
5. General Plant	5.5	8.3	7.7	21.5	5.5	8.3	7.7	21.5
6. Studies and Design	10.5	-	-	10.5	10.5	-	-	10.5
TOTAL	281.7	392.1	376.9	1,050.7	226.7	392.1	320.6	939.4

ESMERALDAS ELECTRIC COMPANY

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 Program				1970-73 Program			
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
1. Generation								
1-1200 KW Diesel-Electric Generating Plant	30.2	264.1	-	294.3	30.2	264.1	-	294.3
1-1200 KW D-E Unit (Inst. only, imported with EXIM funds)	16.5	-	-	16.5	16.5	-	-	16.5
2. Substations								
1-1500 KVA 2.4/13.2 KV	5.5	24.7	-	30.2	5.5	24.7	-	30.2
1- 4000 KVA 2.4/13.2 KV (inst. only, imp. with EXIM funds)	11.0	-	-	11.0	11.0	-	-	11.0
3. Transmission	-	-	-	-	-	-	-	-
4. Distribution								
90 Km. 7.6/13.2 Distribution Lines, 9000 total consumers	302.5	24.2	168.3	495.0	134.2	24.2	-	158.4
5. General Plant	5.5	-	5.5	11.0	5.5	-	5.5	11.0
6. Studies and Design	2.8	-	-	2.8	-	-	-	-
TOTAL	374.0	313.0	173.8	860.8	202.9	313.0	5.5	521.4

LOS RIOS ELECTRIC COMPANY

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 PROGRAM				1970-73 PROGRAM			
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
1. Generation								
2-1000 KW Diesel-Electric Generating Plant	55.0	-	440.0	495.0	55.0	-	440.0	495.0
1-1000 KW Diesel-Electric Generating Unit	13.8	-	220.0	233.8	13.8	-	220.0	233.8
1-1000 KW Diesel-Electric Generating Unit	13.8	-	220.0	233.8	-	-	-	-
2. Substation								
1-5800 KVA 4.16/13.2 KV	17.6	-	112.8	130.4	17.6	-	112.8	130.4
1-1600 KVA 13.2/69 KV	6.6	33.0	-	39.6	6.6	33.0	-	39.6
1-1600 KVA 69/13.2 KV	6.6	33.0	-	39.6	6.6	33.0	-	39.6
3. Transmission								
34 Km. 69 KV Line Babahoyo-Puebloviejo	121.0	121.0	-	242.0	121.0	121.0	-	242.0
46 Km. 13.2 KV Line Ventana-San Juan-Babahoyo- Juján, Puebloviejo-Ricaurte	88.6	88.6	-	177.2	88.6	88.6	-	177.2
4. Distribution								
80 Km. 7.6/13.2 Distribution Lines, 8000 total consumers	220.0	27.5	192.5	440.0	104.5	27.5	77.0	209.0
5. General Plant	8.3	17.6	-	25.9	8.3	17.6	-	25.9
6. Studies and Design	11.7	-	-	11.7	11.7	-	-	11.7
TOTAL	563.0	320.7	1,185.3	2,069.0	433.7	320.7	849.8	1,604.2

MILAGRO ELECTRIC COMPANY
SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 PROGRAM				1970-73 PROGRAM			
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
<u>1. Generation</u>								
3-1000 KW Diesel-Electric Generating Unit	55.0	-	660.0	715.0	55.0	--	660.0	715.0
1-1500 KW Diesel-Electric Generating Unit	19.3	-	330.0	349.3	-	-	-	-
<u>2. Substation</u>								
1-4500 KVA 2.4/13.2 KV	17.6	70.4	-	88.0	17.6	70.4	-	88.0
1-1900 KVA 2.4/13.2 KV	9.4	-	27.5	36.9	-	-	-	-
<u>3. Transmission</u>								
27 Km. 13.2 KV Line Yaguachi-Milagro-Naranjito	33.6	40.8	-	74.4	33.6	40.8	-	74.4
<u>4. Distribution</u>								
60 Km. 7.6/13.2 Distribution Lines, 9300 total consumers	255.7	55.0	200.7	511.4	134.5	55.0	79.5	269.0
<u>5. General Plant</u>	12.1	11.0	5.0	28.1	8.3	11.0	-	19.3
<u>6. Studies and Design</u>	22.0	-	-	22.0	22.0	-	-	22.0
TOTAL	424.7	177.2	1,223.2	1,825.1	271.0	177.2	739.5	1,187.7

CUENCA ELECTRIC COMPANY

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 PROGRAM				1970-73 PROGRAM			
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
1. Generation								
Enlargement power houses	5.5	-	-	5.5	5.5	-	-	5.5
1-75 KW Diesel-Electric unit (inst. only, equipment already purchased)	6.0	-	-	6.0	6.0	-	-	6.0
1-250 KW Diesel-Electric Gene- rating Unit	10.0	55.0	-	65.0	10.0	55.0	-	65.0
1-225 KW Diesel-Electric Generating Unit	9.0	49.5	-	58.5	9.0	49.5	-	58.5
2. Substation								
1-30 KVA 2.4/13.2 KV (inst. only, equipment already purchased)	0.1	-	-	0.1	0.1	-	-	0.1
1-595 KVA 2.4/22 KV	2.3	9.2	-	11.5	2.3	9.2	-	11.5
1-365 KVA 22/6.3 KV	1.4	5.6	-	7.0	1.4	5.6	-	7.0
1-230 KVA 22/13.2 KV	0.9	3.5	-	4.4	0.9	3.5	-	4.4
3. Transmission								
40 Km. 22 KV Line, Cuenca-Girón	53.0	79.0	-	132.0	53.0	79.0	-	132.0
19 Km. 6.3 KV Line Cuenca-Sayausí, Cuenca-Baños and Girón-Tarqui-Cumbe	18.6	22.9	-	41.5	18.6	22.9	-	41.5
4. Distribution								
9 Km. 7.6/13.2 Distribution Line, 950 total consumers	26.1	16.9	9.3	52.3	12.1	16.9	9.3	38.3
5. General Plant	3.3	5.0	-	8.3	3.3	5.0	-	8.3
6. Studies and Design	2.7	-	-	2.7	2.7	-	-	2.7
TOTAL	138.9	246.6	9.3	394.8	124.9	246.6	9.3	380.8

EL ORO ELECTRIC COMPANY

SUMMARY OF ESTIMATED COSTS (\$000)

PROGRAM	1970-80 PROGRAM				1970-73 PROGRAM			
	Local Costs	Foreign Exchange AID	Other	Total	Local Costs	Foreign Exchange AID	Other	Total
1. <u>Generation</u>	-	-	-	-	-	-	-	-
2. <u>Substation</u>								
1-1100 KVA 34.5/13.2 KV	5.0	17.3	1.9	24.2	5.0	17.3	1.9	24.2
1-4000 KVA 34.5/13.2 KV	16.5	71.5	-	88.0	16.5	71.5	-	88.0
3. <u>Transmission</u>								
60 Km. 34.5 KV Line Santa Rosa-Zaruma	93.5	61.9	75.6	231.0	93.5	61.9	75.6	231.0
4. <u>Distribution</u>								
59 Km. 7.6/13.2 Distribution Lines, 5950 total consumers	163.6	38.0	125.6	327.2	79.5	38.0	41.4	158.9
5. <u>General Plant</u>	7.2	2.8	3.3	13.3	7.2	2.8	3.3	13.3
6. <u>Studies and Design</u>	5.6	-	-	5.6	5.6	-	-	5.6
TOTAL	291.4	191.5	206.4	689.3	207.3	191.5	122.2	521.0

UNCLASSIFIED

COMPARATIVE BALANCE SHEETS

INECEL

(\$000 - Exchange Rate U.S. \$ = \$/18.18)

	<u>December 31, 1969</u>	<u>December 31, 1968</u>	<u>December 31, 1967</u>	<u>December 31, 1966</u>
Assets				
Current Assets				
Cash	2,487	1,478	785	924
Accounts & Notes Receivable	2,343	1,422	667	178
Materials	1,002	1,186	348	77
Prepaid Expenses	4,042	1,826	986	-
Other Current Assets	<u>74</u>	<u>121</u>	<u>353</u>	<u>58</u>
Total Current Assets	<u>9,948</u>	<u>6,033</u>	<u>3,139</u>	<u>1,237</u>
Property and Equipment				
Generating Plant Equipment	5,059	4,829	4,661	-
Less Depreciation	<u>2,401</u>	<u>2,283</u>	<u>1,975</u>	<u>1,780</u>
Other Building and Equipment	505	447	418	-
Less Depreciation	<u>113</u>	<u>392</u>	<u>66</u>	<u>367</u>
Total Property & Equipment (Net)	<u>3,050</u>	<u>2,908</u>	<u>3,038</u>	<u>2,147</u>
Other Assets				
Investments in Affiliates	5,730	5,132	4,405	-
Sub-Loans to Affiliates ^{1/}	<u>5,282</u>	<u>4,177</u>	<u>2,457</u>	-
Total Other Assets	<u>11,012</u>	<u>9,309</u>	<u>6,862</u>	<u>7,104</u> ^{4/}
Deferred Charges ^{2/}	<u>1,890</u>	<u>1,812</u>	<u>1,306</u>	<u>421</u>
Total Assets and Deferred Charges	<u><u>25,900</u></u>	<u><u>20,062</u></u>	<u><u>14,345</u></u>	<u><u>10,909</u></u>

UNCLASSIFIED

UNCLASSIFIED

	<u>December 31</u> 1969	<u>December 31</u> 1968	<u>December 31</u> 1967	<u>December 31</u> 1966
<u>Liabilities & Net Worth</u>				
Liabilities				
Current Liabilities				
Accounts & Notes Payable	1,780	480	156	223
Customer Deposits	58	52	41	-
Other Current Liabilities	<u>79</u>	<u>102</u>	<u>66</u>	<u>35</u>
Total Current Liabilities	<u>1,917</u>	<u>634</u>	<u>263</u>	<u>258</u>
Long Term Liabilities				
Foreign Loans ^{1/}	6,841	5,342	3,309	776
Other Long Term Liabilities	<u>66</u>	<u>66</u>	<u>-</u>	<u>-</u>
Total Long Term Liabilities	<u>6,907</u>	<u>5,408</u>	<u>3,309</u>	<u>776</u>
Deferred Credits ^{3/}	<u>2,382</u>	<u>1,561</u>	<u>349</u>	<u>7</u>
Total Liabilities and Deferred Credits	11,206	7,603	3,921	1,041
Net Worth	<u>14,694</u>	<u>12,459</u>	<u>10,424</u>	<u>9,868</u>
Total Liabilities, Deferred Credits & Net Worth	<u>25,900</u>	<u>20,062</u>	<u>14,345</u>	<u>10,909</u>

^{1/} Foreign Loans (Borrower is INECEL)	6,841
Sub-Loans from INECEL to Affiliates	<u>5,282</u>
Net Loans Payable from INECEL's Operations	1,559

UNCLASSIFIED

Balance Sheet

2/ Deferred charges represent accumulated costs of previous accounting periods which upon further analysis will be transferred to the following accounts in the approximate amounts as follows:

1. Fixed asset accounts (primarily feasibility and engineering studies)	\$ 992
2. Investments in affiliates	267
3. Net Worth (expenses applicable to previous accounting periods)	578
4. Materials and supplies	26
5. Accounts undetermined at present time	<u>27</u>
	<u>\$1,890</u>

3/ Deferred credits represents the following items:

1. Unidentified (pending receipt of documentation) creditors of materials recorded as an asset	\$ 963
2. Unconsolidated capital of branches	657
3. Contributions and special funds received from the GOE and other entities for electrification program	673
4. Net worth (income applicable to previous accounting periods)	<u>89</u>
	<u>\$2,382</u>

4/ Breakdown unknown.

5/ Prepaid expenses includes materials and supplies to be charged to projects as used.

COMPARATIVE INCOME STATEMENT

As of December 31

\$000 - Exchange Rate US\$ - S/ 18.18

	<u>1969</u>	<u>1968</u>	<u>1967</u>
Income			
Taxes on sale of electrical energy	1,321	1,235	664
Taxes on consumer items	1,390	1,367	1,223
Operating income	680	601	354
Rental and interest income	217	152	99
Other income	<u>74</u>	<u>68</u>	<u>134</u>
	3,682	3,423	2,474
Expenses			
Administrative expense	230	40	83
Designing expense	87	45	68
National supervision expense	216	136	130
Operating expense	835	795	596
Engineering and construction expense	380	321	326
Rental expense	79	173	70
General expense	<u>57</u>	<u>24</u>	<u>32</u>
	<u>1,884</u>	<u>1,534</u>	<u>1,305</u>
Net income for year	<u><u>1,798</u></u>	<u><u>1,889</u></u>	<u><u>1,169</u></u>

INECEL

SOURCE AND UTILIZATION OF FUNDS

As of December 31

\$000 - Exchange Rate U.S.\$ = S/ 18.18

	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
<u>Source of Funds</u>								
Net Income	1,889	1,798	1,905	2,012	2,119	2,226	2,333	2,440
Depreciation	327	146	235	235	235	235	235	235
Increase in long-term debt-Foreign Loans								
AID, Eximbank, British Government	2,099	1,499	1,689					
Poland			1,278	1,000				
British Government - New			400	92				
AID Loan - Proposed			2,111	678	761			
Other long-term debt								
Suppliers			1,273	1,593	177	596	96	690
Increase in current liabilities**	371	1,283						
Increase in deferred credits**	1,212	821						
Decrease in other current assets	232	47	71	72	71	72	71	72
Allotments from GOE	146	437	3,090	1,242	462	35	846	793
Allotments from electric companies and GOE for distribution lines			808	808	808	808	994	994
	<u>6,276</u>	<u>6,031</u>	<u>12,860</u>	<u>7,732</u>	<u>4,633</u>	<u>3,972</u>	<u>4,575</u>	<u>5,224</u>

Note: 1968 and 1969 are actual results. 1970-75 projected on basis of data furnished by INECEL.

** No projections are made since this data is unpredictable.

	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
<u>Utilization of Funds</u>								
Investments in Affiliates*	727	598						
Loans to Affiliates*	1,720	1,105						
Generating plants and transmission lines			10,598	2,836	825	825	825	825
Distribution lines			808	808	808	808	994	994
General plant and equipment*	168	230						
Other buildings and equipment*	29	58						
Increase in deferred charges*	506	78						
Increase in other assets*	2,433	2,953						
Payments to suppliers				382	834	830	949	905
Rural electrification project - proposed			432	3,692	1,086	1,118	151	140
Debt Service - Foreign Loans								
AID Loan - Proposed				21	49	64	71	71
British Government - New				18	22	44	44	44
AID, Poland, Eximbank and British Government			810	903	1,234	1,241	1,199	1,181
	<u>5,583</u>	<u>5,022</u>	<u>12,648</u>	<u>8,660</u>	<u>4,858</u>	<u>4,930</u>	<u>4,233</u>	<u>4,160</u>
Increase (Decrease) in Cash	693	1,009	212	(928)	(225)	(958)	342	1,064
Beginning Balance	785	1,478	2,487	2,699	1,771	1,546	588	930
Ending Balance	<u>1,478</u>	<u>2,487</u>	<u>2,699</u>	<u>1,771</u>	<u>1,546</u>	<u>588</u>	<u>930</u>	<u>1,994</u>

Note: 1968 and 1969 are actual results. 1970-75 projected on basis on data furnished by INECEL.

* No projections made due to lack of information and nature of categories.

ESMERALDAS ELECTRIC COMPANY - STATEMENT OF OPERATIONS

(THOUSANDS OF DOLLARS)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1. Operating Revenues													
Total MWH Sales	2712	3150	3810	4880	5650	6560	7550	8730	9860	11150	12240	13900	15850
Unit Sales (dollar/KWH)	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053
Gross Revenue from Sales	143.01	166.33	201.22	257.70	298.35	346.42	398.68	460.95	520.68	588.77	646.31	733.99	836.96
Other Income	1.34	1.99	1.76	2.48	3.08	3.41	3.96	4.40	5.17	5.83	6.60	7.48	8.47
Total Operating Revenues	144.35	168.32	202.98	260.18	301.43	349.83	402.64	465.35	525.85	594.60	652.91	741.47	845.43
2. Operating Costs													
Operation and Maintenance	47.69	49.61	51.65	54.18	57.70	61.22	65.29	70.18	72.71	77.39	80.30	85.92	92.40
Fuel	55.61	67.54	78.27	97.24	109.46	123.65	138.50	155.94	173.81	194.06	210.39	235.97	265.84
Marketing	12.49	13.97	15.62	17.71	20.18	22.99	26.34	30.36	33.71	37.60	39.99	44.56	49.90
Administration and General Expense	8.73	19.08	20.18	21.56	23.33	25.24	27.50	30.14	31.90	34.48	36.08	39.16	42.68
Depreciation Expense	25.04	25.30	28.38	31.13	49.61	55.88	80.14	82.56	84.98	87.40	89.82	92.18	94.55
Total Operating Costs	149.56	175.50	194.10	221.82	260.33	288.98	337.77	369.18	397.11	430.93	456.58	497.79	545.37
3. Operating Income	(5.21)	(7.18)	8.88	38.36	41.10	60.85	64.87	96.17	128.74	163.67	196.33	243.68	300.06
4. Interest		40.97	39.43	37.84	36.13	40.69	38.78	36.80	34.70	32.45	30.14	27.70	25.08
5. Net Income	(5.4)	(48.15)	(30.55)	0.52	4.97	20.16	26.09	59.37	94.04	131.22	166.19	215.98	274.98

ESMERALDAS ELECTRIC COMPANY

CASH FLOW
(Thousands of Dollars)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1. Source of Funds											
Operating Income	8.88	38.36	41.10	60.85	64.87	96.17	128.74	163.67	196.33	243.68	300.06
Depreciation Expense	28.38	31.13	49.61	55.88	80.14	82.56	84.98	87.40	89.82	92.18	94.55
Increase in Paid-in Share Capital											
a. Local Members	49.50										
b. INECEL	71.50	44.0	22.0	22.0							
Borrowings											
a. AID Loan (proposed)				313.0							
Total Source of Funds	158.26	113.49	112.71	451.73	145.01	178.73	213.72	251.07	285.15	335.86	394.61
2. Utilization of Funds											
Construction Expenditures											
a. Local Currency	66.0	44.0	33.0	59.9	27.0	24.2	24.2	24.2	24.0	24.0	24.0
b. Foreign Exchange			5.5	313.0	24.2	24.2	24.2	24.2	24.0	24.0	24.0
Debt Service											
a. Exim Bank Loan	68.6	68.6	68.6	68.6	68.6	68.6	68.6	68.6	68.6	68.6	68.6
b. AID Loan					17.2	17.2	17.2	35.6	34.6	33.6	32.6
Total Utilization of Funds	134.6	112.6	107.1	441.5	137.0	134.2	134.2	152.6	151.2	150.2	149.2
Increase (Decrease) in Cash	23.66	0.89	5.61	10.23	8.01	44.53	79.52	98.47	133.95	185.66	245.41
Cash Balance Beginning of Year		23.66	24.55	30.16	40.39	48.40	92.93	172.45	270.92	404.87	590.53
Cash Balance End of Year	23.66	24.55	30.16	40.39	48.40	92.93	172.45	270.92	404.87	590.53	835.94

SANTO DOMINGO ELECTRIC COOPERATIVE - STATEMENT OF OPERATIONS

(THOUSANDS OF DOLLARS)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1. Operating Revenues													
Total MWH Sales	2548	2980	3440	4239	4900	5670	6540	7550	8640	9880	11340	13020	14960
Unit Sales Price (dollar/KWh)	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Gross Revenue from Sales	111.80	130.60	150.80	185.40	214.80	248.60	286.70	309.30	378.80	433.11	497.10	570.80	655.80
Other Income	4.24	2.60	3.03	3.69	4.29	4.95	5.72	6.16	7.59	8.64	9.96	11.44	13.09
Total Operating Revenues	116.04	133.20	153.83	189.09	219.09	233.55	292.42	315.46	386.39	441.75	507.06	582.24	668.89
2. Operating Costs													
Operation and Maintenance	41.18	44.55	48.08	52.58	55.50	58.80	62.32	66.23	70.68	76.62	82.01	88.12	94.83
Fuel	35.75	42.57	47.51	73.05	83.88	96.15	109.73	125.41	143.18	163.64	187.84	215.79	247.80
Marketing	5.78	6.16	6.76	8.25	9.08	10.07	11.16	12.37	13.70	15.24	16.88	18.70	20.73
Administration and General Expense	10.17	12.48	16.12	18.26	19.36	20.68	22.06	23.60	25.30	27.56	29.65	32.07	34.65
Depreciation Expense	27.56	18.15	34.10	25.75	63.25	82.51	83.06	84.16	85.26	112.21	113.31	114.41	114.96
Total Operating Costs	122.44	123.91	152.57	187.89	231.07	268.21	288.33	311.77	338.12	395.27	429.69	469.09	512.97
3. Operating Income	(6.40)	9.29	1.26	1.20	(11.98)	(14.66)	4.09	3.69	48.27	46.48	77.37	113.15	155.92
4. Interest	-	-	5.94	36.80	33.22	29.37	25.25	20.79	36.80	31.02	24.75	22.22	19.47
5. Net Income	(6.40)	9.29	(4.68)	(35.60)	(45.20)	(44.03)	(21.16)	(17.10)	11.47	15.46	52.62	90.93	136.45

SANTO DOMINGO ELECTRIC COOPERATIVE

CASH FLOW
(Thousands of Dollars)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1. Source of Funds											
Operating Income	1.26	1.20	(11.98)	(14.66)	4.09	3.69	48.27	46.48	77.37	113.15	155.92
Depreciation Expense	34.10	35.75	63.25	82.51	83.06	84.16	85.26	112.21	113.31	114.41	114.96
Increase in Paid-in Share Capital											
a. Local Members	66.00		66.00				49.50				
b. INEGEL		72.10		44.00	24.75		90.76				
Borrowings											
a. AID Loan (proposed)		539.60	43.00								
b. Suppliers		203.48					242.02				
Total Source of Funds	101.36	852.13	160.27	111.85	111.90	87.85	515.81	158.69	190.68	227.56	270.88
2. Utilization of Funds											
Construction Expenditures											
a. Local Currency	45.1	129.35	101.80	9.35	9.35	9.35	33.00	9.35	9.35	9.35	7.7
b. Foreign Exchange	9.9	539.76	42.90	9.35	9.35	9.35	371.85	9.35	9.35	9.35	7.7
Debt Service											
a. Existing Loans	27.50	27.50	27.50	27.50							
b. AID Loan		10.78	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66
c. Supplier's Credit		39.07	39.07	39.07	39.07	39.07	85.55	85.55	46.48	46.48	46.48
Total Utilization of Funds	82.50	746.30	222.93	96.93	69.43	69.43	502.06	115.91	76.84	76.84	73.54
Increase (Decrease) in Cash	18.86	105.83	(62.66)	14.92	42.47	18.42	13.75	42.78	113.84	150.72	197.34
Cash Balance Beginning of Year		13.86	124.69	62.03	76.95	119.42	137.84	151.59	194.37	208.21	358.93
Cash Balance End of Year	18.86	124.69	62.03	76.95	119.42	137.84	151.59	194.37	208.21	358.93	656.27

MACAS ELECTRIC COOPERATIVE - STATEMENT OF OPERATIONS

(THOUSANDS OF DOLLARS)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1. Operating Revenues													
Total MWH Sales		401	465	531	608	699	810	930	1,083	1268	1497	1788	2160
Unit Sales Price (dollar/KWH)	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056
Gross Revenue from Sales	22.46	26.04	29.74	34.05	39.84	45.38	52.08	60.65	71.01	83.83	100.13	120.96	
Other Income	0.39	0.46	0.53	1.02	1.17	1.36	2.56	1.82	2.13	2.52	3.00	3.63	
Total Operating Revenues	22.85	26.50	30.27	35.07	40.31	46.72	53.64	62.47	73.14	86.35	103.13	124.59	
2. Operating Costs													
Operation and Maintenance	4.96	5.87	6.29	6.04	8.60	10.42	11.17	12.10	13.23	14.65	16.42	18.73	
Fuel	4.26	4.62	5.34	5.10	5.78	-	-	-	-	-	-	-	
Marketing	3.63	3.99	4.41	4.90	5.46	6.11	6.86	7.79	8.93	10.34	12.11	14.42	
Administration and General Expense	2.23	2.56	2.78	3.36	3.65	4.30	4.68	5.17	5.76	6.49	7.41	8.62	
Depreciation Expense	0.48	0.48	1.13	29.78	29.78	42.91	43.29	43.66	44.04	44.41	44.79	45.16	
Total Operating Costs	15.56	17.72	19.95	51.18	53.27	63.74	68.00	68.72	71.96	75.89	80.73	86.93	
3. Operating Income	7.29	8.78	10.32	(16.11)	(12.96)	(17.02)	(12.36)	(6.25)	1.18	10.46	22.40	37.66	
4. Interest	-	-	8.48	8.48	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16
5. Net Income	7.29	8.78	1.84	(24.59)	(27.12)	(31.18)	(26.52)	(20.41)	(12.98)	(3.70)	8.24	23.50	

MACAS ELECTRIC COOPERATIVE

CASH FLOW
(Thousands of Dollars)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1. Source of Funds											
Operating Income	8.78	10.32	(16.11)	(12.96)	(17.02)	(12.36)	(6.25)	(1.18)	10.46	22.40	37.66
Depreciation Expense	0.48	1.13	29.78	29.78	42.91	43.29	43.66	44.04	44.41	44.79	45.16
Increase in Paid-in Share Capital											
a. Municipalities		75.00		13.00							
b. INECEL	4.0	350.00		60.00							
c. Local Members		110.00		9.46							
Borrowings											
a. AID Loan (proposed)		423.90		284.20							
Total Source of Funds	13.26	950.35	13.67	383.48	25.89	39.93	37.41	42.86	54.87	67.19	82.82
2. Utilization of Funds											
Construction Expenditures											
a. Local Currency	8.23	498.00		89.37	7.5	7.5	7.5	7.5	7.5	7.5	7.5
b. Foreign Exchange		423.90		284.10							
Debt Service											
a. AID Loan		8.48	8.48	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16
Total Utilization of Funds	8.23	930.38	8.48	387.63	21.66						
Increase (Decrease) in Cash	5.03	19.97	5.19	(4.15)	4.23	9.27	15.75	21.20	33.21	45.53	61.16
Cash Balance Beginning of Year	-	5.03	25.00	30.19	26.04	30.27	39.54	55.29	76.49	109.70	155.23
Cash Balance End of Year	5.03	25.00	30.19	26.04	30.27	39.54	55.29	76.49	109.70	155.23	216.39

CERTIFICATE

I hereby certify to the Administrator of the Agency for International Development that to the best of my knowledge and belief Ecuador, as the Borrower, possesses both the financial and human resources effectively to maintain and utilize the project to be undertaken pursuant to the terms of the AID loan proposed in this paper for Rural Electrification of Ecuador with the guarantee of the Government of Ecuador. In so certifying I have taken into account the maintenance and utilization of projects in Ecuador previously financed or assisted by the United States, including two previous loans to the Ecuadorean Institute of Electrification (INECEL), and I have more particularly taken into account the demonstrated capability of Ecuador to effectively utilize development projects of this nature.

5/28/70

Date

R. Minges

Robert J. Minges

Director

A.I.D. Mission to Ecuador

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CHECKLIST OF STATUTORY CRITERIA

(Alliance for Progress)

In the right-hand margin, for each item write answer or, as appropriate, a summary of required discussion. As necessary, reference the section(s) of the Capital Assistance Paper, or other clearly identified and available document, in which the matter is further discussed. This form may be made a part of the Capital Assistance Paper.

The following abbreviations are used:

FAA - Foreign Assistance Act of 1961, as amended by the Foreign Assistance Act of 1968.

App. - Foreign Assistance and Related Agencies' Appropriations Act.

MMA - Merchant Marine Act of 1950, as amended

COUNTRY PERFORMANCE

Progress Towards Country Goals

1. FAA §.208; §.251(f).

A. Describe extent to which country is:

(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.

The Government of Ecuador has placed high priority on agricultural activities, although its efforts have been hindered by serious fiscal problems.

(2) Creating a favorable climate for foreign and domestic private enterprise and investment.

Legislation favorable for private enterprises and investment is in force and being improved; the private sector is healthy and active in Ecuador.

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(3) Increasing the public's role in the developmental process.

The Government of Ecuador is elected by the people in accordance with the Constitution of 1967, the Central Government and the Provincial and Municipal governments are responsive to the needs of the population within the limits of budgetary restraints.

(4) (a) Allocating available budgetary resources to development.

Despite the budgetary restraints, and inefficiencies in the establishment of priorities in public sector expenditures, the budgetary resources allocated to development is significant.

(b) Diverting such resources for unnecessary military expenditure (see also Item No. 13) and intervention in affairs of other free and independent nations. (See also Item No. 17.)

Ecuador and its Government are not diverting budgetary resources for unnecessary military expenditures.

(5) Willing to contribute funds to the project or program.

The GOE has expressed willingness to contribute funds to the project consistent with the budgetary restraints. The creation of a National Electrification Fund was approved by the Ecuadorian Congress in April 21, 1970. (Legislative Decree No. 70-09.)

(6) *Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.*

The rule of law, freedom of expression and of the press exist in Ecuador. These rights are guaranteed by the Constitution. Individual initiative and private enterprise are encouraged and estimated.

(7) *Adhering to the principles of the Act of Bogota and Charter of Punta del Este.*

Ecuador is signatory and adheres to the Act of Bogotá and Charter of Punta del Este.

(8) *Attempting to repatriate capital invested in other countries by its own citizens.*

Attempts are constantly being made in Ecuador to repatriate capital invested in other countries by its own citizens. Ecuador has a relatively sound climate of investment.

(9) *Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.*

The GOE appears to have good intentions, but its performance has been limited.

B. *Are above factors taken into account in the furnishing of the subject assistance?*

All the above factors have been taken into account, especially the strengthening of the cooperative movement and the allocation of funds for the general electrification of Ecuador including the rural areas.

Treatment of U.S. Citizens

2. FAA §.620(c). *If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?*

It has not been determined that the GOE has taken any steps which require the application of the sanctions prescribed by this Section.

3. FAA §.620(e)(1). *If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing-ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?*

It has not been determined that the GOE has taken any steps which require the application of the sanctions prescribed by this Section.

4. App. B.106. *If country attempts to create distinctions because of their race or religion among Americans in granting personal or commercial access or other rights otherwise available to U.S. citizens generally, what steps (will be) (have been) taken during loan negotiations to influence elimination of such distinctions?*

Ecuador does not take such action.

5. FAA §. 620(o); Fishermen's Protective Act. §.5. *If country has seized, or imposed any penalty or sanction against, any U.S. fishing vessel on account of its fishing activities in international waters,*

a. has any deduction required by Fishermen's Protective Act been made?

b. has complete denial of assistance been considered by A.I.D. Administrator?

Since January 1, 1968, arrest incidents have been reported as follows: March 20, 1968, 1 boat; August 7, 1968, 4 boats; December 10; 1969, 1 boat; June 18, 1969, 1 boat; February 14, 1970, 1 boat. Protests have been lodged with the GOE.

Although there have been four seizures of U.S. fishing vessels by Ecuador that could qualify as requiring deductions, claims are provisionally pending action during negotiations with Chile, Ecuador and Peru to reach a practical solution to the fisheries problem.

The Loan will not be authorized unless the A.I.D. Administration considers denying assistance to the GOE and determines nevertheless to permit the authorization.

Relations with U.S. Government and Other Nations

6. FAA §. 620(d). *If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?*

Not applicable.

7. FAA §. 620(j). *Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action, of U.S. property?*

The GOE has always protected and tried to prevent damage or destruction by mob action of U. S. property.

8. FAA §.620(l). *If the country has failed to institute the investment guaranty program for the specific risks of expropriation, in convertibility or confiscation, has the A.I.D. administration within the past year considered denying assistance to such government for this reason?*
- Ecuador has instituted such a program.
9. FAA §.620(q). *Is the government of the recipient country in default on interest or principal of any A.I.D. loan to the country?*
- No.
10. FAA §.620(t). *Has the country severed diplomatic relations with U.S.? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?*
- No.
11. FAA §.620(u). *What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearage taken into account by the A.I.D. Administrator in determining the current A.I.D. Operating Year Budget?*
- Ecuador is now in the process of making necessary payment for arrearages to the U.N. It is expected that this payment will be made during the next few weeks. The Administrator has also authorized continued assistance to Ecuador in accordance with FAA §.620(a).
12. FAA §.620(a); App. §.107(a) and (b). *Does recipient country furnish assistance to Cuba, sell strategic material to Cuba, or permit ships or aircraft under its flag to carry cargoes to or from Cuba.*
- No.

13. FAA §.620(b). *If assistance is to a government, has Secretary of State determined that it is not controlled by the international Communist movement.* The Secretary of State has determined that Ecuador is not controlled by International Communist movement.
14. FAA §.620(f), App. §.109. *Does recipient country have a communist government* No.
15. FAA §.620(i). *Is recipient country in any way involved in (a) subversion of, or military aggression against, the U.S. or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression.* No.
16. FAA §.620(n); App. 107(b) and 116. *Does recipient country furnish goods to North Viet-Nam or permit ships or aircraft under its flag to carry cargoes to or from North Viet-Nam?* No.

Military Expenditures

17. FAA §. 620(s). *What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points to be coordinated with PPC/MAS.)* The Military budget is approximately 12% of the GOE budget. A marginal amount of foreign exchange is spent in military equipment. PL-480 or other development assistance is not used for military purposes. The country's resources are not devoted to military expenditures to a degree that materially interferes with its development.

18. App. B.119. How much spent by country during current U.S. fiscal year for sophisticated military equipment purchased since January 1, 1968? Has corresponding amount been deducted from current OYB, or is the weapons purchase determined by the President to be important to U.S. national security? (Responses to these questions to be coordinated with PPC/MAS.)

Ecuador has not purchased sophisticated military equipment since January 1, 1968.

CONDITIONS OF THE LOAN

General Soundness

19. FAA §.201(d). Information and conclusion on reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.

The terms and conditions of the loan are considered reasonable and consistent with the laws of Ecuador and the United States.

20. FAA §.251(b)(2); §.251(e). Information and conclusion on activity's economic and technical soundness. If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to A.I.D. an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner.

The activity is considered economically and technically sound and the GOE through INECEL has submitted an application for the Loan, assuring that funds will be used in an economically and sound manner.

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21. FAA §.251(b). *Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.* The Borrower is considered capable of repaying the Loan. Ecuador has a good record of payments of its foreign debt.
22. FAA §.611(a)(1). *Prior to signing of loan will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?* All necessary plans for the project including a reasonably estimate of the costs to the U. S. of the assistance have been prepared. Additionally the Borrower will be required in the Loan Agreement to present to AID final plans and specifications including the costs of each subproject under the Loan.
23. FAA §.611(a)(2). *If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purposes of loan?* No further legislative action is required within Ecuador for the proposed Loan.
24. FAA §.611(e). *If loan is for capital assistance, and all U.S. assistance to project now exceeds \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?* The Mission Director's certification appears in Annex IX of the Loan Paper.
25. FAA §.251(b). *Information and conclusion on availability of financing from other free-world sources, including private sources within the United States.* On the basis of appropriate inquiry, it appears that the activities proposed for financing under this loan cannot be financed from other sources.

Loan's Relationship to Achievement
of Country and Regional Goals

26. FAA §.207; §.251(a). *Extent to which assistance reflects appropriate emphasis on; (a) encouraging development of democratic economic, political, and social institutions; (b) self-help in meeting the country's food needs; (c) improving availability of trained manpower in the country; (d) programs designed to meet the country's health needs, or (e) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and voluntary agencies; transportation and communication; planning and public administration; urban development; and modernization of existing laws.*
- The project will materially (a) encourage the development of economic, political and social institutions of Ecuador, in the rural areas; (b) will promote self-help through cooperatives which are indirectly involved in providing agriculture inputs that will raise the food production in Ecuador; and will also facilitate the economic and social development through small agricultural operations, small industries and cooperatives.
27. FAA §.209. *Is project susceptible of execution as part of regional project? If so why is project not so executed?*
- No.
28. FAA §.251(b)(3). *Information and conclusion on activity's relationship to, and consistency with, other development activities, and its contribution to realizable long-range objectives.*
- The project is clearly consistent with other development activities in Ecuador as reflected in the project description and contributes to reliable long-range objectives.

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29. FAA §.251(b)(7). *Information and conclusion on whether or not the activity to be financed will contribute to the achievement of self-sustaining growth.* As reflected in the paper, the activity will contribute to the achievement of self-sustaining growth in Ecuador.
30. FAA §.281(a). *Describe extent to which the loan will contribute to the objective of assuring maximum participation in the task of economic development on the part of the people of the country, through the encouragement of democratic, private, and local governmental institutions.* The proposed assistance will contribute to the objectives stated in this section.
31. FAA §.281(b). *Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.* As reflected in the Loan Paper the project meets all the stated criteria. It encourages the formation of two rural electric cooperatives and active participation of the Ecuadorean population living in rural areas.

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32. FAA §.601(a). *Information and conclusions whether loan will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions.*
- Proposed Loan will encourage efforts of the country to foster private initiative and the development and use of cooperatives, as well as improving the technical efficiency of small industry and agriculture.
33. FAA §.619. *If assistance is for newly independent country; is it furnished through multilateral organizations or plans to the maximum extent appropriate?*
- Not applicable.
34. FAA §.251(h). *Information and conclusion on whether the activity is consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress in its annual review of national development activities.*
- The activity is consistent with the recommendations of CIAP.
35. FAA §.251(g). *Information and conclusion on use of loan to assist in promoting the cooperative movement in Latin America.*
- Proposed Loan will promote the formation and organization of new cooperatives in the rural areas of Ecuador.

36. FAA §.209; §.251(b)(8).
Information and conclusion whether assistance will encourage regional development programs, and contribute to the economic and political integration of Latin America.

Proposed Loan will encourage regional development through rural electrification and will indirectly contribute to the economic integration of Latin America.

Loan's Effect on U.S. and A.I.D Program

37. FAA §.251(b)(4); §.102:
Information and conclusion on possible effects of loan on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving the U.S. balance of payments position.

The proposed loan will not have an adverse effect on the U. S. economy or areas of labor surplus. Assistance will be furnished in a manner consistent with improving U. S. balance of payments position.

38. FAA §.601(b). *Information and conclusion on how the loan will encourage U.S. private trade and investment abroad and how it will encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).*

U. S. private trade and investment abroad will be encouraged through the development of additional possibilities via the import component of this loan.

39. FAA §.601(d). *If a capital project, are engineering and professional services of U.S. firms and their affiliates used to the maximum extent consistent with the national interest?*
- Yes. They will be so used.
40. FAA §.602. *Information and conclusion whether U.S. small business will participate equitably in the furnishing of goods and services finance by the loan.*
- The Loan Agreement will contain the standard provisions to insure that U. S. small business will participate equitably in the furnishing of goods and services financed under the proposed loan.
41. FAA §.620(h). *Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries?*
- No.
42. FAA §.621. *If technical assistance is financed by the loan, information and conclusion whether such assistance will be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis. If the facilities of other Federal agencies will be utilized, information and conclusion on whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs.*
- Technical assistance will be secured from NRECA and from other Latin American countries which are qualified in the rural electrification field.

43. FAA §.252(a). *Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources.*
- Funds under proposed loan will be utilized to secure equipment and materials from private enterprise, except for the small portion required for technical assistance.

Loan's Compliance with Specific Requirements

44. FAA §.201(d). *Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter?*
- Yes.
45. FAA §.603(a). *Information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.*
- The Loan Agreement will provide for compliance with excess property procurement regulations.
46. FAA §.604(a); App. §.103. *Will all commodity procurement financed under the loan be from U.S. except as otherwise determined by the President?*
- Commodity procurement will be from U. S. and Western Hemisphere countries south of Canada except Cuba, as determined by the new untying policy established for Latin America.

47. FAA §.604(b). *What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price?*

The loan agreement will provide for compliance with bulk commodity procurement regulations.

48. FAA §.604(d). *If the host country discriminates against U.S. marine insurance companies, will loan agreement require that marine insurance be placed in the U.S. on commodities financed by the loan?*

Yes.

49. FAA §.604(c). *If off-shore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?*

The project does not contemplate the off-shore procurement of any agricultural commodity or product.

50. FAA §.611(b); App. §.101. *If loan finances water or water-related land resource construction project or program, is there a benefit-cost computation made, insofar as practicable, in accordance with the procedures set forth in the Memorandum of the President dated May 15, 1962?*

Not applicable.

51. FAA §.611(a). *If contracts for construction are to be financed, what provision will be made that they be let on a competitive basis to maximum extent practicable?*

The Loan Agreement will provide that all construction contracts be let on a competitive basis.

52. FAA §.620(g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property?

Appropriate provision will be included in the Loan Agreement to insure that the funds of the proposed loan will not be used to compensate for expropriated or nationalized property.

53. FAA §.612(b); §.636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

As reflected in the financial plan, maximum feasible local contributions have been sought and obtained.

54. App. §.104. Will any loan funds be used to pay pensions, etc., for military personnel?

No.

55. App. §.111. Compliance with requirements for security clearance of U.S. citizen contract personnel.

These requirements will be complied with.

56. App. §.112. *If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms?* The Loan agreement will provide for compliance with this requirement. Thus A.I.D. will approve all contractors and contract terms to be financed under the proposed loan.
57. App. §.114. *Will any loan funds be used to pay U.N. assessments?* No.
58. App. §.115. *Compliance with regulations on employment of U.S. and local personnel for funds obligated after April 30, 1964 (Regulation 7).* The loan agreement will assure compliance with this section.
59. FAA §.636(f). *Will any loan funds be used to finance purchase, long-term lease, or exchange of motor vehicle manufactured outside the United States, or any guaranty of such a transaction?* No.
60. App. §.401. *Will any loan funds be used for publicity or propaganda purposes within U.S. not authorized by the Congress?* No.

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61. FAA §.620(k). *If construction of productive enterprise, will aggregate value of assistance to be furnished by U.S. exceed \$100 million?* No.
62. FAA §.612(d). *Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?* No. The U. S. does not own excess foreign currency.
63. MMA §.901.b. *Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed with funds made available under this loan shall be transported on privately owned U.S. flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.* The Loan Agreement will provide for compliance with the 50 per centum U. S. flag shipping requirement.

DRAFT LOAN AUTHORIZATION

Provided from: Alliance for Progress Loan Funds
ECUADOR: Rural Electrification Assistance

Pursuant to the authority vested in the Deputy U. S. Coordinator, Alliance for Progress, by the Foreign Assistance Act of 1961, as amended, and the delegation of authority issued thereunder, I hereby authorize the establishment of a loan ("Loan") pursuant to Part I, Chapter 2, Title VI, Alliance for Progress, to the Republic of Ecuador ("Borrower") of not to exceed three million five hundred and fifty thousand dollars (\$3,550,000) to assist in financing a portion of the foreign costs of Borrower's program of rural electrification, the Loan to be subject to the following terms and conditions:

1. Interest and Terms of Repayment.

Borrower shall repay the Loan to the Agency for International Development ("A.I.D.") in United States dollars within (40) years from the first disbursement under the Loan, including a grace period of not to exceed ten (10) years. The Borrower shall pay to A.I.D. in United States dollars on the disbursed balance of the Loan interest of two percent per annum during the grace period and three (3) percent per annum thereafter.

2. Conditions Precedent to Disbursement.

- a) Prior to the first disbursement, INECEL shall present to AID and to the satisfaction of AID, a program for implementation of the cooperative portion of the project, including the establishment with adequate staff of a section within INECEL to be responsible for the promotion, organization and administration of rural electric cooperatives.

- b) INECEC shall submit to AID and to the satisfaction of AID an audit of its operations.
- c) Prior to committing or disbursing funds for each sub-project, INECEC shall present to AID for approval: (1) final plans and specifications, including updated feasibility studies, financing and construction plans for each sub-project. (2) Drafts of all contracts for the procurement of equipment and materials and construction facilities.

3. Other Terms and Conditions.

- a) Except for marine insurance, goods and services financed under the Loan shall have their source and origin in the United States or in any independent country of the Western Hemisphere south of the United States except Cuba. Marine insurance financed under the loan shall have its source and origin in the United States or in any independent country south of the United States except Cuba, provided, however, that such insurance may be financed under the loan only if it is obtained on a competitive basis and any claims thereunder are payable in convertible currencies.
- b) The Loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

4. Covenants.

INECEC will be required to give adequate assurance to AID that its local contribution and the necessary suppliers credit will be available on a timely basis to carry out the sub-projects.

Deputy U.S. Coordinator

Date