MID-TERM EVALUATION

OF

RURAL ELECTRIFICATION II (PER-2)

USAID PROJECT NO. 520-0248

September 30, 1985

FINAL REPORT

on

MID-TERM EVALUATION

of

RURAL ELECTRIFICATION II (PER-2)

USAID PROJECT NUMBER 520-0248

by the

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION
1800 Massachusetts Avenue, N.W., Washington, D.C. U.S.A.

July 15 - August 2, 1985

PROJECT BEING IMPLEMENTED

by the

NATIONAL INSTITUTE FOR ELECTRIFICATION
(INSTITUTO NACIONAL DE ELECTRIFICACION - INDE)
Republic of Guatemala, Central America

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PROJECT BACKGROUND

The project purpose, as summarized from the project paper, Guatemala - Rural Electrification (revised) June 12, 1978, AID-DLC/P-2269, and later amendments and implementation letters, is to provide electric service to small villages in rural areas in the Western and Central Highlands, Eastern and South Coast Regions of Guatemala. The project will provide 70,000 new connections, approximately 33,000 in previously non-electrified populations and 37,000 in electrified populations. The construction of 56 kilometers of 69 KV transmission lines and 901 kilometers of distribution networks will service 342 beneficiary communities. Project financing is provided by a $10.6 million AID loan and $12.6 million GOG counterpart contribution for a total project cost of $23.2 million.

INTRODUCTORY STATEMENT

The evaluators arrived in Guatemala City on July 14, 1985 for a three-week period to carry out the Mid-Term Evaluation of this USAID-financed project, Project Number 520-0248, Rural Electrification II, being implemented by the National Institute for Electrification (Instituto Nacional de Electrificación - INDE). The evaluation was carried out in accordance with the Statement of Work contained in Article II of the Program Description (Attachment 2) of Cooperative Agreement No. 520-0000-A-00-5273-00, dated July 5, 1985, between USAID/Guatemala and the National Rural Electric Cooperative Association (NRECA), of Washington, D.C., U.S.A. (A copy of the section of

the Program Description containing the Statement of Work is included as Attachment No. 1.)

METHODOLOGY

As agreed with USAID/Guatemala staff, the Statement of Work was the prime guideline for undertaking and completing the evaluation. This was supplemented by the use of Worksheet No. 6, entitled "General Appraisal of Overall Rural Electrification Program," and Worksheet No. 7, entitled "General Appraisal of Operating Programs Requesting AID Assistance," which are a part of NRECA's Planning Model for Rural Electrification in Developing Countries (see Attachment No. 2). During the evaluation the evaluators conducted numerous interviews with staff of USAID, PER-2 (the implementing unit of INDE), INDE headquarters, regional and sub-regional personnel, the project consultants and beneficiaries in villages. A list of major contacts is appended at Attachment No. 3. A list of areas and villages visited is appended as Attachment No. 4.

FINDINGS AND RECOMMENDATIONS

As agreed with USAID and PER-2 staff, this evaluation report will follow the outline of the Statement of Work.

A. Physical and Financial Advance of the Project Against Programmed Targets

1. Findings - Physical Advance

Actual findings on physical advances against programmed targets are shown on Chart 1, Rural Electric Distribution Systems - Outputs/Advance, and Chart 2, Physical Advance of PER-2, as follows:

Original targets are taken from the Loan Agreement, USAID Loan Number 520-T-031, signed between USAID and the Ministry of Finance of the Government of Guatemala (GOG) on May 21, 1979. Procedural delays in internal GOG approval prevented the initial implementation until July 1980. The original programmed targets were changed in the reprogramming document, Plan de Electrificación Rural No. 2 (PER-2) - Reprogramación, March 1983, according to the Cronograma de Trabajo shown on page 88. The changes, with the exception of the number of villages, are noted on Chart 1 which follows. While the reprogramming document does not explicitly state the total number of villages to be electrified, it does list those already electrified. Page 12 of the above-cited document, "Cuadro de Avance Físico Según Programa Original" (work completed as of December 31, 1982), shows 64 previously non-electrified villages and 6 previously partially electrified villages which were electrified as of that date. It also lists those to be electrified between 1983 and 1985. The consultants' reports list an additional 158 previously non-electrified and 114 previously partially electrified villages to be completed under the program, for a grand total of 342 villages as follows:

CHART No. 1

RURAL ELECTRIC DISTRIBUTION SYSTEMS-OUTPUTS/ADVANCE

CATEGORY	Loan Agreement AID	Reprogrammed* GOG	Actual Outputs 6/30/85 Completed	Percentage
1. 387 Kms. of 7.6 KV distribution lines	583 Kms.	321.1 Kms.	205.0 Kms.	63.8%
2. Secondary (120/240 V) lines installed	489 Kms.	901.2 Kms.	758.1 Kms.	84.1%
3. Service drops, meters and house wiring	70,000	70,000	38,946	55.6%
4. 69 KV Subtransmission lines	150 Kms.	56 Kms.	50.4 Kms.	90.0%
5. Substation constructed	1	1	0	0

* See Plan de Electrificación No. 2 (PER-2) Reprogramming, March 1983, page 88.

CHART 2

PHYSICAL ADVANCE OF PER-2

TYPE	Dec. 1982	%	Dec. 1984	%	June 1985	%	Dec. 1985
1. Primary Distribution Lines							
Projected	583?		229.2	71	275.2*	85.7	321.1
Actual	46.9	8.0	154.4	48.1	205.0	63.8	
2. Secondary Distribution Lines							
Projected	589?		650	72.2	732*	81.2	901.2
Actual	143.2	24.3	561.1	62.3	758.1	84.1	
3. Consumer connections							
Projected	70,000?		45,235	65.0	57,618*	82.3	70,000
Actual	4,407	6.3	24,005	34.3	38,946	55.6	
4. Transmission line							
Projected	150		56	100	56*	100	56
Actual	12	8.0	50.4	90	50.4	90	
5. Substation							
Projected	1?		1	100	1*	100	1
Actual	0	0	0	0	0	0	

* June 1985 projected targets estimated on 6/12 of programed targets for total year 1985.

? Lacking original projection of project targets for 1982 The percentages of completion noted above are based on project targets listed in Project Paper.

222 previously non-electrified

120 previously partially electrified

The evaluators have used the targets as amended by the March 1983 Cronograma de Trabajo as a basis for reporting on the physical advance of the project. In general terms, the advance of the project through June 30, 1985 against programmed physical targets is as follows:

	Target	Completed	% Completed
Primary Distribution Lines	321.1 kms.	205.0 kms.	63.8%
Secondary Distribution Lines	901.2 kms.	758.1 kms.	84.1%
Consumer Connections	70,000	38,946	55.6%
Transmission Line	56.0 kms.	50.4 kms.	90.0%
Substation	1	0	0.0%

It was projected in the reprogramming document of March 1983 that the construction program of PER-2 would have been completed by December 31, 1985 and that progress by the end of June 1985 would have been greater than that actually achieved. See Chart No. 2. For example, the construction of primary distribution lines was projected to have been 85.87 percent completed and the progress reports of the consultants indicate that only 63.8 percent of the distribution lines had been completed by that date. The document also projected that 83.2 percent or 57,618 connections would have been made; as of June 30, 1985, only 55.5 percent or 38,946 were connected.

The main reasons cited by project staff and others for this lack of progress against programmed targets were (1) the complex nature of the procurement procedures and (2) the Intervention in INDE by the GOG in 1984.

The procedures within INDE for all but extremely minor purchases appear to be extremely slow. According to INDE's own guidelines, there are at least 13 steps which must be taken between the initiation of a purchase request and the approval of the request. Generally this process takes from three to four months and the document(s) have to be published for public bid. The certification and adjudication process takes approximately two months, the contracting takes a minimum of one month and most often more, and the delivery of the materials and/or supplies takes a minimum of two additional months. Thus it is estimated that the total process will take a minimum of 11 to 12 months. The evaluators were told by INDE and PER-2 staff that the average time between initiation of a purchase order to the receipt of the materials and/or supplies was between 16 and 24 months.

There had been a particular slowness in consumer connections because of the lack of fuse breaker boxes and meters. The fuse breaker boxes arrived in Guatemala shortly after the arrival of the evaluators, and the scarcity of meters should be relieved by the emergency order of materials noted below.

Efforts are being made to speed up the procurement process. These efforts include:

a. Emergency purchase of local materials in the amount of Q50,000. Purchase in process.

b. Emergency purchase of $94,000 of materials and supplies from the U.S. GOG approval was received by PER-2 staff while the evaluators were in Guatemala.

c. Purchase of materials, supplies and vehicles in the amount of some $844,000 through USAID procurement procedures. Approval was given by the GOG on July 22, 1985. With estimated arrival time of materials purchased through this process at six months, they thus will not arrive before the estimated project completion date of December 3', 1985.

USAID and INDE staff are confident that the above measures will enable the project to reach its physical targets, but not by December 31, 1985.

2. Recommendations - Physical Advance

The evaluators strongly recommend that the date for completion of the project be extended. The length of the extension should be set by mutual agreement between USAID/Guatemala and the GOG-INDE.

INDE should take an in-depth look at its purchasing procedures and amend them to streamline and speed up the purchasing process. In reviewing

the purchasing procedures, it seems that the process could be modified so that the time between the initial requests for materials, supplies, equipment and/or vehicles and the time of their actual arrival in the warehouse could be reduced from the present estimated time of 16 to 24 months to a maximum of 12 months -- even possibly to eight months.

3. Findings - Financial Advance

Actual findings on the financial advance of the project against programmed inputs are shown on Chart 3.

Original inputs are taken from the loan agreement and indicate a total project cost of some $15 million, with USAID Loan Number 520-T-031 providing $8.6 million and the GOG/INDE providing counterpart funding of $6.4 million.

The original programmed inputs were changed in the Reprogramming Document, Plan de Electrificación Rural No. 2 (PER-2) - Reprogramación, March 1983, page 94 of which appears in the Programa de Financiamiento. With slight modification, these inputs were agreed to by USAID in Project Amendment No. 1, signed between USAID and representatives of the GOG and INDE on September 30, 1983. (A copy of Amendment No. 1 is attached as Attachment No. 5.) This Amendment added some $7.9 million to the inputs of the project, with $2 million being provided by USAID (Loan No. 520-T-038) and $5.9 million in counterpart funding by GOG/INDE, bringing the total funding for the project to $22.9 million.

CHART No. 3

27 July 1985

FINANCIAL ADVANCE OF PROJECT
AID LOANS 520-T-031 AND 520-T-038
TARGETS (INPUTS)

Category	Project Paper a/			Reprogrammed c/			Reprogrammed d/			Actual Expenditures 6/30/85 e/			
	AID (000)	GOG b/ (000)	TOTAL (000)	AID (000)	GOG (000)	Total (000)	AID (000)	GOG (000)	TOTAL (000)	AID (000)	GOG (000)	Total (000)	%
1. Construction	6,670	4,870	11,540	10,015	8,983	18,998	9,715	9,282.8	18,997.8	6,053.9	7,944.3	13,998.2	73.7
2. Consulting Services	300	--	300	--	300	300	--	300	300	--	256.1	256.1	85.4
3. INDE Engineering and Administration	--	760	760	--	1,489	1,489	--	1,489	1,489	--	1,454.2	1,454.2	97.7
4. Maintenance and Service Equipment	300	--	300	315	218	533	615.0	218.0	833.0	--	301.4	301.4	36.2
5. Technical Assistance and Training	300	--	300	270	80	350	270.0	80.0	350.0	22.3	--	22.3	6.3
6. Aerial Photography	--	--	--	--	150	150	--	150	150	--	150	150	100.0
7. Inflation	940	700	1,640	--	370	370	--	370	370	--	22.3	22.3	6.0
8. Contingency	90	70	160	--	710	710	--	710.2	710.2	--	--	--	0.0
TOTALES	8,600	6,400	15,000	10,600	12,300	22,900	10,600	12,600	23,200	6,076.2	10,128.3	16,204.5	69.9

a. See Inputs, Page 3, Log Frame, Annex F, Project Paper, Guatemala Rural Electrification (Revised) (June 12. 1978).
b. Includes Resources of INDE and GOG.
c. See Amendment Number 1 dated September 30, 1983.
d. See Implementation Letter No. 40 dated May 8, 1984.
e. PER-2 Financial Advance dated June 30, 1985.

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These reprogrammed inputs were slightly modified by Implementation Letter No. 40, dated May 8, 1984, which provided for an additional input for GOG/INDE of some $300,000 into the Labor line item under construction and the transfer by USAID of $300,000 from the Labor line item to the Service, Maintenance and Construction Equipment line item. (See copy of Implementation Letter, Attachment No. 6.) The additional inputs from GOG/INDE brought the total inputs of the project to the present $23.2 million as shown on Chart No. 3. Actual expenditures for the project through June 30, 1985 are shown on "Avance Financiero del Proyecto," Attachment No. 7. In general terms, the advance of the project through June 30, 1985 against programmed inputs is as follows:

Line Item	Expenditures (000)	Percent of Total Budget
Construction	13,998.2	73.7%
Consultancy	256.1	85.4%
Engineering and Administration	1,454.2	97.7%
Service, Maintenance and Equipment	301.4	36.2%
Technical Assistance and Training	22.3	6.3%
Aerial Photography	150.0	100.0%
Inflation	22.3	6.0%
Contingency	0.0	0.0%
TOTALS	16,204.5	69.0%

A cursory glance at these overall figures appears favorable. But a closer examination of some of the individual line items reveals otherwise.

Chart No. 4

COMPARATIVE ANALYSIS
Actual Expenses Against Budget
As of June 30, 1985

Line Item	Source	Budget[1] (000)	Expenditures[2] (000)	%
1. Construction	AID	9,715.0	6,053.9	62.3
	GOG/INDE	9,282.8	7,944.3	85.6
2. Consultancy	GOG/INDE	300.0	256.1	85.4
3. Eng. & Adm.	GOG/INDE	1,489.0	1,452.2	97.7
4. Maint/Svc eq.	AID	615.0	0.0	0.0
	GOG/INDE	218.0	301.4	138.3
5. TA & Training	AID	270.0	22.3	8.3
	GOG/INDE	80.0	0.0	0.0
6. Aerial Photog.	GOG/INDE	150.0	150.0	100.0
7. Inflation	GOG/INDE	370.0	22.3	6.0
8. Contingency	GOG/INDE	710.2	0.0	0.0
TOTALS	AID	10,600.0	6,076.2	57.3
	GOG/INDE	12,600.0	10,126.3	80.0

1. Present Operating Budget set by Implementation Letter No. 40, dated May 8, 1984.

2. Actual Expenditures as of June 30, 1985 as reported by PER-2 Financial Advance.

There are some difficulties looming which must be taken into account if the project is going to be adequately financed at the local level.

The comparative analysis of line item 1, Construction, indicates that GOG/INDE has spent 85.6 percent of its budgeted amount of $9,282,800, while the physical advance on Chart No. 2 (page 5) indicates only 63 percent of the primary distribution lines, 84 percent of the secondary distribution lines, 90 percent of the transmission line and no percentage of the substation has been built.

The comparative analysis of line item 2, Consultancy Services, indicates that 85.4 percent of this line item has been spent. The present consultancy agreement as written has funds only to carry it through November 1985. The comparative analysis of line item 3, Engineering and Administration, indicates that 97.7 percent of this line item has been spent.

A comparative analysis of line item 4, Service, Maintenance and Construction Equipment, shows that GOG/INDE has spent $301,400 or 138.3 percent of its originally budgeted $218,000.

Expenditures on the other items in the budget are way below budget to date, with the exception of Aerial Photography, which spent precisely 100% of the funds allocated.

4. Recommendations - Financial Advance of the Project

The evaluators recommend that USAID, the Implementing Unit and GOG/INDE plan an early meeting to discuss the counterpart inputs into this project to assure sufficient local funding to meet projected project outputs. Perhaps some of the funds allocated to Inflation and Contingency could be transferred to line items 1, 2, 3 and 4.

The evaluators recommend that more monies be provided so that the Consultancy Services can be extended to coincide with the extended life of the project, if such an extension of the project is agreed to by all parties.

It is also highly recommended that INDE and the implementing unit take advantage of the training and technical assistance component of this project. See the recommendation below in the section on Human Resources, page 34.

5. Preliminary Statistical Information on Usage Patterns for New INDE Consumers Connected by PER-2 as of March 1983

Chart No. 5 reflects the usage information made available to the evaluators about new consumers connected under the PER-2 program. As can be seen, of the total 24,252 new consumers indicated on the chart, the average consumption per consumer per month is 12.24 kWh and the average bill per

Chart 5

Preliminary Statistical Information on New INDE Consumers Connected Under PER-II as of March 1985

	Consumers	Consumption kWh/month	Average KWh/Month/Users	Charges/month	Average charge/ monthly/user
Consumers connected in eastern areas of country	6,783	101,263	14.93	Q 19,501.68	Q 2.88
Consumers connected in western areas of country	17,469	195,445	11.19	Q 42,133.13	Q 2.41
Totals	24,252	296,708	12.24	Q 61,634.81	Q 2.54

NOTE: Of total consumers, 12,799 were connected during 1984; the month used as a base was March 1985 and was taken from the report on consumers of PER-2 for the period ending March 31, 1985 dated April 23, 1985.

Guatemala, June 21, 1985

/s/Ing. Raul Castañeda Illescas
Executive Director of PER-II

consumer per month is Q2.54 (or approximately US$.85 at the current exchange rate of three quetzales for one U.S. dollar).

The Project Paper projected an annual usage per consumer of some 200 kWh per year (see page 104 of the Project Paper). The annual consumption of almost 150 kWh per consumer (12 months x 12.24 kWh) is under that projection by 25 percent. This is not unusual in new rural electrification programs, but if the projects are to become financially viable, INDE must undertake a serious productive uses of electricity program. Recommendations to this end are contained in section D, page 60 below. Experience shows that the broader usage of electricity in the rural villages and farms provides economic justification for future projects.

Note: PER-2 personnel indicated that the statistical report is usually about three months behind the actual connections made by PER-2, thus explaining the difference between the figures on connections reported in the Physical Advance of the Project (Chart 2) and those contained in this Statistical Summary (Chart 5).

B. Assessment of INDE's and Implementing Unit's Capabilities to Successfully Implement the Project in the Areas of Promotion and Selection of Villages, Procurement Procedures, Human Resources and Construction Equipment

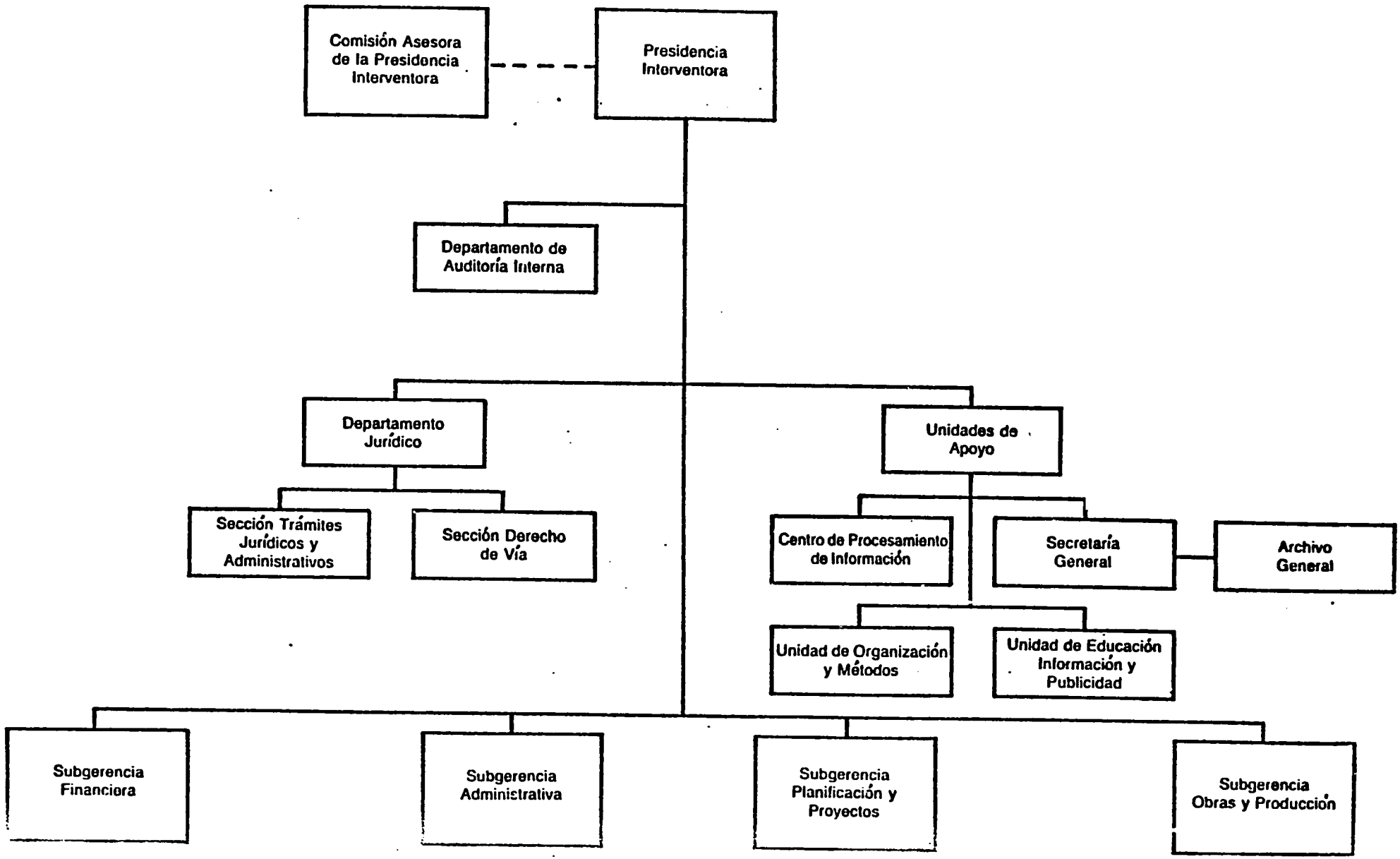
This was one of the more difficult areas to assess because assessing total capability under these circumstances is almost impossible. INDE is a large and complex organization (see organization chart in Chart 6) while the organization of the implementing unit for PER-2 is less complex (see Chart 7). The assessment which follows is primarily based on observable results to date in project achievement, review of policies and procedures implemented (or not implemented) and in-depth interviews with the principles involved in carrying out the projects.

1. Selection and Promotion of Villages (NOTE: the villages first had to be selected and, once selected, the promotion phase began.)

a. Findings - Selection of Villages

Selection criteria for the initial selection of villages are enumerated on pages 26 through 28 of the reprogramming document (Plan de Electrificación Rural No. 2 (PER-2), Reprogramación, March 1983). The capability of INDE staff demonstrated in setting these criteria was excellent. The process of selection appears to be based on sound criteria. The four criteria used are used in pre-feasibility studies for rural electrification programs around the world: the length of the secondary

ORGANIGRAMA DEL INSTITUTO NACIONAL DE ELECTRIFICACION (INDE) 1984



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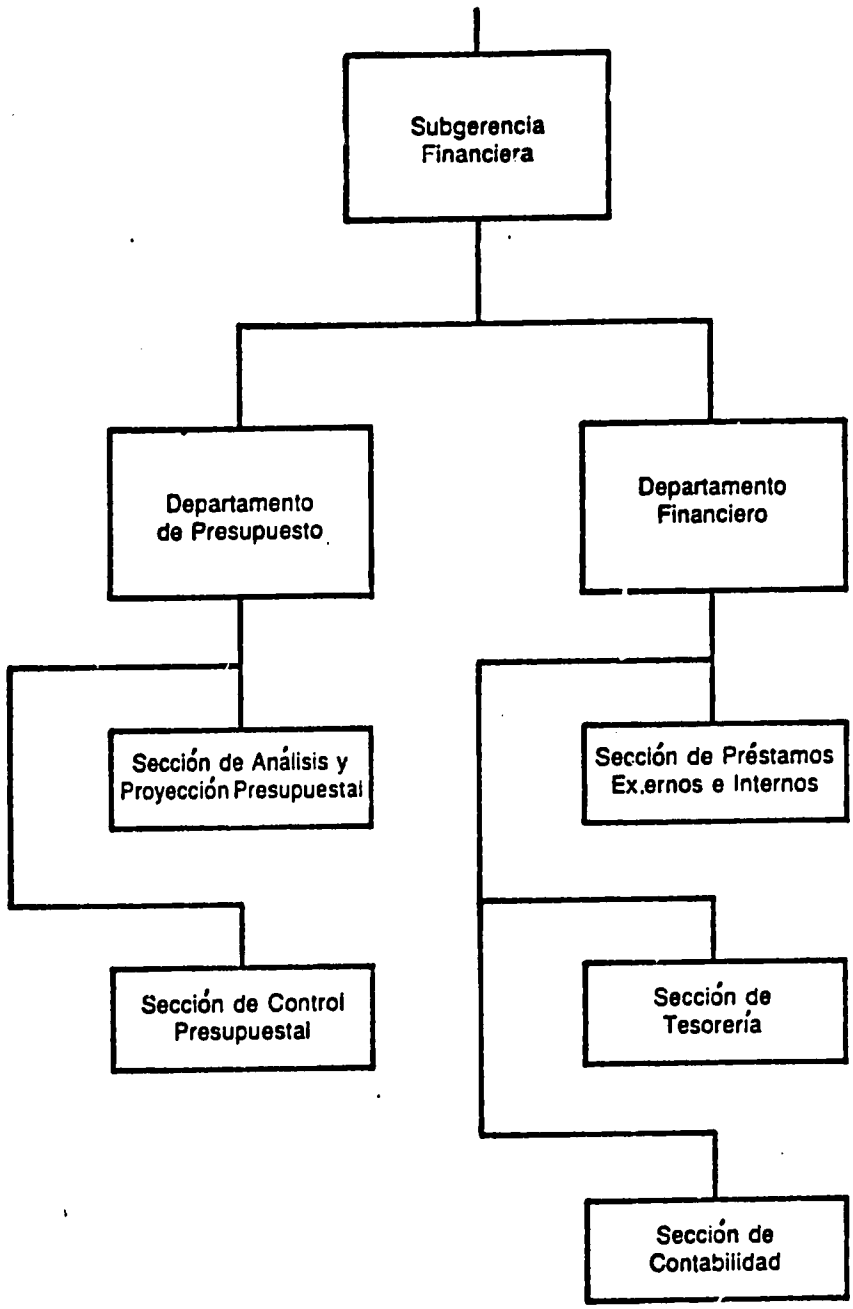

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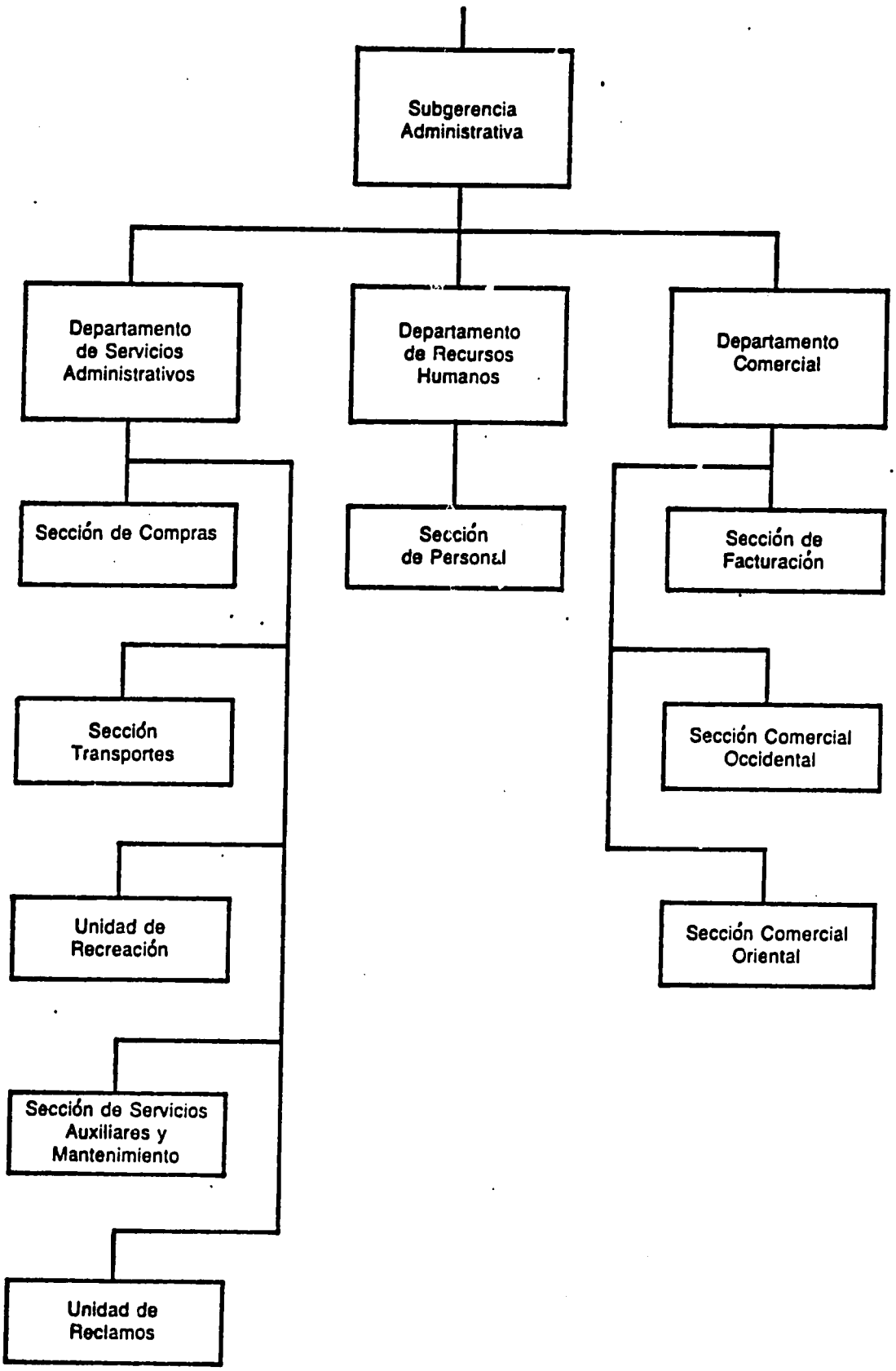

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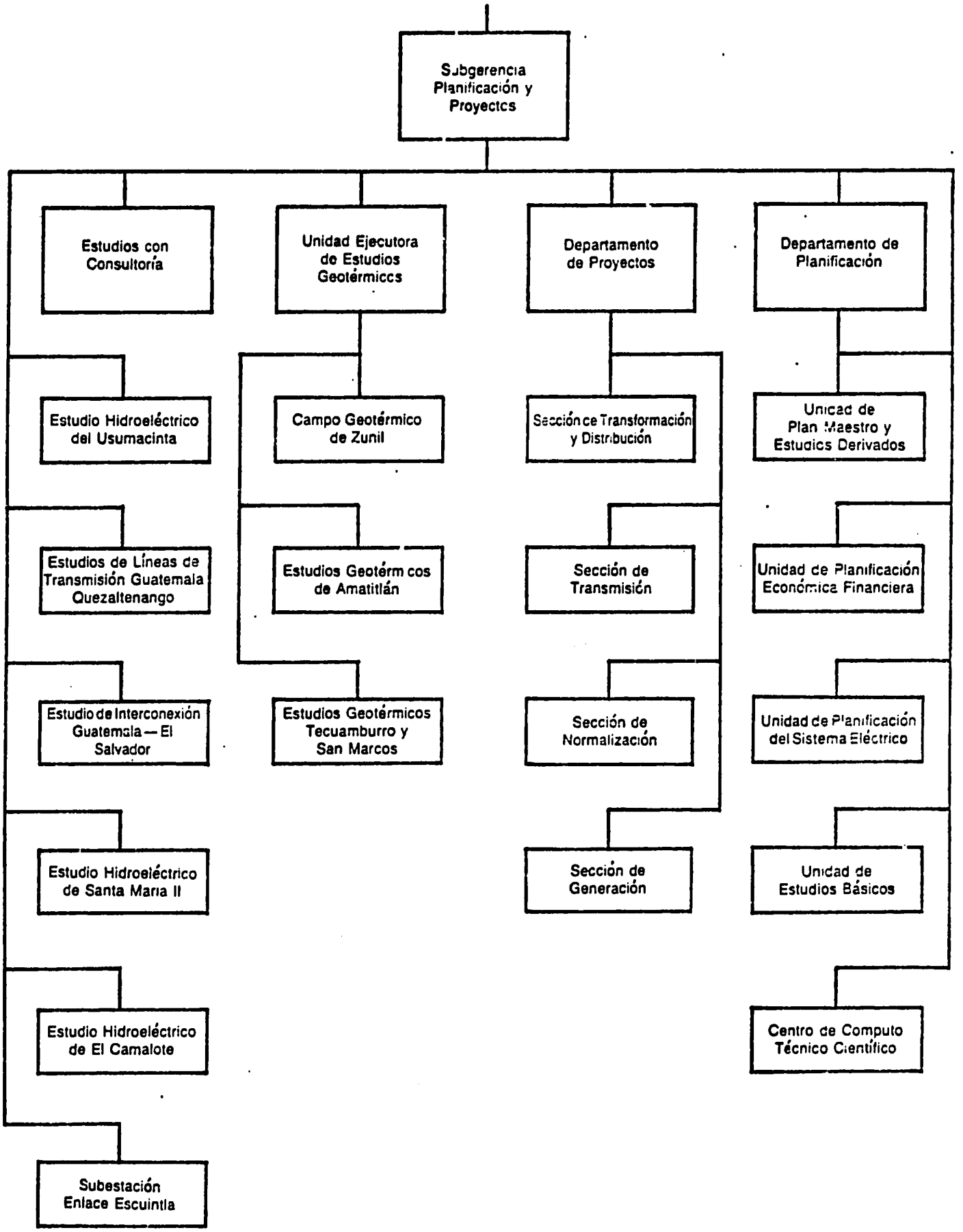

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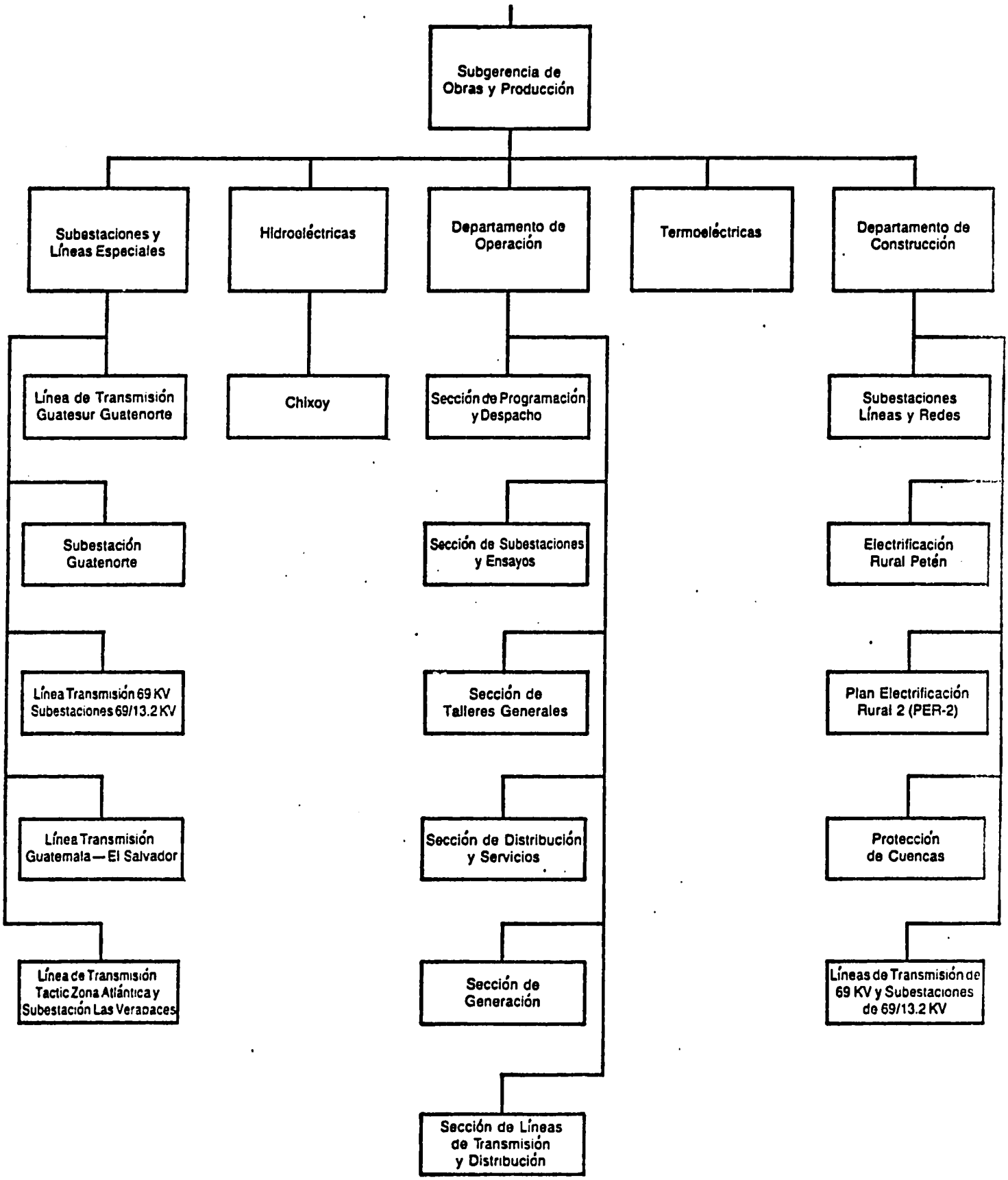

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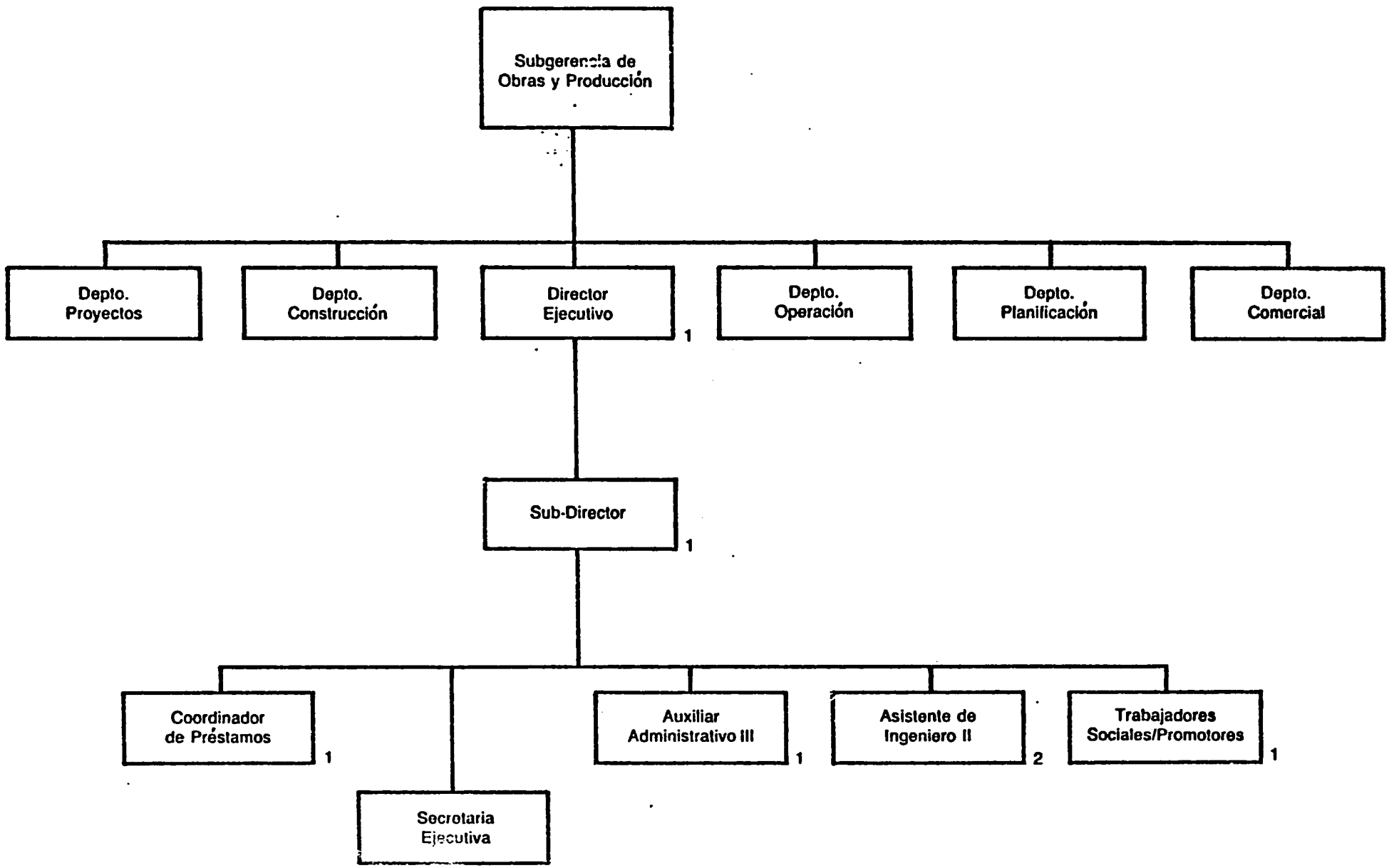

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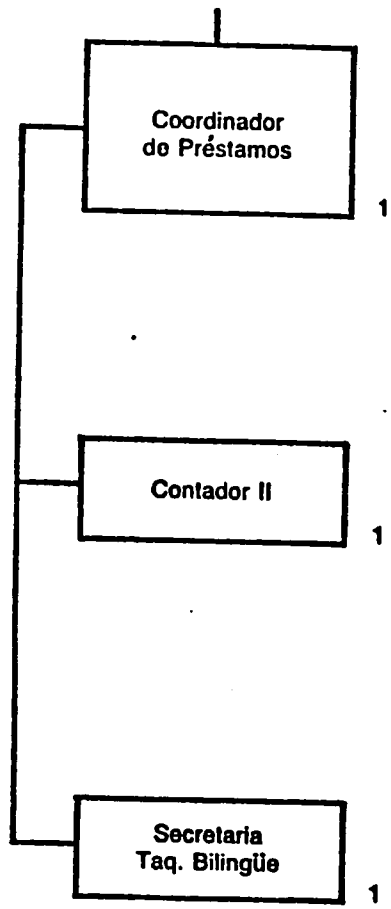

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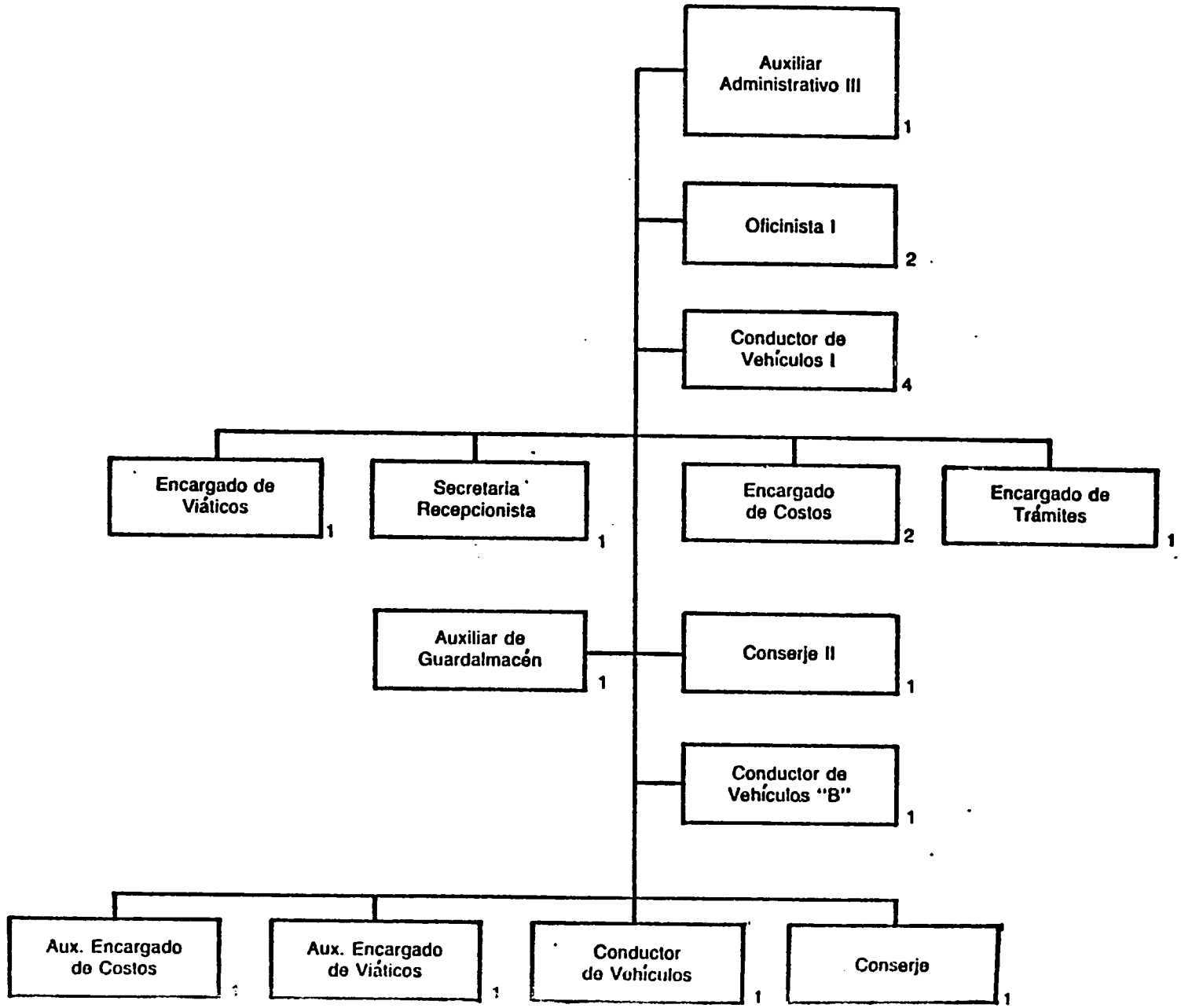
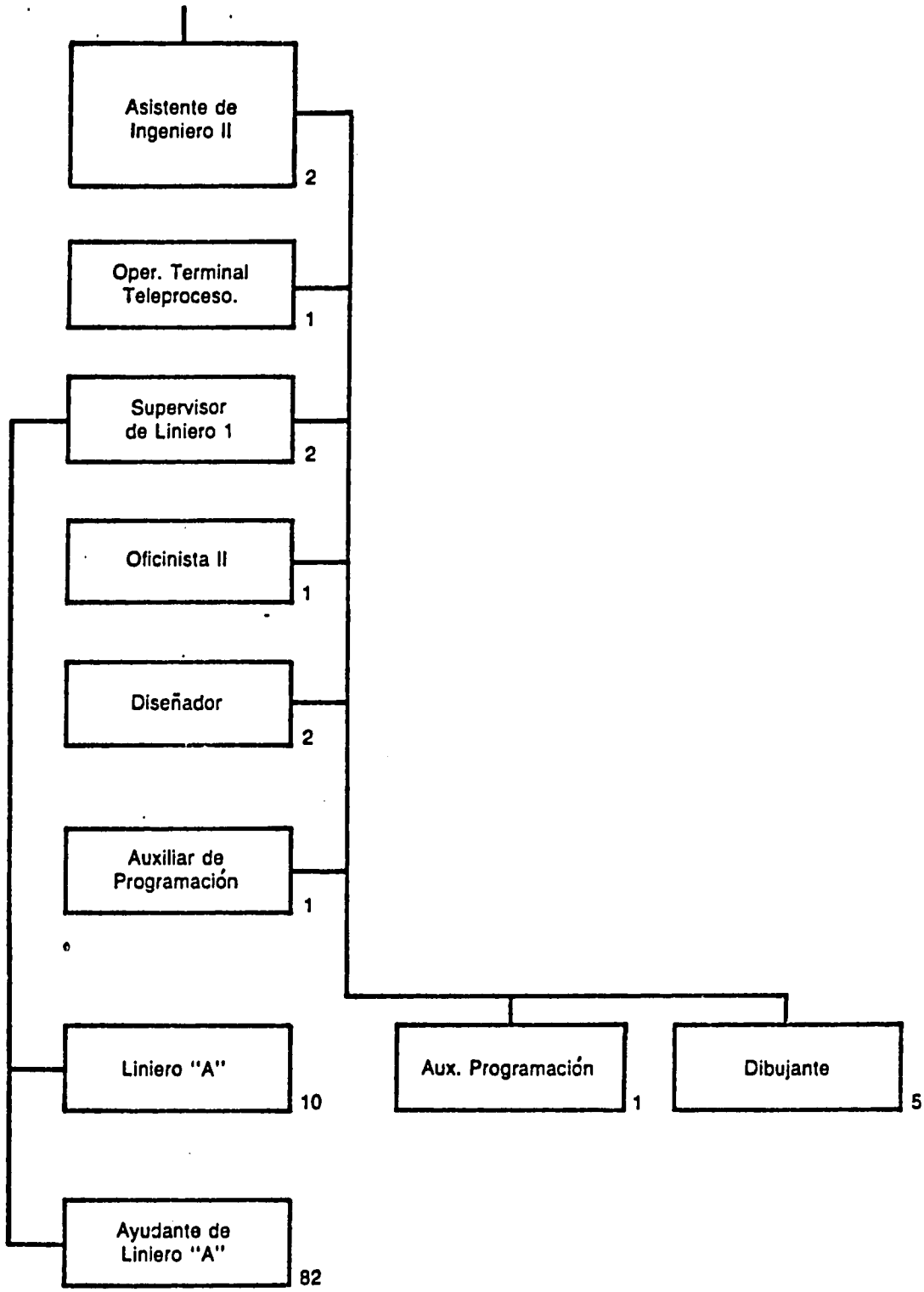
ORGANIGRAMA DEL PLAN DE ELECTRIFICACION RURAL 2 (PER-2)



ORGANIGRAMA DEL PLAN DE ELECTRIFICACION RURAL 2 (PER-2)



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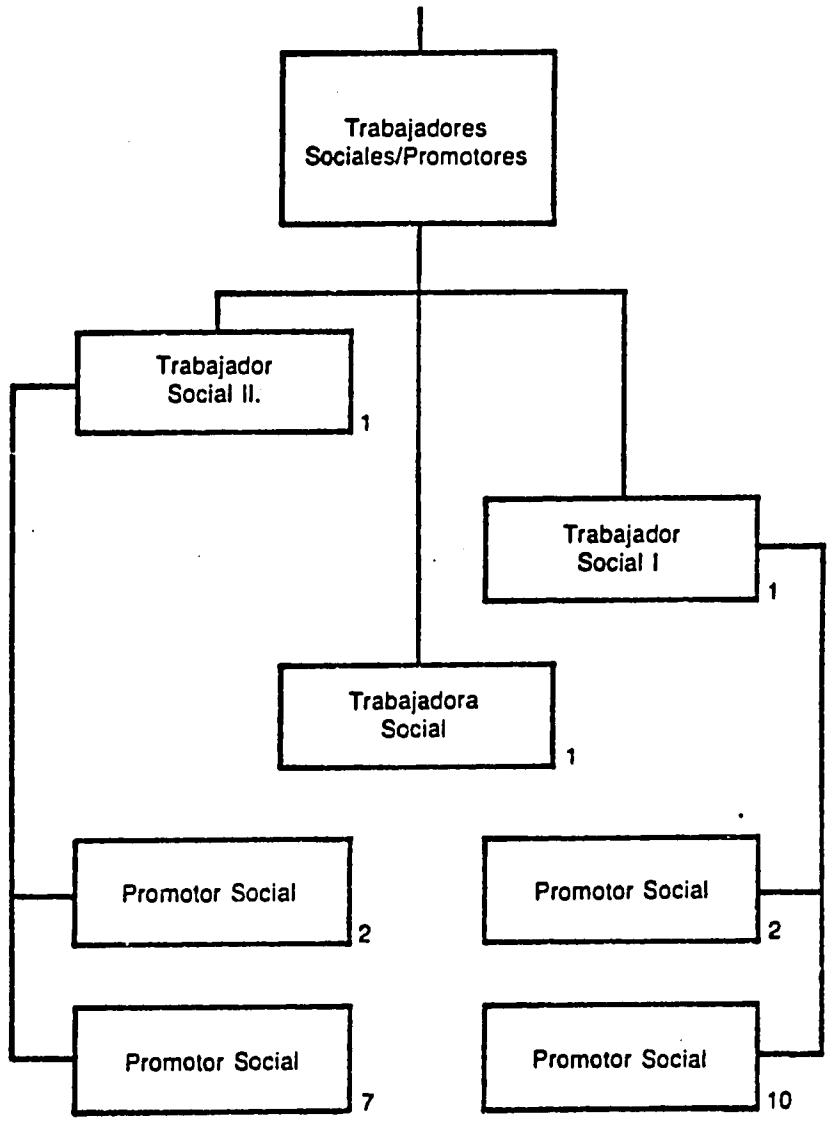

distribution lines, a maximum cost per household connection (Q600), an infrastructure factor (6 on a scale of 10) and an economy factor. However, there seems to have been an omission in setting a minimum eligibility factor for the economy factor of the villages to be selected. It appears that subjective, rather than objective, decisions were made when the villages did not meet the cost criteria of Q600 per consumer or less for household connections and/or a point factor of 6 or more in infrastructure.

The evaluators examined 26 of the 160 village questionnaires from the Eastern Region of PER-2, 20 from newly electrified areas and 6 from previously or partially electrified areas. See Attachment No. 8. Selection of the questionnaires analyzed was done on a random basis, that is, every fifth questionnaire from newly electrified areas (100) was selected, and every tenth questionnaire from the previously electrified areas (60) was selected.

Of the 20 questionnaires from newly electrified areas, the analysis shows the following:

10 villages fully met the criteria of cost and infrastructure
6 villages met only the cost criteria
4 villages met only the infrastructure criteria

If this analysis is valid, and it were applied to the 222 villages previously non-electrified, as indicated on pages 3 and 6 of this report, it would mean that:

50% or 111 villages fully meet the criteria

30% or 67 villages meet only the cost criteria

20% or 44 villages meet only the infrastructure criteria

Of the six village questionaires from the partially electrified areas, the analysis indicates that all met the cost criteria. No data were given on infrastructure or other criteria; thus these could not be analyzed.

It should be noted that the 182 questionnaires from the western and other regions of the country had been misplaced and thus could not be analyzed.

There is now in place an excellent computerized system for the compilation of the data from the questionnaires. From the data generated by computer, the program staff can easily determine if the villages met the criteria for selection.

b. Recommendations - Selection Criteria

The evaluators recommend that selection of villages follow the criteria as set, unless there is some overriding political or economic reason that dictates a different selection criteria. When other criteria are used, the program staff should indicate why different criteria were used and what criteria were used to include non-qualifying villages in the program.

c. Findings - Promotion in Villages

The capability of the "promotores" is excellent and of the highest caliber. This can be attested to by the high percentage of connections in the areas of the newly electrified villages under PER-2. (Visual observations by the evaluators in a few selected villages indicate approximately 80% of potential customers in each of the energized villages visited by the team are already connected.)

d. Recommendations - Promotion in Villages

The only recommendation which pertains to this statement of work is that INDE, and the implementing unit, maintain the high capability which it has developed as it completes promotion in villages yet to be electrified under PER-2. At this time, INDE should ascertain whether PER-2 has sufficient personnel to meet the targets as outlined in the project and assure that these personnel have sufficient vehicles and other support items.

Additional recommendations are as follows:

If plans are developed by INDE's Commercial Department to have an ongoing Promotion (Productive Uses of Electricity) Program, the "promotores," with additional training, could form the nucleus of such a promotion staff.

Either PER-2 or the Commercial Department of INDE should undertake the training of its consumers in the safe use of electricity, including such courses as how to wire their homes and/or small businesses and how to use and repair their electrical appliances and other electric devices.

If further rural electrification programs are developed, this staff should be utilized as "promotores."

2. Procurement Procedures

a. Findings - Procurement Procedures

There appears to be no lack of capability in INDE or the implementing unit in the preparation of procurement documents. The problem is the procurement process itself. It is very complicated, cumbersome and slow.

b. Recommendations - Procurement Process

The Procurement Process within INDE should be streamlined to both assure that necessary internal policy procedures are adhered to and that needed materials, supplies and equipment are provided on a timely basis to meet program targets.

INDE should seek to obtain training of INDE staff on how to streamline its procurement procedures. The actions recently taken by USAID,

the implementing unit and INDE, as enumerated on page 8 above, to expedite the procurement process seem to have been both desirable and sufficient. However, this is only a temporary solution to INDE's procurement problem and will continue to be a temporary solution unless the recommendations made above are implemented.

If neither of the above recommendations can be carried out, and no other procurement procedures can be effected to ensure timely inputs of necessary resources to meet programmed targets, it is recommended that INDE and the implementing unit continue to use the good offices of USAID for procurement to meet the off-shore needs of the project.

3. Human Resources

a. Findings - Human Resources

From observations and interviews, the evaluators feel that the human resources assigned to this project generally appear to have been both sufficient in number and of the necessary capability to successfully implement the project. This may not have been true if existing INDE staff had not been available to be assigned to the implementing unit, if personnel in the Planning and Projects Departments had not been available to give the necessary support, coordination and backstopping, and INDE's Construction Department personnel had not been available to undertake and complete the construction of the lines. The evaluators were informed, however, that, due to budgetary

restrictions, the position of Deputy Director of PER-2, which has been vacant since May 1984, has not been filled and the Director has had to assume these responsibilities in addition to those of his position

The evaluators did find, however, that INDE and the implementing unit have not effectively utilized the training and technical assistance component that was built into the project. They have used only $22,300 of the programmed $350,000. This was included to provide project personnel and others the opportunity to increase INDE's capabilities in rural electrification management and in rural electrification design standards and construction procedures.

From project documentation and interviews it has been ascertained that the following training has taken place:

training of some 275 local electricians
one short-term training course in financial management in Mexico
short courses in English language training by 16 engineers
one two-years Master's of Engineering degree

The implementing unit might be encouraged to make fuller use of the talent available in other sections of INDE. Working in isolation from other sections of INDE does not seem to have had a significant effect on the implementing of the project. But, as noted in Section D of this report, this aspect of relationships needs improvement.

The evaluators, though not specifically called on to do so, feel that some comment concerning the Consulting Group is warranted, since the consultants have had a positive effect on improving the human resources of INDE and the implementing unit's capability to successfully implement the project. More will be said under Section C of this report. At this point it should be pointed out that the consultants have had a singular effect on the implementing unit's capability to consider and then accept cost reduction techniques in the design and construction of rural electric systems in Guatemala.

b. Recommendations - Human Resources

It is highly recommended that INDE and the implementing unit take advantage of the training and technical assistance component of this project. A number of general areas have been discussed among the evaluators, USAID, PER-2 and INDE personnel and others. The order of priority appears to be the following:

promotion or productive uses of electricity programs
rural electrification design standards
rural electrification construction practices
rural electrification systems management and administration
procurement procedures
safe uses of electricity
job training and safety programs

Based on the discussions which have taken place, the evaluators are suggesting a number of potential alternatives for training and technical assistance programs. They are contained in Attachment No. 9.

4. Construction Equipment

a. Findings - Construction Equipment

The evaluators found an extreme shortage of both vehicles and equipment to enable the extremely capable and experienced crews of the INDE Construction Department to adequately and efficiently carry out construction. What equipment they do have is already worn out or will soon be worn out. But, in spite of these shortages, the construction crews have done an excellent job of construction.

There is an extreme shortage of transport vehicles for poles, pole-line hardware and cable. Many times the concrete poles have had to be transported by human manpower.

There is an extreme shortage of pole setting equipment. The INDE Construction Department has ingeniously adapted farm tractors for this purpose.

There is a shortage of digging tools. The crews have had to fashion their own digging tools.

There is a shortage of small hand tools such as:

(1) cable cutters - The crews have been using hacksaws because the cutters they had have worn out.

(2) pliers, wrenches and compression tools - Many times the workers have had to buy their own tools using their own money to do so.

There would have been even greater shortages of appropriate vehicles and tools and equipment had INDE been able to carry out its normal construction program. Had this been the case, there would have been few or no vehicles, and little equipment and materials available for the carrying out of the PER-2 construction program.

Fortunately, most of these shortages will be remedied with the three purchase order procurement processes which are now under way, noted above (page 8) in section A.1, Physical Advance of Project.

The evaluators also observed that most of the members of the crews were lacking what is considered proper wearing apparel for the safety of the work force. Very few hard hats were observed, and very few of the men had the proper shoes. No first aid kits were in evidence.

b. Recommendations - Construction Equipment

The evaluators recommend that the Project Managers and USAID staff assure that the purchase orders in process are kept on track and expedited as quickly as possible. The arrival of the vehicles, supplies, equipment and materials will correct the shortages noted above. It is not only critical that these vehicles, materials and supplies are received to assure completion of project targets, but to assure that the INDE Operations Department has them to be able to properly service and maintain the systems once they are energized.

Though the evaluators realize that it may not be within the means of either PER-2 or INDE at this time, we strongly recommend that INDE adopt policies and procedures for a safety program and then obtain the necessary equipment to assure the safety of the work force and the compliance with adopted safety practices and procedures.

C. Design and Construction Practices Being Used by INDE

The evaluators approached the assessment of the design and construction practices with a slightly different methodology than that used in other sections of this report. First, a general assessment of the electric system built under the PER-2 project was undertaken. This was done using appropriate sections of NRECA's Worksheet No. 7, "General Appraisal of Operating Project" (Attachment 2-2) adapted for this purpose. Results of this appraisal are recorded in Item 1 of this section. Second, general findings made through interviews, on-site visits and a review of the literature concerning design and construction practices of INDE are recorded.

1. General Appraisal of the Operating Project

a. Technical and Administrative Performance

(1) Findings - Outage Performance

The present power outage performance is not recorded for distribution systems. Periodic power outages at high voltage levels (69 kV and above) are recorded and maintained, but normal rural distribution system repairs are performed at the consumer's request. In some isolated areas, outages may last over 24 hours due to distance from municipal offices, lack of telecommunications and normal shortage of replacement materials.

In some instances, distribution installations are inspected periodically within a monthly program of preventive maintenance, but records of distribution system outages are not kept.

Recommendation - Outage Performance

Records of distribution system outages should be kept in order to be able to forecast needs and stock emergency repair materials. These records will aid INDE in determining what materials may be needed in addition to those needed to meet their routine maintenance requirements.

(2) Findings - Present Voltage Stability

The present voltage stability for the PER-2 rural electrification program is well above satisfactory since there is no significant increase in consumer loads aside from average house illumination.

Recommendation - Present Voltage Stability

INDE engineers should constantly check the voltages on the line as the distribution load grows to assure adequate voltages and balanced loads.

(3) Findings - Present Condition and Adequacy of Generation Equipment

The present PER-2 rural electric distribution systems are supplied through existing three-phase, 69/34.5 kV and three-phase 69/13.2 kV substations which provide energy to the three-phase 34.5 kV and 13.2 kV feeders and single-phase 19.9 kV and 7.6 kV secondary lines. The adequacy of the power supply equipment is satisfactory with the exception of a near maximum loaded to capacity 2.5 MVA power transformer at the Chimaltenango 69/34.5 kV substation. AID and INDE have made arrangements, which are in progress, to purchase and install a new 5 MVA transformer which will handle the immediate demand and the PER-2 distribution load supplied from this substation. It was stated by the Operations Chief Engineer of Chimaltenango that there would be an excess of 40 percent power transformer capacity after the installation of the new 5 MVA transformer, which could easily integrate the new distribution loads. The entire network of substations related to the rural electrification program is dependent on the national electric grid, which is adequate at the present time.

There is an indication on the books of INDE of an excess of installed capacity, but this is somewhat deceptive because of the deteriorated condition of the thermal plants, many of which need to be taken out of service periodically for repair and/or overhauling. There is a definite shortage of capacity during the summer months (November to May). This is being partially solved by USAID's Electric Power Reserve Project (No. 520-0344) which will

provide INDE with a 41.9 MW diesel unit on a loan basis until the hydroelectric facility, Chixoy, comes on line.

Recommendation - Present Condition and Adequacy of Generation Equipment

The new 5 MVA power transformer at the Chimaltenango substation should be installed before all completed distribution systems are energized from this substation. The existing 2.5 MVA transformer should be utilized as a backup unit.

(4) Findings - Present Condition and Adequacy of Distribution Lines

The present condition and adequacy of distribution lines is excellent for all rural areas visited by the evaluators (see Attachment No. 4). However, as we will more fully point out in section 1.b.1 below, future design and construction of primary and secondary distribution lines should be modified to incorporate lighter materials for such items as pole types, pole heights and wire size to permit performing the same functions at reduced costs without sacrificing mechanical strength and electric reliability.

Early in the construction and even now, 30-foot and 35-foot concrete poles were used for primary and secondary distribution line construction in the PER-2 program. The average weights of these two standard-

size poles is 750 pounds for the 35-foot and 500 pounds for the 30-foot pole. One of the great concerns in transporting these poles over rough terrain is breakage; a second is the quantity that can be loaded on a transport truck, which varies from four to five poles, depending on road conditions. Normally the poles are handled with a modified farm tractor but, in areas where access is difficult for truck or tractor, poles are handled manually using as many as 36 people. Recently, PER-2 began using standard 25-foot and 30-foot Class 5 wood poles for primary and secondary distribution line construction. The average weights for these two standard pole sizes were not available. The personnel in the regional construction departments have mentioned that they are hauling as many as ten wooden poles per load without fear of breakage. This is a good indication that the wooden poles are more light weight and easier to transport, handle and erect.

In order to point out the usage and cost savings of wood poles versus concrete poles, the following information was obtained from the consultants' records for material unit prices effective June 30, 1985:

Concrete Poles	Delivered Unit Price-Quetzales	Wooden Poles	Delivered Unit Price-Quetzales
30-foot	Q. 174.90	30-foot	Q. 78.98
25-foot	Q. 165.00	25-foot	Q. 61.82

The locally fabricated wood poles are produced utilizing the American Wood Preservers Association specifications. Unfortunately, from field inspections and several interviews, it was discovered that a quality control program has not been developed to monitor pole defects prior to field delivery.

Time and manpower did not permit an exhaustive examination of INDE's present designs and specifications.

Recommendation - Present Condition and Adequacy of Distribution Lines

The present INDE designs and specifications for rural primary and secondary distribution lines should be analyzed more fully by design engineers with extensive experience in rural electrification systems design.

INDE should establish a regular inspection program with the pole fabricators in order to monitor quality production according to the specifications. INDE should also follow a routine pole inspection in their regular maintenance program.

(5) Findings - Present Condition and Adequacy of Office and Equipment

Observation of present office conditions shows them to be satisfactory throughout the regional offices. Office equipment was satisfactory. Equipment for field use was sparse or nonexistent. The meter testing equipment in the Quetzaltenango regional office was lacking an automatic calibrator; calibration had to be done by hand. The engineering and

field staff on the construction units lacked such essential items as meggars, voltage testers, short-circuit testing equipment and watt/hour meters.

Recommendations -- Present Condition and Adequacy of Office and Equipment

Present offices and office equipment should be upgraded as financial and economic conditions within INDE improve.

The construction crews should be provided with the proper equipment for testing the adequacy, reliability and safety of the systems before they are energized.

b. Current Project Practices

(1) Findings - Line Construction

Specified standards are used. Designs are planned in Guatemala City. Construction is done by INDE personnel. Specified standards are now being implemented for 19.9 kV and 7.6 kV distribution systems for design as well as for construction. During the early stages of the construction phase, field installations were made on the basis of routine experience carried over from other earlier distribution projects. Although the crews did not have hard copies of the design standards in hand in the field, field installations almost exactly met the issued design standards.

Design drawings for each community are prepared in the PER-2 design section, with advice and input from the consultants contracted for this purpose. According to procedures set up, these designs are then submitted to the design section of the Projects Department of INDE for comment and approval. Minor design changes to INDE's normal design criteria have been made by the PER-2 design department and the consultants to make the designs more appropriate for rural electric distribution conditions.

All construction has been performed by the normal INDE construction crews with assistance from assigned PER-2 linemen helpers and other staff. The assignment of these experienced crews has been of great value to the PER-2 project. Overall construction workmanship and installations are, in general, good, even with the lack of proper tools and equipment.

Recommendation - Line Construction

A definitive design criteria should be established for rural electric distribution to cover pole types, pole span lengths, pole heights, cable sizing, conductor sagging, protective equipment sizing and distribution transformer sizing. In addition, the present normal INDE design and construction standards should be carefully reviewed to conform to current rural electric distribution conditions or standards as a good indication of future cost savings in design as well as construction.

INDE should investigate reducing its line cost by using higher wood poles, longer span lengths and small conductor sizes. In the U.S., poles for rural areas are generally 30 or 35 feet long. Although shorter poles (25 feet) are less expensive, more poles and pole-top assemblies would be required, resulting in greater overall cost. Using a 30-foot pole, the span length could be increased to 160 meters (see REA Bulletin 160-2, Exhibit 14), or 6.25 poles per kilometer. At a pole cost of Q. 78.98, the pole cost per kilometer would be reduced from Q. 618.20 to Q. 494. The reduced number of pole-top assemblies would add to this expected savings.

The advantage of running single-phase lines to small towns is that, as the load grows, additional phase conductors can be added to serve projected load growth. A single-phase line with conductors sized for initial loads can be upgraded with additional conductors to serve loads for approximately 20 years without the need for larger conductors. Hence, INDE is over building by using conductor sizes larger than needed for its initial load. For example, INDE uses a conductor size of 1/0 ACSR when a No. 4 ACSR could have been used as effectively. On a kilmeter cost basis, the 1/0 ACSR conductor is Q. 540, whereas the kilometer cost of a No. 4 ACSR is Q. 240. This could mean a savings of Q. 300 per conductor kilometer.

Construction has been carried out very well, and according to normal INDE specifications and standards. It is recommended, however, that a lineman's training course be arranged to reinforce practical skills learned on the job, when the construction crews have the proper tools and

equipment. A construction design and staking course could be offered in Guatemala, in Spanish, to a selected number of crew chiefs to train them in rural electric systems design and construction. See Attachment 9.

(2) General Comments on Design and Construction Practices

Findings - Design Practices

The design standards and specifications used in PER-2 have been adapted from INDE's normal designs and specifications. It is our understanding that these standards were adapted from the U.S. REA standards for three-phase, single-phase systems. The similarity in designs attests to this. This overall design practice is good, but these standards should be carefully reviewed to ascertain if more effective engineering or more economic utilization of materials could be employed in future rural distribution projects. Present design standards and specifications are geared more for urban installations rather than rural. There is an apparent use of costly concrete poles and pole sizes and heavier conductor sizes than may be necessary in the newly constructed primary and secondary rural distribution lines.

Minor modifications to INDE's normal standards and procedures have been made upon the recommendation of the consultant (CM-TEL), e.g., procedures for making design changes; the utilization of 30-foot wood poles for primary rural distribution lines and 25-foot wood poles for secondary rural

distribution lines instead of concrete poles; and the coordination of standards with other existing utilities, such as the telephone company.

It has also been observed that there is a lack of a definitive guide for the application of rural distribution design criteria to proper conductor sizes, conductor sagging charts, distribution transformer capacities, pole sizes and pole span distances, and protective equipment and fuse sizing.

Furthermore, there are no written standards for service drops and household installations.

Recommendations - Design Practices

The review of standards for primary and secondary distribution lines by the consultants should be a continued. Modifications should become a part of the standardized design specifications to be reviewed and approved by the Projects Department and then codified as rural electrification project designs. This should be done in order to reduce what is the apparent excess cost of poles and conductors.

Standards for service drops and household wiring should be developed.

The foregoing recommendation is a repeat of that recommended above, but it bears repetition.

Findings - Construction Practices

PER-2 construction methods and practices have been adapted from the normal INDE projects and are satisfactory. The present shortage of construction tools and equipment is a serious problem. Construction methods and efficiency would greatly improve if the crews had the proper tools and equipment. During the period that the evaluators were in Guatemala, a plan for the purchase of the required tools and equipment was worked out among the Government of Guatemala, INDE and USAID. See page 8 above.

Recommendation - Construction Practices

All steps humanly possible to expedite the delivery of these very necessary items should be undertaken by all involved parties.

D. The Administrative Structure of the Implementing Unit and Its Relationship with Other Divisions of INDE in Coordinating the Project

1. Findings - The Administrative Structure of the Implementing Unit

The present administrative structure of PER-2 can be ascertained from the Organizational Chart, Chart 7, on page 23. As of July 30, 1985, the PER-2 staff numbered 152, with four vacancies. A breakdown of staff by sections is as follows:

Executive Director	1
Administrative Section	16
Coordination of Loans	4
Engineering and Construction	107
Social Work and Promotion	24

As can be seen in reviewing the organizational chart, the Executive Director of PER-2 reports directly to the Manager of the Works and Production Division. It should be noted that there has been a significant change from the administrative or coordinating unit that was envisioned in the Project Paper. But the structure that has evolved is an excellent structure for an administrative unit for a new program of rural electrification.

It has been NRECA'S experience that, when significant rural electrification programs are planned, it is almost always more effective and

efficient to create a new rural electrification department, section or unit to be totally responsible for the implementation of such a program. The validity of this observation can be attested to by the rate of advance toward programmed targets before and after the organizational and staffing changes were effected. See Chart 2 on page 5. The organizational structure as it presently exists is more than adequate to carry out the objectives of PER-2.

The unit might be strengthened by filling the position of Deputy Director. There seems to be no unit head for the Social and Promotion Workers, and thus it is assumed that this group of people report directly to the Executive Director of PER-2.

There had been some problems with the Planning Department and the Projects Department concerning the overlapping functions of PER-2 staff and the staffs of these departments but, generally speaking, these problems have been or are being worked out.

The working relationships with all other divisions and/or departments appear to be excellent, save for the normal problems in a rather large, bureaucratic organizations.

Additional Findings

While evaluating PER-2, other situations became evident which are outside the scope of the Statement of Work but which merit mention in this report.

The PER-2 implementing unit is working on the site selection process for PER-3 or Per Q (for a five-year plan) for a follow-on program of additional rural electrification projects. The "promotores" have undertaken studies and interviews for additional villages and the computer section of PER-2 has compiled the data on numerous villages.

The INDE Planning Department has begun an impact evaluation of PER-2 and has requested data from PER-2 personnel. PER-2 personnel have stated that its "promotores," who are the only qualified staff to collect this data, cannot be assigned to do this because they are still needed in the promotional process for villages selected to be part of PER-2.

Recommendations - The Administrative Structure of the Implementing Unit

The administrative structure of the implementing unit should be strengthened by filling the position of the Deputy Director, which is presently vacant.

The "promotores" should be trained to undertake the promotion of the productive uses of electricity and they, or perhaps staff of the Commercial Department, should be trained to become trainers to instruct consumers in the use, care and repair of electric appliances and other electric devices used in the home, on the farm and in small businesses.

Both the implementing unit and INDE management staff should continue the improvements in the relationships between the unit and the Planning and Projects Departments that each have begun.

Recommendations on rural electrification design and construction practices are made above in Section C (Design and Construction Practices).

2. Relationship with Other Divisions, Departments and Units of INDE

Findings - Relationships

The following findings are based on in-depth interviews with those persons listed on Attachment No. 3, Major Contacts, and by personal observations of the evaluators.

a. Implementing Unit's View of Its Relationships with Other Units of INDE

(1) Works and Production Division. Excellent working relationships exist with this division. It is apparent that PER-2 staff and the staffs of the Construction Department and Operations work well together.

(2) Planning and Projects Division. No problems were apparent at the division level. What problems there were seem to have been worked out. There was no mention of serious problems with the Planning Department,

except for the question of the locus of the planning responsibility for rural electrification. There were, however, some concerns regarding the Projects Department over which entity should be doing systems designs for rural electrification. At this time, PER-2 staff make design modifications at the suggestion of the consultants and then submit these modifications to the Projects Department for approval. PER-2 staff indicate that at times the Projects Department is slow to approve modifications in design.

(3) Administrative Division. PER-2 works mainly with the Commercial Department of the Administrative Division. No serious problems were mentioned or observed. The two entities appear to have an excellent relationship.

(4) Financial Division. Generally good working relationships exist between the division and the implementing unit. There apparently are some problems in the approval process for procurement and some slowness in the reconciliation and payment of expenses. These items are reportedly being worked on and much improvement has allegedly taken place. Room for improvement exists in the area of procurement.

b. Other INDE Units' Views of Their Relationships With the Implementing Unit

(1) Works and Production Division (Sub-Gerencia de Obras y Producción). The best relationships between PER-2 and other units of INDE

seem to be in this section. This seems to be the case because, from an organizational point of view, PER-2 is part of this division. The division director stated that this program, and follow-on rural electrification projects, are very important to the development of Guatemala.

- Construction Department, Works and Production Division. PER-2 personnel have established good relationships with this Department. The department director stated that relationships are excellent. The only complaints articulated are that there are insufficient tools, materials, equipment and vehicles for the crews and there is delay in the arrival of new equipment.

- Operations Department, Works and Production Division. Relationships with this department were reported and observed to be excellent. There are established procedures for the acceptance of the systems built under PER-2 which are generally followed in all cases. Some few systems were not accepted but corrections were made without undue delay. All completed systems, with the exception of one, have been integrated into the ongoing operational network.

- Regional and Sub-Regional Construction and Operations Department. Relationships were said to be excellent with all involved regions and sub-regional offices and in the field. Personal observation by the evaluators confirmed this. Some minor problems exist in day-to-day

relationships, but these were said to be normal and have caused no undue difficulty or delay in project implementation.

(2) Division of Planning and Project (Sub-Gerencia de Planificación y Proyectos). Good relationships exist at the division level. The division director indicated that there had been some problems in the past but that most of these have been worked out. He strongly supports PER-2.

- Planning Department, Division of Planning and Projects. The department head indicated that there had been some differences of opinion over the role of planning between PER-2 personnel and his department but that the differences are being worked out.

The Planning Department has begun to undertake a socio-economic evaluation of PER-2, as called for in the loan agreement, and indicates that it will need coordination and collaboration from PER-2 staff. (PER-2 management indicates that they will assist the Planning Department when their "promotores" are finished with their responsibilities of promotion in the villages to be connected under PER-2.) This collaboration should help further improve relationships between the implementing unit and the Planning Department.

- Design Department, Division of Planning and Projects. Relationships are generally good. There are some concerns over who should be doing the designing for PER-2 -- PER-2 design staff with the assistance of the

consultants or Design Department staff. The evaluators found that while, in general, the roles of each are set forth in policy and procedures, these are not always followed. We were informed, however, that this situation is being rectified with the assistance of the division manager.

(3) Administrative Division. The evaluators did not have any direct contact with personnel at the division level, but relationships are reported to be excellent, except for the normal administrative difficulties found in a large, bureaucratic organization.

- Commercial Department, Administrative Division. Relationships between the Commercial Department and personnel of PER-2, both at the headquarters level and at the regional and sub-regional levels, are excellent. There is a procedure for reporting new connections under PER-2 to the Commercial Department and this is followed in all cases. The only reported difficulty arises when the service application forms arrive late in the Commercial Department and the new consumers are billed for two months of service instead of one.

Though not directly related to relationships between INDE and the implementing unit, it seems important to make a few observations concerning consumer service.

Top management of INDE has recognized the need for improved consumer services and intends to raise the Commercial Department to division

level. The department head recognizes the need for promotion of sane, safe and productive uses of electricity. His plans as he discussed them were good, but do not seem to go far enough. Suggestions for a more effective program for the promotion of productive uses of electricity are contained below on page 60.

(4) Financial Division. No direct contact with this division was made by the evaluators, but reports indicate that relationships are quite good. PER-2 staff reports that the financial staff have tried to speed up the approval of funds for both local and offshore purchases but have been handicapped by internal procedures and foreign exchange currency policies and procedures.

(5) Consulting Firm. Though not called for in the Statement of Work, the evaluators would like to comment on the relationship between PER-2 and the consulting firm of CM-TEL. This is an excellent relationship. The consulting staff is dedicated to the rural electrification program and, in the eyes of the evaluators, have given invaluable assistance to the PER-2 staff.

Recommendations - Relationships

a. Implementing Unit's View of Its Relationships with Other Units of INDE

PER-2 staff should continue to seek improvement in its relationships with the Planning and Design Departments. This might best be

done by clearly defining, on paper, the roles of each unit in the planning and design processes and then setting up policies and procedures for these functions. Because of the funding process and the nature of this significant rural electrification program, the evaluators see a role for PER-2 personnel in both the planning function and the design function in rural electrification projects, present and future. However, the permanent planning functions for INDE, as it is now organized, belong to the Planning Department, and the permanent design functions belong to the Projects Department. PER-2 personnel need to keep this in mind.

b. Other INDE Units' Views of Their Relationships With the Implementing Unit

(1) Works and Production Division. No recommendations seem needed concerning the existing relationships of PER-2 with the Works and Production Division and its Construction and Operations Departments. There is no reason to believe that these good relationships will not continue. They may even improve when the greatly needed materials, equipment, supplies and vehicles are received by project personnel.

(2) Planning and Projects Division. See recommendation under Item a on the preceding page. Roles and functions of the Planning Department and the Projects Department vis-a-vis PER-2 must be clarified so as to avoid confusion and duplication.

(3) Administrative Division. The evaluators recommend, if the PER-2 staff and/or USAID feel the need, that a more in-depth evaluation of relationships between PER-2 and the Administrative Division be undertaken. Such an evaluation could lead to steps to improve the administrative processes of PER-2.

The plans to raise the Commercial Department to division level and to provide a Consumer Service and Promotion staff, which will lead both to improved relationships with consumers and increase the productive uses of electricity, seem sound. INDE should incorporate into the Commercial Division a Consumer Relations Department and give this department the responsibility for developing a plan for the productive uses of electricity. The plan should include sufficient staffing to effectively implement it. Promotion/productive use of electricity should staff be assigned to each of the regional and sub-regional offices of INDE. Guidelines for the development of such a plan are contained in a paper given at the seminar on Productive Uses of Electricity in Rural Areas held in San José, Costa Rica, in December 1983, in which seven INDE staff participated, including the Executive Director of PER-2, the Chief of the Commercial Department and the Chief of the Planning Department.

We strongly recommend the funding of a productive uses program as a part of any additional rural electrification programs in Guatemala and strongly suggest that no further electrification projects be funded without the provision of monies for a countrywide productive uses of

energy program which will include the consumers connected through PER-2 and other previously connected rural consumers.

(4) Financial Division. Time did not permit an evaluation of this division by the evaluators. Therefore, no recommendations can be made.

(5) Consulting Firm. We applaud the relationship between PER-2 and the consulting firm. From all indications, this relationship will continue.

Attachment No. 1

Excerpted from Attachment No. 2 to Cooperative Agreement No. 520-0000-A-00-5273-00 between USAID/Guatemala and the National Rural Electric Cooperative Association, dated July 5, 1985.

PROGRAM DESCRIPTION

Article I - Purpose

To perform a mid-term evaluation of Project No. 520-0248, Rural Electrification - II, being implemented by the National Institute for Electrification (Instituto Nacional de Electrificación - INDE).

Article II - Statement of Work

The Recipient shall carry out the following activities:

A. Evaluate the physical and financial advance of the project against the programmed targets. If necessary, the evaluation team should recommend the necessary actions to correct implementation delays.

B. In reference to A. above, the Recipient should assess INDE's and the implementating unit's capabilities to successfully implement the project in areas such as: promotion and selection of villages, procurement procedures, human resources and construction equipment.

C. Evaluate the design and construction practices being used by INDE and recommend necessary corrections.

D. Evaluate the administrative structure of the implementing unit and its relationship with other divisions of INDE in coordinating the project.

WORKSHEET #6

"General Appraisal of Overall Rural Electrification Program"

(General Instructions)

1. The performance of this planning component also requires time, research and study. The Mission personnel most knowledgeable of the activities of the LDC "lead" power agencies should undertake this activity. Again, numerous interviews with policy makers in the power sector may be required.

2. The worksheet requires two separate judgments to be made by the individual making the assessment. After conducting the necessary interviews he should check off the most appropriate response to the data items in the "activity implementation status" column. He then must identify the most appropriate agency to undertake corrective action when a program activity weakness is apparent (i.e., those activities noted on the worksheet as either being not implemented at all or only partially implemented).

WORKSHEET #6

GENERAL APPRAISAL OF OVERALL RURAL ELECTRIFICATION PROGRAM

Activity Implementation Status				Suggested Program Policy and Practice Activities	Suggested Corrective Action	Agency for Corrective Action
Imple-mented	Partially Implemented	Not Implemented	Not Applicable			
				1. Rural Electrification Development Planning:		
—	—	—	—	. R. E. goals and plans are incorporated in the LDC development plan.	—	—
—	—	—	—	. R. E. construction is coordinated with other government rural development projects.	—	—
—	—	—	—	. R. E. construction is coordinated with the LDC national power supply agency.	—	—
				2. Rural Electrification Funding and Credit:		
—	—	—	—	. Local currency for project funding is committed and available on "soft term" basis.	—	—
—	—	—	—	. Local public funds are available for local public facility electric billings.	—	—
—	—	—	—	. Credit is available for consumer connection charges and housewiring.	—	—
				3. Tax Exemption and Franchises:		
—	—	—	—	. Imported materials are free of custom duties and delays.	—	—
—	—	—	—	. Tax exemption is given on project operations and plant assets.	—	—
—	—	—	—	. Franchise encroachment of R. E. service areas is protected by law and operating franchises are granted to projects.	—	—

WORKSHEET #6

Lane 2

GENERAL APPRAISAL OF OVERALL RURAL ELECTRIFICATION PROGRAM

Activity Implementation Status				Suggested Program Policy and Practice Activities	Suggested Corrective Action	Agency for Corrective Action
Imple-mented	Partially Implemented	Not Implemented	Not Applicable			
				4. Tariffs and Collections:		
—	—	—	—	. Tariff structures are responsive to cost of service.	—	—
—	—	—	—	. Formal wholesale power agreements for R. E. projects are required or full cost recovery of R. E. auto-generation costs are required.	—	—
—	—	—	—	. Effective billing and collection practices developed and monitored.	—	—
				5. R. E. Agency Institution:		
—	—	—	—	. An independent and technically staffed rural electrification agency is organized.	—	—
—	—	—	—	. Dynamic, influential, and stable leadership is present.	—	—
—	—	—	—	. Adequate program/project funding and regulatory authorizations are delegated to the R. E. agency	—	—
—	—	—	—	. Attractive and sufficient agency wage and salary plans and incentives are developed.	—	—

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WORKSHEET #6

GENERAL APPRAISAL OF OVERALL RURAL ELECTRIFICATION PROGRAM

Activity Implementation Status				Suggested Program Policy and Practice Activities	Suggested Corrective Action	Agency for Corrective Action
Implemented	Partially Implemented	Not Implemented	Not Applicable			
				6. Technical Standards and Controls:		
—	—	—	—	• Low-cost R. E. design and construction standards and specifications are developed.	—	—
—	—	—	—	• These standards and specifications are used for all new R. E. project construction.	—	—
—	—	—	—	• Joint electric design standards are developed among power authorities.	—	—
—	—	—	—	• Project maintenance and inspection programs are developed and monitored.	—	—
				7. Operations Standards and Controls:		
—	—	—	—	• Project uniform reporting and accounting systems are developed and are operational.	—	—
—	—	—	—	• Project operations monitoring systems are developed and are operational.	—	—
—	—	—	—	• Project continuing property record systems developed, operational and kept current.	—	—

GENERAL APPRAISAL OF OVERALL RURAL ELECTRIFICATION PROGRAM

Activity Implementation Status				Suggested Program Policy and Practice Activities	Suggested Corrective Action	Agency for Corrective Action
Implemented	Partially Implemented	Not Implemented	Not Applicable			
				C. Training Programs:		
—	—	—	—	. for headquarters agency personnel.	—	—
—	—	—	—	. for project management personnel.	—	—
—	—	—	—	. for project employees.	—	—
				D. Materials Availability:		
—	—	—	—	. Sources of local construction materials and contractors identified and developed with materials and services delivered when needed.	—	—
—	—	—	—	. Sources of needed foreign construction material and contractors identified and developed with materials and services delivered when needed.	—	—
—	—	—	—	. Effective material warehousing and material distribution procedures are developed and are operational.	—	—

WORKSHEET #6

GENERAL APPRAISAL OF OVERALL RURAL ELECTRIFICATION PROGRAM

Activity Implementation Status				Suggested Program Policy and Practice Activities	Suggested Corrective Action	Agency for Corrective Action
Implemented	Partially Implemented	Not Implemented	Not Applicable			
				10. Productive Use of Electricity:		
—	—	—	—	• Consumer training programs in the productive use of electricity undertaken.	—	—
—	—	—	—	• Consumer credit assistance programs for productive end uses of electricity undertaken.	—	—
—	—	—	—	• Marketing and business development research and assistance to consumers and to electric equipment and material suppliers undertaken.	—	—

WORKSHEET #7

"General Appraisal of Operating Project Requesting AID Assistance"

(General Instructions)

1. Appraisal of these requests should be made by Mission staff with intimate knowledge of electric utility operations. If such expertise is not available, it is suggested that the Mission either request the services of a qualified consultant to undertake the appraisal or assign the appraisal to Mission capital development or rural development staff. Assignment of capital development staff is more appropriate in cases when the project to be appraised is an operating unit of a national power company. Assignment of rural development staff is appropriate when this is not the case.

2. Site inspection of the project is optional. Management personnel from the project requesting assistance should first answer the questions found on the worksheet. The Mission representative then should go over each question with project management staff, asking them to verify each response. If the verification is insufficient, site inspection may be necessary before the most appropriate responses can be made on the worksheet.

General Appraisal of Operating Project Requesting AID Assistance

A. Technical and Administrative Performance

	Excellent	Satisfactory	Poor	Suggested corrective action	Suggested agency for corrective action
1. Present power outage performance					
2. Present voltage stability					
3. Present condition and adequacy of generation equipment (if applicable)					
4. Present condition and adequacy of distribution lines					
5. Present condition and adequacy of office and equipment					
6. Percent of total households served located in rural areas					
7. Present rate affordability by low income rural households					
8. Payments of bills by consumers					

B. Current Project Practices

	Yes	No	Not Applicable (Other agency performs practice)	Suggested Corrective Action	Agency for Corrective Action
1. Line construction					
• Specified standards used					
• Designs planned locally					
• Construction by local contractors or project personnel					
2. Operations					
• Local administration and control of billing and collections					
• Full separate local accounting for project					
• Line maintenance performed by local staff					
3. Staffing					
• Formal position descriptions and organization plans					
• Staff training programs					
• Responsive wage and salary plan					
4. Consumer programs					
• Credit assistance					
• Community affairs programs					
• Electric use promotion programs					

WORKSHEET #7

C. Project Support

1. Community

- Consumers cooperative in project construction
- Community financial assistance for construction or project programs
- Favorable local tax and legal climate

2. Government

- Adequate technical assistance from government
- Adequate financial assistance from government
- Favorable national legislation

3. Private organizations

- Financial assistance from private organizations
- Coordinated development programs with private organizations
- In-kind contributions from private organizations

Yes	Some or Partial	No	Suggested Corrective Action	Agency for Corrective Action

Attachment No. 3

LIST OF MAJOR CONTACTS

Rural Electrification Evaluation - Guatemala
Rural Electrification Plan - 2 (PER-2)
AID Loans 520-T-031 and 038
July 15 - August 2, 1985

U.S. Agency for International Development/Guatemala
8a. Calle 7-86, Zona 9
Guatemala City, Guatemala
Tels: 311541. Direct: 61274

Mr. Lawrence Odle, Project Development Office

Mr. Roberto Figueroa, Project Officer, Engineering and Energy Office

Plan de Electrificación Rural - 2 (PER-2), INDE
7a. Avenida 1-20, Zona 4
Edificio Torrecafé, 3r. Nivel
Guatemala City, Guatemala
Tel: 315125 or 315124

Ing. Raúl Eduardo Castañeda Illescas, Executive Director

Lic. Jacinto Palomo, Loan Coordinator

Ing. Mario Puga, Distribution Design Engineer

Mrs. Candida Rosa Mayorga de Cordero, Social Worker

Mr. Rolando Oliva, Computer Programmer and Operator

CM-TEL, Cordón y Mérida, Ings., TELECTRO, S. A. (Consultants)
6a. Avenida 6-94, Zona 9
Guatemala City, Guatemala
Teles: 316494 and 318631

Ing. Alfredo R. Szarata S., Project Manager

Ing. Klaus Rotter Poppe, Electrification Specialist

Ing. Octavio Cordón, Administrative Specialist

Instituto Nacional de Electrificación (INDE)
6a. Avenida 2-73, Zona 4
Guatemala City, Guatemala
Tel: 67991 through 4

Ing. Fausto Javier Aragón, Designated Assistant
Sub-Gerencia de Obras y Producción

Ing. David A. Lepe Cervantes, Chief, Dept. of Construction
Tel: 320995, Telex INDE 313-GU

Ing. Gustavo Adolfo Orozco, Superintendent of Operation II
San José Villa Nueva, Villa Nueva, Guatemala, C.A.
Tels: 480919, 481112, 0310309, Telex: 5324 - GU

Ing. Oscar Valero Perdomo Pujol, In Charge, Sub-directorate of Planning and Projects
Tel: 66028

Ing. Edgar Florencio Montúfar, Director, Planning Department
Tels: 315387, 66343, 315221 - TELEX: INDE 313 GU

Ing. Francisco Montero C., Chief, Electric System Planning Unit
Apartado Postal 293-A, Guatemala, C. A.
Tel: 67991, Ext. 118 & 119

Ing. Sergio A. Chocano, Chief, Projects Department
Tel: 317364

Ing. Rodolfo Rivas Sánchez, Chief, Commercial Department
Tels: 65852 or 67991/4, Ext. 70

Proyecto de Planificación Energética, Ministerio de Energía y Minas

Ing. Luís Alberto Paz A., National Director
Tel: 760679-82

National Economic Planning Council

Ing. Luís Alberto Paz A., Secretary General
Tels: 539804, 511601/9, Ext. 526

INDE Field Staff

Ing. Constantino Villagrán, Resident Delegate, Western Systems
14 Avenida 1-47, Zona 1
Quetzaltenango, Guatemala
Tels: 0612365, 0612416, 0614779

Ing. Roberto Rosas, Chief, Engineering Operations
Sub-Regional Office
Chimaltenango, Guatemala

Ing. Otto Palma, Construction Supervisor
Eastern Region
Los Esclavos, Jutiapa, Guatemala

Mr. Carlos Enrique
Chimaltenango, Guatemala

Sub-Regional Office

Mr. E. A. Salguero B., Substation Operator
Eastern Region
El Progreso, Guatemala

Attachment No. 4

VILLAGES VISITED BY THE EVALUATION TEAM

Village	Department	Date Visited
San Ixtán	Jutiapa	July 17, 1985
San Fernando	Jutiapa	July 17, 1985
La Pava	Jutiapa	July 17, 1985
El Jícaro Grande	Jutiapa	July 17, 1985
Las Pilas	Jutiapa	July 17, 1985
Pueblo Viejo	Jutiapa	July 17, 1985
El Carpintero	Jutiapa	July 17, 1985
La Canoa	Chimaltenango	July 18, 1985
Panimococ	Chimaltenango	July 18, 1985
Panabajal	Chimaltenango	July 19, 1985
Los Encuentros	Sololá	July 19, 1985
Argueta	Sololá	July 19, 1985
Xaquixja	Sololá	July 19, 1985
Xajaxac	Sololá	July 19, 1985
Chirijox	Sololá	July 23, 1985
El Progreso	El Progreso	July 24, 1985
San José Chirijuyu	Chimaltenango	July 25, 1985
Chirijuyo	Chimaltenango	July 25, 1985
San Jacinto	Chimaltenango	July 25, 1985

INDE Regional/Sub-Regional Offices	Department	Date Visited
Los Esclavos	Jutiapa	July 17, 1985
Chimaltenango	Chimaltenango	July 18, 1985
Quetzaltenango	Quetzaltenango	July 23, 1985
Los Esclavos	Jutiapa	July 24, 1985
Chimaltenango	Chimaltenango	July 25, 1985

ATTACHMENT 5
ANEXO 5

AGENCY FOR INTERNATIONAL DEVELOPMENT
United States A.I.D. Mission to Guatemala
American Embassy
Guatemala City, Guatemala, C.A.

CONVENIO DE PRESTAMO

Enmienda No. 1

Electrificación Rural

Préstamo 520-T-031

CONSIDERANDO, que con fecha 21 de mayo de 1979 fue suscrito el Convenio de Préstamo 520-T-031 "Electrificación Rural" entre los ESTADOS UNIDOS DE AMERICA, representado por la Agencia para el Desarrollo Internacional (A.I.D.), y la REPUBLICA DE GUATEMALA (Prestatario).

CONSIDERANDO, que el Prestatario y la A.I.D. han decidido modificar dicho Convenio de Préstamo para incrementar los fondos asignados al Proyecto y extender la Fecha Final para Completar el Proyecto.

POR TANTO, las Partes por este medio acuerdan la presente Enmienda No. 1 y Anexo 1-A al Convenio de Préstamo No. 520-T-031 en la siguiente forma:

1. Se agrega una nueva Sección 3.1.(a) que estipula:

El préstamo adicional para el Proyecto. La A.I.D. conviene en otorgar al Prestatario un préstamo adicional, de acuerdo con el Acta de Ayuda al Exterior de 1961 y sus Enmiendas, por una cantidad hasta de DOS MILLONES DE DOLARES DE LOS ESTADOS UNIDOS DE AMERICA (U.S. $2,000,000), la cual se utilizará exclusivamente para financiar los costos en Dólares y los Costos en

LOAN AGREEMENT

Amendment No. 1

Rural Electrification

Loan 520-T-031

WHEREAS, the Loan Agreement No. 520-T-031 Rural Electrification was signed on May 21, 1979 between the UNITED STATES OF AMERICA, represented by the Agency for International Development (A.I.D.), and the REPUBLIC OF GUATEMALA (Borrower).

WHEREAS, the Borrower and A.I.D. have decided to modify such Loan Agreement in order to increase the funds assigned to the Project and extend the Project Assistance Completion Date.

THEREFORE, the Parties hereby agree upon this Amendment No. 1 and Annex 1-A to the Loan Agreement No. 520-T-031 in the following form:

1. A new Section 3.1.(a) is added which stipulates:

Additional Loan to the Project. A.I.D. agrees to provide the Borrower an additional loan, in accordance with the Foreign Assistance Act of 1961 and its Amendments, in an amount up to TWO MILLION UNITED STATES DOLLARS (U.S. $2,000,000), which will be used exclusively to finance foreign exchange and local currency costs for goods and services for

Moneda Local de bienes y servicios para el Proyecto. Por lo tanto, con el otorgamiento de este préstamo adicional el financiamiento de la A.I.D. para el Proyecto asciende hasta la cantidad de DIEZ MILLONES SEISCIENTOS MIL DOLARES DE LOS ESTADOS UNIDOS DE AMERICA (US$10,600,000).

this Project. Therefore, with the provision of the additional loan funds, AID agrees to provide up to the amount of TEN MILLION SIX HUNDRED THOUSAND UNITED STATES DOLLARS (U.S.$10,600,000) for the Project.

2. Se agrega una nueva Sección 3.2.(c) que estipula:

2. A new Section 3.2.(c) is added which stipulates:

Los recursos adicionales del Prestatario para el Proyecto. A menos que la A.I.D. convenga lo contrario por escrito, el Prestatario se compromete a contribuir al Proyecto, durante la vigencia total del mismo, recursos adicionales de contrapartida por una cantidad no menor en QUETZALES al equivalente de CINCO MILLONES NOVECIENTOS MIL DOLARES DE LOS ESTADOS UNIDOS DE AMERICA (U.S. $5,900,000). Estos recursos adicionales serán proporcionados en la siguiente forma: Una cantidad en QUETZALES al equivalente de DOS MILLONES DE DOLARES DE LOS ESTADOS UNIDOS DE AMERICA (US $2,000,000) de recursos provenientes del Gobierno Central y una cantidad en QUETZALES al equivalente de TRES MILLONES NOVECIENTOS MIL DOLARES DE LOS ESTADOS UNIDOS DE AMERICA (U.S.$ 3,900,000) de recursos propios del Instituto Nacional de Electrificación (INDE). Por lo tanto, con la contribución de estos recursos adicionales del Prestatario, el financiamiento del Gobierno de la República de Guatemala para el Proyecto asciende a una cantidad no menor en QUETZALES al equivalente de DOCE MILLONES TRECIENTOS MIL DOLARES DE LOS ESTADOS UNIDOS DE AMERICA (U.S. $12,300,000).

Borrower's additional resources to the Project. Unless A.I.D. otherwise agrees in writing, the Borrower agrees to contribute to the Project, during the life of the Project, additional counterpart resources for an amount not less than the amount in Quetzales in the equivalent of FIVE MILLION NINE HUNDRED THOUSAND UNITED STATES DOLLARS (U.S. $5,900,000). These additional resources will be provided as follows: an amount in QUETZALES equivalent to TWO MILLION UNITED STATES DOLLARS (U.S.$ 2,000,000) of resources from the Central Government and an amount in QUETZALES equivalent to THREE MILLION NINE HUNDRED THOUSAND UNITED STATES DOLLARS (U.S. $ 3,900,000) of resources of the National Institute of Electrification (INDE). Therefore, with the Borrower's contribution of these additional resources, the financing provided by the Government of the Republic of Guatemala for the Project increases to a quantity not less than the amount in Quetzales in the equivalent of TWELVE MILLION THREE HUNDRED THOUSAND UNITED STATES DOLLARS (U.S.$12,300,000).

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3. Se modifica el literal (a), Sección 3.3 Fecha Final para Completar el Proyecto así:

Excepto que las Partes acuerden lo contrario por escrito, la Fecha Final para Completar el Proyecto (FFCP) es el 31 de diciembre de 1985. La FFCP es la fecha en la cual las partes estiman que todos los servicios y todos los bienes financiados con fondos provenientes del préstamo habrán sido proporcionados para el Proyecto en la forma contemplada en este Convenio y la Enmienda No. 1 al mismo.

4. Se agrega una nueva Sección 4.1 (a) que estipula:

Intereses sobre DOS MILLONES DE DOLARES DE LOS ESTADOS UNIDOS (U.S.$2,000,000) adicionales. El Prestatario pagará a la A.I.D. en concepto de intereses el dos por ciento (2%) anual durante los diez (10) años siguientes a la fecha del primer desembolso de DOS MILLONES DE DOLARES DE LOS ESTADOS UNIDOS (U.S.$2,000,000), y subsiguientemente una tasa del tres por ciento (3%) anual sobre el saldo pendiente de amortizar del mismo y sobre cualquier suma adeudada por concepto de intereses vencidos. Los intereses sobre saldos pendientes se calcularán desde la fecha de cada desembolso de conformidad con lo que se determine en la Sección 8.5 y deberán pagarse semestralmente. Los intereses sobre interés pendiente de pago se calcularán a partir de la fecha de vencimiento y pago de dichos intereses. Los intereses se computarán con base a un año de 365 días. El primer pago deberá efectuarse seis (6) meses después del primer desembolso en la fecha que determine la A.I.D.

3. Subsection (a) of Section 3.3 Project Assistance Completion Date is modified as follows:

Except as the Parties may otherwise agree in writing the Project Assistance Completion Date (PACD) is December 31, 1985. The PACD is the date by which the Parties estimate that all services financed under the Loan will have been performed and all goods financed under the Loan will have been furnished for the Project as contemplated both in the Agreement and Amendment Number One to said Agreement.

4. A new Section 4.1 (a) is added which stipulates:

Interest on the Additional TWO MILLION UNITED STATES DOLLARS (U.S. $2,000,000). The Borrower shall pay to A.I.D. interest which shall accrue at the rate of two percent (2%) per annum for ten (10) years following the date of the first disbursement of TWO MILLION UNITED STATES DOLLARS (U.S.$2,000,000) hereunder and at the rate of three percent (3%) per annum thereafter on the outstanding balance of Principal and on any due and unpaid interest. Interest on the outstanding balance of Principal shall accrue from the date of each respective disbursement as such date is defined in Section 8.5, and shall be payable semi-annually. Interest on any due and unpaid interest shall accrue from the date when such interest becomes due and payable. Interest shall be computed on the basis of a 365 day year. The first payment of interest shall be due and payable no later than six (6) months after the first disbursement hereunder, on a date to be specified by A.I.D.

5. Se agrega una nueva Sección 4.2.(a) que estipula:

Amortización de DOS MILLONES DE DOLARES DE LOS ESTADOS UNIDOS (U.S.$2,000,000) adicionales. El Prestatario cancelará a la A.I.D. los DOS MILLONES DE DOLARES DE LOS ESTADOS UNIDOS (U.S.$2,000,000), en un término de veinticinco (25) años a contar de la fecha del primer desembolso del mismo, en treinta y un (31) pagos semestrales aproximadamente iguales que incluirán capital e intereses. La primera amortización de los DOS MILLONES DE DOLARES DE LOS ESTADOS UNIDOS (U.S.$2,000,000) será pagadera nueve años y medio (9-1/2) después de la fecha en que venza el primer pago de intereses. La A.I.D. proporcionará al Prestatario un calendario de amortizaciones calculado de acuerdo con lo estipulado en esta Sección después de que se haya verificado el desembolso final de los DOS MILLONES DE DOLARES DE LOS ESTADOS UNIDOS (U.S. $2,000,000).

5. A new Section 4.2.(a) is added which stipulates:

Repayment of the Additional TWO MILLION UNITED STATES DOLLARS (U.S. $2,000,000). Borrower shall repay to A.I.D. the TWO MILLION UNITED STATES DOLLARS (U.S. $2,000,000) within twenty-five (25) years from the date of the first disbursement hereunder, in thirty-one (31) approximately equal semi-annual installments of Principal and interest. The first installment of the TWO MILLION UNITED STATES DOLLARS (U.S. $2,000,000) shall be payable nine and one-half (9-1/2) years after the date on which the first interest payment is due. A.I.D. shall provide Borrower with an amortization schedule in accordance with this Section after the final disbursement of the TWO MILLION UNITED STATES DOLLARS (U.S. $2,000,000).

6. Se agrega una nueva Sección 5.1.(h) que estipula:

Condición Previa al Primer Desembolso del Préstamo Adicional al Proyecto. Previo al primer desembolso de los fondos adicionales proporcionados al préstamo por medio de esta Enmienda, o a la emisión de cualquier documento de compromiso, el Prestatario suministrará a la A.I.D. un dictamen legal tal como es requerido en la Sección 5.1.(a) de este Convenio.

6. A new Section 5.1.(h) is added which stipulates:

Condition Precedent to Initial Disbursement Under the Project. Prior to the first disbursement of additional funds provided for within this loan amendment, or the issuance of any commitment document, the Borrower will provide to A.I.D. a legal opinion such as is required in Section 5.1.(a) of the Agreement.

Con excepción de las modificaciones hechas por este medio, el Convenio de fecha 21 de mayo de 1979 permanece en vigor.

EN FE DE LO CUAL, el Prestatario y los ESTADOS UNIDOS DE AMERICA, cada uno actuando a través de su representante debidamente autorizado, celebran esta Enmienda y la firman y ejecutan el 30 de septiembre de 1983.

Except as hereby amended, the said Agreement between the Borrower and A.I.D., dated May 21, 1979 remains in full force and effect.

IN WITNESS WHEREOF, the Borrower and the UNITED STATES OF AMERICA, each acting through its respective duly authorized representative have caused this Amendment to be signed in their names and delivered on September 30, 1983.

REPUBLICA DE GUATEMALA

Lic. Eric Meza Duarte
Primer Viceministro de Finanzas
Encargado del Despacho

Ing. Luis Hugo Solares Aguilar
Ministro de Comunicaciones,
Transporte y Obras Públicas

Ing. Rolando Yon Siú
Gerente General INDE

THE UNITED STATES OF AMERICA

Frederic Chapin
Ambassador
United States of America

Charles E. Costello
Director
USAID Mission to Guatemala

ANEXO I-A

ENMIENDA A LA DESCRIPCION DEL PROYECTO DE ELECTRIFICACION RURAL

El propósito de esta Enmienda es ampliar el monto de financiamiento al proyecto de Electrificación Rural, suscrito el 21 de mayo de 1979, el cual contribuirá al desarrollo equilibrado del programa de energía eléctrica de Guatemala, facilitando la participación de la población rural de bajos ingresos en los beneficios del programa de inversión de energía del Instituto Nacional de Electrificación ("INDE"). El INDE acelerará la prestación de sus servicios a dicha población conectando aproximadamente 70,000 nuevos usuarios en numerosas comunidades del Altiplano Occidental y Central y en las regiones de la Costa Sur y Oriente de Guatemala. Al INDE se le proporcionará directamente asistencia técnica, adiestramiento, equipo de mantenimiento y vehículos con el objeto de fortalecer su capacidad administrativa y su capacidad para prestar servicio a aproximadamente a 70,000 consumidores adicionales. Aproximadamente, 40,000 conexiones de residencias y comercios serán hechos en aldeas ya electrificadas y que no requieren ampliación de la red de distribución. Alrededor de 10,000 conexiones residenciales y comerciales se harán en aldeas parcialmente electrificadas y que requieren ampliación de la red de distribución. Además, se conectarán aproximadamente 20,000 residencias y usuarios comerciales en aldeas que actualmente no cuentan con electricidad y que requerirán de construcción de líneas eléctricas primarias y secundarias nuevas.

ANNEX I-A

AMENDED PROJECT DESCRIPTION RURAL ELECTRIFICATION PROJECT

The purpose of this Amendment is to increase the amount of funding to the Rural Electrification Project, signed on May 21, 1979, which will contribute to a balanced electric power development program for Guatemala by facilitating the participation of low-income rural populations in the benefits of the energy investment program of the National Institute of Electrification (INDE). INDE will accelerate its services to the rural population by connecting approximately 70,000 new users in numerous villages in the Western and Central Highlands and the Eastern and South Coast Regions of Guatemala. Technical assistance, training, maintenance equipment and vehicles will be provided directly to INDE to strengthen its administrative and service capabilities for the estimated 70,000 additional new customers. Approximately 40,000 residential and commercial connections will be made in villages which are already electrified and do not require an expansion of the distribution network. An estimated 10,000 residential and commercial users will be hooked-up in partially electrified villages which require an expansion of the distribution network. In addition about 20,000 residential and commercial users will be hooked-up in previously non-electrified villages which will require the construction of new primary and secondary electricity distribution lines.

El proyecto se ha diseñado para proporcionar electrificación a usuarios que residen en zonas que cuentan con un acceso adecuado a información, mercados, salud, educación y servicios agrícolas, y otra infraestructura de desarrollo, en esta forma logrando hasta el máximo el uso de este recurso para fines productivos.

El área del proyecto en el Altiplano Occidental y Central está definida por los límites departamentales de los siete departamentos siguientes: Totonicapán, El Quiché, Huehuetenango, Sololá, Chimaltenango, Alta Verapaz y Baja Verapáz. Además, se incluyen en el área del proyecto, las zonas del Altiplano (definidas como de 5,000 pies y de mayor altitud) de los departamentos de San marcos y Quezaltenango. En la Región Oriental el proyecto cubrirá los departamentos de Jutiapa, Jalapa, El Progreso, Chiquimula y Santa Rosa, y en el departamento de Zacapa la parte sur del Valle del Río Motagua. En la región de la Costa Sur el proyecto incluirá los departamentos de Suchitepequez, Retalhuleu, Escuintla y la parte sur de San Marcos y Quezaltenango.

El incremento en costos del proyecto para proporcionar electricidad a 70,000 nuevos usuarios residenciales y comerciales se atribuye a dos causas:

1) El costo original del proyecto diseñado en 1976 ha aumentado durante los últimos siete años debido a la inflación.

2) Entre 1976, cuando la lista original propuesta de aldeas

The Project is designed so as to bring electrification to users who live in areas where there is adequate access to information, markets, health, education and agricultural services and other development infrastructure, thereby maximizing productive use of this resource.

The Project area in the Western and Central Highlands is defined by the departmental boundaries of the seven departments of Totonicapán, El Quiché, Huehuetenango, Sololá, Chimaltenango, Alta Verapaz and Baja Verapaz. In addition, the Highland areas (defined as 5000 feet and above) of the departments of San Marcos and Quetzaltenango are included in the project area. In the Eastern Region the Project will operate in the departments of Jutiapa, Jalapa, El Progreso, Chiquimula, Santa Rosa and in the department of Zacapa in the area south of the Motagua River Valley. In the South Coast Region the Project will include the departments of Suchitepequez, Retalhuleu, Escuintla and the southern portion of San Marcos and Quezaltenango.

The increase in total project costs to provide electricity to 70,000 new residential and commercial users is attributed to two causes:

1) Due to inflation, the original cost of the project designed in 1976 has increased during the last seven years.

2) Between 1976 when the original proposed list of villages

que serían incluidas en el programa de electrificación rural fué elaborada, y 1980, cuando se iniciaron las actividades del proyecto, muchas de las aldeas más concentradas y menos aisladas habían recibido electricidad por medio de la red de electricidad normal del programa de electrificación rural del INDE, obligando por lo tanto al programa de electrificación rural a seleccionar aldeas adicionales más aisladas, con un costo mayor de construccion para sustituir las aldeas originalmente propuestas que ya fueron electrificadas con recursos del INDE.

to be included in the rural electrification program was elaborated, and 1980 when project activities were initiated many of the more concentrated, less isolated villages had received electricity through INDE's normal electrical network expansion program, thereby forcing the Rural Electrification program to select additional, more isolated villages, with higher construction costs to replace the originally proposed villages but subsequently electrified with non-project funds.

Para asegurar una calidad mínima aceptable de servicio en las áreas donde los sistemas de distribución serán extendidos y ampliados, se financiarán aproximadamente 56 kilómetros de líneas de subtransmisión de 69KV. Se requiere también una sub-estación para transformar voltaje y proteger las nuevas líneas de distribución. Se construirá aproximadamente un total de 321 kms. de líneas de distribución primaria y 901 kms. de líneas de distribución secundaria. Se instalarán acometidas, contadores y alambrado interno en los hogares de los 70,000 nuevos usuarios estimados. El préstamo prevé fondos para financiar el alambrado interno de los hogares de los nuevos usuarios que serán reembolsados por el consumidor recargándolo a su cuota mensual de luz durante un período de cuatro años.

To ensure minimally acceptable quality of service in the areas where distribution systems are to be extended and expanded, approximately 56 kilometers of 69KV subtransmission lines will be financed. One substation is also required to provide transformation of voltage and protection for the new distribution lines. A total of approximately 321 kilometers of primary distribution lines and 901 kilometers of secondary lines will be built. Service drops, meters, and customer-owned house wiring for the estimated 70,000 new users will be installed. Funds to finance house wiring, which will be repaid by the customer by affixing a charge to his monthly utility bill for four years are provided by the loan.

Durante el último año del proyecto se llevará a cabo una evaluación para medir el impacto en relación a la tasa de adopción de electricidad para usos productivos

An impact evaluation which measures the rate of adoption of electricity for productive purposes by low income rural families

de familias del área rural de bajos ingresos.

Finalmente, el costo total del proyecto está estimado en VEINTIDOS MILLONES NOVECIENTOS MIL DOLARES DE LOS ESTADOS UNIDOS ($22,900,000) de los cuales DIEZ MILLONES SEISCIENTOS MIL DOLARES (U.S. $10,600,000) serán financiados con fondos del Préstamo desembolsados durante los años proyectados de vigencia del proyecto. La República de Guatemala contribuirá con una cantidad en Quetzales no menor al equivalente de DOCE MILLONES TRESCIENTOS MIL DOLARES (U.S. $12,300,000) incluyendo costos sufragados en su equivalente en especie, durante el mismo período. El INDE será la entidad ejecutora del Proyecto y será responsable de la expansión del sistema de distribución rural después de que el proyecto se haya concluído.

El Cuadro I de este Anexo refleja un plan financiero ilustrativo de la distribución de los SIETE MILLONES NOVECIENTOS MIL DOLARES (U.S. $7,900,000) adicionales con fondos del Préstamo y de la contrapartida, en dólares y moneda local. El Cuadro II refleja la fuente y uso anual de los VEINTIDOS MILLONES NOVECIENTOS MIL DOLARES (U.S. $22,900,000) disponibles para el Proyecto. Un resumen del Plan Financiero de los VEINTIDOS MILLONES NOVECIENTOS MIL DOLARES (U.S. $22,900,000) para el Proyecto de Electrificación Rural se presenta en el Cuadro III de este Anexo.

will be carried out during the last year of the project.

The total cost of the project is estimated at TWENTY TWO MILLION NINE HUNDRED THOUSAND U.S. DOLLARS ($22,900,000) of which TEN MILLION SIX HUNDRED THOUSAND U.S. DOLLARS ($10,600,000) will be financed with loan funds disbursed over the projected life of the project. The Republic of Guatemala will contribute an amount not less than the equivalent in Quetzales of TWELVE MILLION THREE HUNDRED THOUSAND U.S. DOLLARS ($12,300,000) including costs borne on an in-kind basis during the same period. INDE will be the Implementing Agency for the project and will be responsible for the extension of rural distribution system after the project has terminated.

Table I of this Annex provides an illustrative financial plan for the distribution of the additional SEVEN MILLION NINE HUNDRED THOUSAND U.S. DOLLARS ($7,900,000) million in counterpart and loan funds, both in foreign and local currencies. Table II provides on an annual basis the source and use of the total TWENTY TWO MILLION NINE HUNDRED THOUSAND U.S. DOLLARS ($22.900,000) available for the project. A summary financial plan for the TWENTY TWO MILLION NINE HUNDRED THOUSAND U.S. DOLLARS ($22,900,000) million Rural Electrification Project is given in Table III of this Annex.

10/V

TABLE I/CUADRO I

SELECTIVE DISBURSEMENT PLAN FOR THE INCREMENTAL INCREASE IN FINANCIAL RESOURCES BY SOURCE, APPLICATION, AND CURRENCY

RURAL ELECTRIFICATION PROJECT (PER-3)

PLAN ILUSTRATIVO DE DESEMBOLSOS DE LA AMPLIACION DEL FINANCIAMIENTO POR FUENTE Y USO DE LOS FONDOS

PROYECTO DE ELECTRIFICACION RURAL (PER-3)

(000s)

INVESTMENT CATEGORY/ CATEGORIA DE INVERSION	1983					1984					1985					TOTAL				
	AID		INDE	GOB.	TOTAL	AID		INDE	GOB.	TOTAL	AID		INDE	GOB.	TOTAL	AID		INDE	GOB.	TOTAL
	$	Q				$	Q				$	Q				$	Q			
Construction/Construcción																				
Materials/Materiales			1860.0		1930.0	900.0			470.0	1370.0	600.0			284.0	884.0	1680.0		1860.0	754.0	4114.0
Labor/Mano de Obra									6600	6600	-	467.0	200.0	600.5	1167.3		467.0	200.0	1160.0	1847.0
Substation 69 Kv. Subestación 69 Kv.						13.0		230.0		231.0						13.0		230.0		231.0
Total Construction/ Total Construcción			1860.0		1860.0	913.0		230.0	1130.5	2261.5	600.0	467.0	200.0	784.5	2051.5	1813.0	467.0	2260.0	1824.0	6312.0
Advisory Services/Consultoría								120.6		120.6			88.7		832			209.3		209.3
Technical Assistance & Training/ Asistencia Técnica y Adiestramiento									40.0	40.0									40.0	40.0
Service, Maintenance & Construction Equipment/Equipo de Mantenimiento Servicio y Construcción																				
INDE Administration/Administración INDE								266.0		266.0			266.7		266.7			532.0		532.0
Aerial Photography/ Fotografía Aérea																				
Inflation/Inflación								169.1	18.0	283.1			104.1	19.2	123.3			273.2		
Contingencies/Imprevistos								284.0		334.0			236.4		236			691.0		590.0
TOTAL			1860.0		1860.0	913.0		1167.1	1186.5	3236.6	600.0	467.0	902.0	803.0	2783.4	1813.0	467.0	3860.0	2860.0	7800.0

Septiembre, 1983

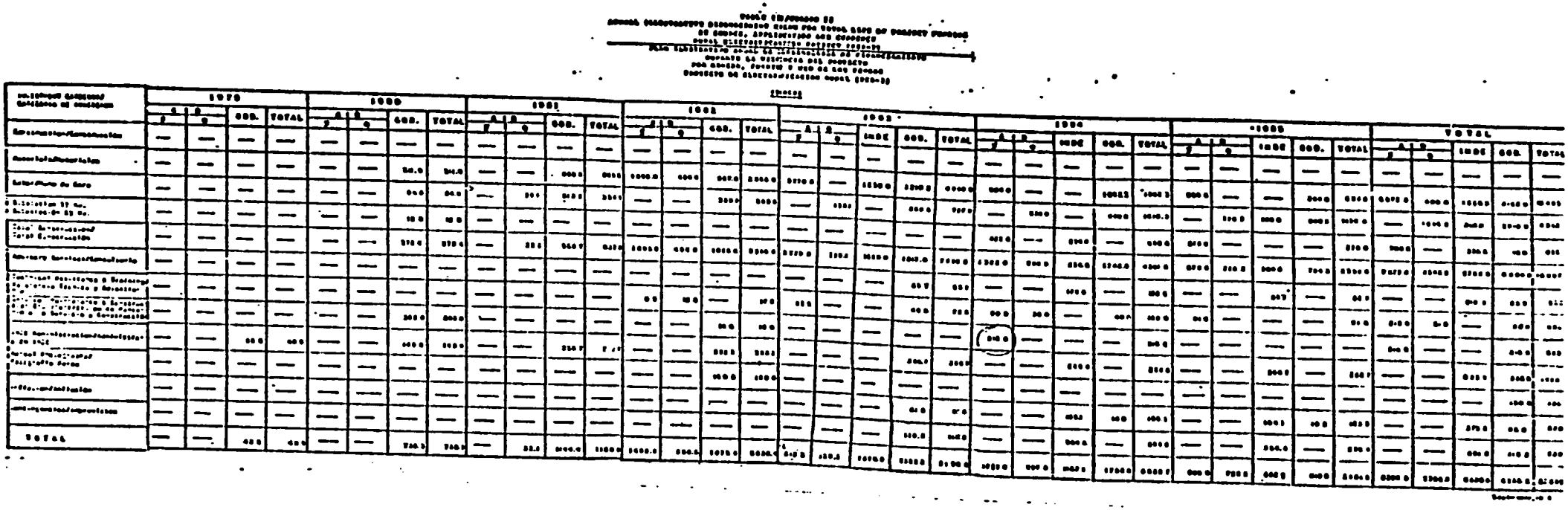

TABLE III/CUADRO III

RURAL ELECTRIFICATION
ELECTRIFICACION RURAL

SUMMARY FINANCIAL PLAN (In Thousand U.S. Dollars)
RESUMEN DEL PLAN FINANCIERO (In Miles de Quetzales)

Renglón/Item	Presupuesto Aprobado el 24 de Julio de 1980/Budget Approved on July 24, 1980			Presupuesto Total Modificado/ Modified Total Budget		
	AID	GdeG GOG	Total	AID	GdeG GOG	Total
	Q					
1. Construcción de Líneas de Subtransmisión/Distribución Construction of Subtransmission/Distribution of Lines	6,660	4,880	11,540	10,015	8,983	18,998
2. Consultoría en Ingeniería Consulting Engineer	315	-	315	-	300	300
3. Servicios de Ingeniería y Administración del INDE INDE Engineering & Administration	-	760	760	-	1,489	1,489
4. Equipo de Mantenimiento y Servicio Maintenance & Service Equipment	315	-	315	315	218	533
5. Asistencia Técnica y Adiestramiento Technical Assistance & Training	270	-	270	270	80	350
6. Fotografía Aerea Areal Photography	-	-	-	-	150	150
7. Inflación (Costos) Inflation	810	590	1,400	-	370	370
8. Imprevistos (Costos) Contingency	230	170	400	-	710	710
Total	8,600	6,400	15,000	10,600	12,300	22,900

1439C/1440C

ATTACHMENT 6
ANEXO 6

AGENCY FOR INTERNATIONAL DEVELOPMENT
United States A.I.D. Mission to Guatemala
American Embassy
Guatemala City, Guatemala, C. A.

Préstamo A.I.D. 520-T-031
Electrificación Rural II
Carta de Ejecución No. 40

8 de mayo de 1984

Ing. Raúl Rodríguez Soto
Gerente General
Instituto Nacional de Electrificación (INDE)
6a. Avenida 2-73, Zona 4
Ciudad de Guatemala

Estimado Ing. Rodríguez,

Acuso recibo de la carta del Ing. Luis José Figueroa Flores, Subgerente de Obras y Producción del INDE, de fecha 21 de marzo de 1984 (Oficio No. 0-500-150-84) en la cual solicita la aprobación de A.I.D. para el traslado de $300,000.00 de fondos de Préstamo del renglón presupuestario "Mano de Obra" al renglón presupuestario "Equipo de Mantenimiento, Construcción y Servicio" de los Préstamos A.I.D. 520-T-031 y 520-T-038.

Entendemos que la cantidad total de fondos de Préstamo y de contrapartida asignada al renglón "Mano de Obra" (Q4,562,100.00) no se reducirá ya que la contribución de contrapartida del INDE en dicho renglón se incrementará en Q300,000.00. Por este medio la Misión A.I.D. aprueba la transferencia presupuestaria solicitada y el presupuesto modificado que se detalla en el Anexo 1.

A.I.D. Loan 520-T-031
Rural Electrification II
Implementation Letter No. 40

8 de mayo de 1984

Ing. Raúl Rodríguez Soto
Gerente General
Instituto Nacional de Electrificación (INDE)
6a. Avenida 2-73, Zona 4
Guatemala City

Dear Ing. Rodríguez,

I acknowledge receipt of the letter from Ing. Luis José Figueroa Flores, INDE's Deputy Manager for Construction and Production, dated March 21, 1984 (Oficio No. 0-500-150-84), requesting A.I.D. approval for the transfer of $300,000.00 of loan funds from the "Labor" budget line item to the "Service, Maintenance and Construction Equipment" budget line item of A.I.D. Loans 520-T-031 and 520-T-038

We understand that the total amount of loan and counterpart funds assigned to the "Labor" line item ($4,562.100.00) will not be reduced since INDE's counterpart contribution in said line item will be increased by $300,000.00. The A.I.D. Mission hereby approves the requested budget transfer and the revised budget detailed in Annex 1.

En relación a la Carta de Ejecución No. 38 de fecha 3 de abril de 1984, por medio de la cual se asignaron y comprometieron $1,546,000.00 de fondos de Préstamo del componente "Mano de Obra para costos de mano de obra, los registros de la Misión A.I.D. muestran que en el año fiscal 1981 se desembolsaron $22,044.54 de fondos de préstamo para costos de mano de obra. Por lo tanto, por este medio estamos reduciendo en $22,044.54 la cantidad total de fondos de Préstamo comprometidos para costos de mano de obra.

Tal como se especifica en el presupuesto modificado, la cantidad total de fondos de Préstamo presupuestada y comprometida para costos de mano de obra será $1,546,000.00, de la cual $1,523,955.46 están pendientes de desembolso por la Misión A.I.D.

In reference to Implementation Letter No. 38 of April 3, 1984, through which $1,546,000.00 of loan funds from the "Labor" component were earmarked and committed for labor costs, the A.I.D. Mission's records show that $22,044.54 of loan funds were disbursed in FY-1981 for labor costs. Therefore, we are hereby reducing the total amount of loan funds committed for labor costs by $22,044.54.

As specified in the revised budget, the total amount of loan funds budgeted and committed for labor costs will be $1,546,000 of which $1,523,955.46 are pending disbursement by the A.I.D. Mission.

Atentamente,

Sincerely,

Charles E. Costello
Director

ANEXO I (ANNEX I)

ELECTRIFICACION RURAL (RURAL ELECTRIFICATION)

RESUMEN DEL PLAN FINANCIERO (EN MILES DE DOLARES Y QUETZALES)
/SUMMARY FINANCIAL PLAN (IN THOUSANDS US DOLLARS AND QUETZALES)

RENGLON/ITEM	Presupuesto aprobado el 30 de septiembre de 1983/Budget approved on September 30, 1983				Modificaciones /Modifications			Presupuesto Modificado /Revised Budget			
	AID	INDE	GOG	TOTAL	AID	INDE	GOG	AID	INDE	GOG	TOTAL
1. Construcción /Construction:											
a. Materiales /Materials	7,468.8	1,850.0	4,166.9	13,485.7	-	-	-	7,468.8	1,850.0	4,166.9	13,485.7
b. Mano de obra /Labor	1,846.2	200.0	2,515.9	4,562.1	-300.0	+300.0	-	1,546.2	500.0	2,515.9	4,562.1
c. Subestación 69KV /Substaton 69KV	700.0	238.0	12.0	950.0	-	-	-	700.0	238.0	12.0	950.0
Total Construcción /Total Construction	10,015.0	2,288.0	6,694.8	18,997.8	-300.0	+300.0	-	9,715.0	2,588.0	6,694.8	18,997.80
2. Servicios de Consultoría de Ingeniería /Consulting Engineering Services	-	214.3	85.7	300.0	-	-	-	-	214.3	85.7	300.0
3. Ingeniería y Administración del INDE /INDE Engineering and Administration	-	534.0	955.0	1,489.0	-			-	534.0	955.0	1,489.0

RENGLON/ITEM	Presupuesto aprobado el 30 de septiembre de 1983/Budget approved on September 30, 1983				Modificaciones /Modifications			Presupuesto Modificado /Revised Budget			
	AID	INDE	GOG	TOTAL	AID	INDE	GOG	AID	INDE	GOG	TOTAL
4. Equipo de Mantenimiento, Servicio y Construcción/Service Maintenance and Construction Equipment	315.0	-	218.0	533.0	+300.0	-	-	615.0	-	218.0	833.0
5. Asistencia Técnica y Adiestramiento /Technical Assistance and Training	270.0	-	80.0	350.0	-	-	-	270.0	-	80.0	350.0
6. Fotografía Aérea /Aerial Photography	-	-	150.0	150.0	-	-	-	-	-	150.0	150.0
7. Inflación/Inflation	-	273.2	96.8	370.0	-	-	-	-	273.2	96.8	370.0
8. Imprevistos /Contingency	-	591.0	119.2	710.2	-	-	-	-	591.0	119.2	710.2
TOTAL	10,600.0	3,900.5	8,399.5	22,900.0	-	+300.0	-	10,600.0	4,200.5	8,399.5	23,200.0

3116C

CONVENIO DE PRESTAMO 520-T-031/T-038

Attachment No. 7

INSTITUTO NACIONAL DE ELECTRIFICACION
I.N.D.E.
GUATEMALA, C. A.
ESTADO DE CUENTA
PLAN DE ELECTRIFICACION RURAL 2
PER-2
AVANCE FINANCIERO DEL PROYECTO AL 30 DE JUNIO DE 1985

RENGLON	PLAN FINANCIERO 1979-1985 CONFORME REPROGRAMACION			CANTIDADES TOTALES ACUMULADAS PAGADAS AL MES DE JUNIO DE 1985		CANTIDADES DISPONIBLES AL 30 DE JUNIO DE 1985	
	AID	GOBIERNO INDE	TOTAL MILES	AID	GOBIERNO INDE	AID	GOBIERNO INDE
Administración e Ingenieria	---	1,489,000	1,489.0	---	1,454,239.23	---	34,760.77
Equipo de Mantenimiento y Servicio	615,000	218,000	833.0	---	301,429.32	615,000.00	---
Consultoria en Supervision	---	300,000	300.0	---	256,085.37	---	43,914.63
Asistencia Tecnica y Adiestramiento	270,000	80,000	350.0	22,336.68	---	247,663.32	80,000.00
Construccion							
Materiales	7,468,800	6,016,900	13,485.7	5,924,440.47	4,750,695.25	1,544,359.53	1,266,204.75
Mano de Obra	1,546,200	3,015,900	4,562.1	129,389.90	3,181,619.29	1,416,810.10	---

CONVENIO DE PRESTAMO 520-T-031/T-038

Attachment No. 7

INSTITUTO NACIONAL DE ELECTRIFICACION (Cont'd)
I.N.D.E.
GUATEMALA, C. A.
ESTADO DE CUENTA
PLAN DE ELECTRIFICACION RURAL 2
PER-2
AVANCE FINANCIERO DEL PROYECTO AL 30 DE JUNIO DE 1985

RENGLON	PLAN FINANCIERO 1979-1985 CONFORME REPROGRAMACION			CANTIDADES TOTALES ACUMULADAS PAGADAS AL MES DE JUNIO DE 1985		CANTIDADES DISPONIBLES AL 30 DE JUNIO DE 1985	
	AID	GOBIERNO INDE	TOTAL MILES	AID	GOBIERNO INDE	AID	GOBIERNO INDE
Subestacion	700,000	250,000	950.0	—	12,000.00	700,000.00	328,000.00
Fotografia Aerea	—	150,000	150.0	—	150,000.00	—	—
Inflacion	—	370,000	370.0	—	22,272.22	—	347,727.78
Imprevistos	—	710,200	710.2	—	—	—	710,200.00
TOTALES	10,600,000	12,600,000	23.2	6,076,167.05	10,128,340.68	4,523,832.95	2,270,807.93

NOTA: Debido a un aparente incremento de Q.249,148.61 en la cuenta GOB/INDE, oportunamente se hara el ajuste correspondiente.

Doct. 5427C

Attachment 8-1

List of New Villages

	Municipality	Potential consumers	Connections	Density 10-30	Density 30-60	Length of secondary	Length of primary	Secondary	Investment Primary	Investment Consumer	Index Infra-structure	Index Economic
Chiquimula												
Maraxco	Chiquimula	216	194	90	10	4.4	1.5	270.0	42.5	312.5	7.1	4.0
Caña Vieja	Ipala	53	45	95	5	1.0	1.0	255.0	122.2	377.2	6.0	4.6
El Rosario	Ipala	128	102	70	20	2.6	2.5	306.7	134.8	441.5	6.1	3.6
El Progreso												
Los Morales	El Progreso	73	65	70	30	1.8	0.4	330.0	38.1	368.1	6.8	5.0
La Montañita	Sansare	90	81	30	70	3.0	4.0	450.0	271.6	721.6	6.8	4.8
Jalapa												
Songotongo	San Luis Jilotepeque	38	38	80	10	0.9	0.6	273.3	94.1	367.4	6.1	5.6
Pino Zapatón	San Carlos Alzatate	118	106	70	30	2.9	10.0	330.0	518.9	848.9	6.5	6.2
Salamo	Monjas	100	70	40	60	2.4	0.6	420.0	51.1	471.1	5.9	3.0
El Carrizal	Mataquescuintla	144	144	48	2	3.0	3.4	252.0	129.9	381.9	7.9	5.0
San José La Sierra	Mataquescuintla	194	174	55	30	5.0	6.5	345.9	205.5	551.3	8.9	8.0
Jutiapa												
Ixtacapa	Jutiapa	200	150	66	0	3.0	6.0	240.0	220.0	460.0	2.8	4.8
El Quequexque	Agua Blanca	76	64	80	20	1.6	5.2	300.0	446.9	746.9	7.3	3.8
Asuncion Grande	Asunción Mita	79	59	60	40	1.8	2.0	360.0	186.4	546.4	7.1	5.6
Eidea Guevara	Asunción Mita	128	102	70	30	2.8	0.0	330.0	0.0	330.0	6.1	5.4
San Fernando	Quezada	46	46	80	20	1.1	2.0	300.0	239.1	539.1	5.8	4.6
Santa Rosa												
El Carrizal	Santa Rosa de Lima	48	43	70	25	1.1	0.0	318.9	0.0	318.9	5.8	3.4
San Juan Tapalapa	Casillas	130	104	65	10	2.4	6.0	280.0	317.3	597.3	7.8	6.2
San Antonio	Santa María Ixhuatán	100	80	50	50	2.6	2.0	390.0	137.5	527.5	5.1	6.0
San José Pineda	Santa María Ixhuatán	119	95	38	39	3.1	3.0	391.9	173.7	565.6	5.7	6.2
Aldea La Casita	Santa María Ixhuatán	49	41	40	22	1.2	2.5	346.5	335.4	681.8	6.4	4.0

As of July 31, 1985.

Attachment 8-2

List of Partially Electrified Villages

Village	Municipality	Type of project planned	Consumer within the grid	Transformers within grid	Transformers outside grid	Density 10-30	Density 30-60	Length of grid	Investment/ consumer
Chiquimula									
Esquipulas	Esquipulas	Pending	16	0	61	20	50	2.9	573.4
El Progreso									
San Agustín Acasaguastlán	San Agustín Acasaguastlán	Pending	156	2	269	70	20	8.6	384.2
El Jícaro	El Jícaro	Pending	101	2	75	70	20	2.4	384.4
Jalapa									
San Luís Jilotepeque	San Luís Jilotepeque	Pending	184	3	480	40	40	19.5	487.5
Jutiapa									
Aldea La Pava	Quezada	Pending	0	0	42	83	3	1.1	316.1
Santa Rosa									
Oratorio	Oratorio	Pending	7	0	21	100	0	0.6	331.4

As of July 26, 1985.

It is recommended that most of this training take place in Guatemala, and that the trainers concentrate on training trainers who will in turn train others within the INDE organization.

METHODOLOGY

Primary emphasis should be on on-the-job training, supplemented by classroom training and/or seminars as deemed necessary. The descriptions which follow are general in nature and should be further tailored to Guatemala and INDE circumstances when definitive plans for the training are concretized.

1. Productive Uses of Electricity

Introduction - As noted on page 14, the monthly consumption per consumer is extremely low (12.24 kWh) among those newly connected under the PER-2 program. While this electric energy itself has brought some elementary social and economic benefits to the rural areas served, to justify the investment in the delivery system, this electricity must be consciously channeled into those kinds of economic and social activities that will bring about the biggest gains to the people it is serving. The process of developing the type of programs that will bring this about is not an easy one.

The evaluators have recommended that PER-2 and INDE develop a Productive Uses of Electricity Program now.

Training Program - To begin the process, a Productive Uses of Electricity Seminar should be held in Guatemala at the earliest possible moment. Such a seminar would concentrate on developing the organization for a productive uses of electricity program and the development of plans for a countrywide productive uses of electricity program.

Duration of the Seminar - one week

Number of Participants - up to 30

Estimated Cost - $30,000.00

Course Description - A course such as this is designed to identify areas in which efforts need to be initiated or expanded to enhance the financial and technical stability of electric systems through systematic planning and promotion of new and appropriate productive end-uses of electric energy. The course should cover methods and reasons for developing plans and conducting activities and programs relating to customer service activities, including customer market analysis, information and education programs, community development programs, customer financing programs and energy cost/benefit analysis for customers. Case studies of productive use activity in other countries should be presented and critiqued. Participants should begin the development of work plans to implement an effective productive uses program in their own service areas.

2. Rural Electrification Design Standards

Introduction - The evaluation shows that there could be a significant savings in the construction of rural electric lines in Guatemala if low-cost but still reliable standards could be designed and accepted by PER-2 and the INDE Design Department. The present INDE designs and specifications for rural primary and distribution lines should be analyzed more fully by design engineers with extensive experience in rural electric systems designs.

Training Program - Courses are available in Engineering Design and Staking and Secondary (Low-Tension) Design. These courses should be combined and offered in Guatemala.

Duration of Course - three weeks

Number of Participants - maximum of ten per three-week course

Estimated Costs in Guatemala (by Spanish-speaking instructor):

a. With training materials in English - $450 per training day, plus international travel, subsistence allowances and local expenses. 15 days x $450.00 = $6,750.00

b. With training materials in Spanish - $450 per training day plus cost of translations of materials (estimate to be sought if this option is selected).

Estimated Costs in the U.S. (at one of the U.S. rural utilities in the Southwest - with Spanish-speaking instructor[s])

Course fee - $130 per training day for the first participant and $65 per day for each additional participant up to a maximum of ten participants per course.

Course materials, equipment and shipment charges - $150 per participant.

1st participant - 15 days x $130	$ 1,950
next 9 participants - 15 days x $65 x 9	8,750
materials - 10 persons x $150	1,500
TOTAL - fees and materials only	$12,225

The above fees do not cover international transportation, local transportation, subsistence allowances or personal expenses.

Course Description - These combined courses should be designed to give the participants an opportunity to learn basic Rural Electrification Administration (REA) theory of distribution system design, as well as provide practical exposure to REA methods and management techniques in staking procedures, construction materials requirements, construction unit requirements, transformer loading, grounding, service drops and meter entrance design.

This course should be offered principally to design engineers and construction supervisors. It should be tailored to the needs of INDE and should include an analysis of present INDE design standards.

3. Rural Electrification Construction Practices

Introduction - The evaluation shows that construction, in the main, is being carried out under what are normal pre-rural electrification procedures. It has been somewhat difficult to get the construction crews to adopt new procedures even when design standards have been modified to lower costs in rural areas. It is also evident that new written procedures must be developed as revised standards are adopted.

It is obvious that rural electrification construction practices and procedures cannot be implemented until rural electrification standards are adopted. It also follows that training in construction practices must follow the adoption of such standards. It is also difficult to require crews to comply with standards, practices and procedures if they are improperly equipped to do so, as was noted on pages 24-26.

However, the basic INDE standards for construction, which were adapted from REA standards, are in place in Guatemala, and key INDE staff would benefit greatly from training in construction practices. Therefore, two courses of action for such training are recommended:

Construction Practices Training - on site in Guatemala

Training Program - An experienced rural electrification construction supervisor/trainer should travel to Guatemala to train the appropriate local staff in construction practices. The training should include classroom training, training yard training and on-the-job training by a Spanish-speaking instructor.

Estimated Duration of Course - approximately six weeks

Estimated Costs (assuming that all necessary tools and equipment to undertake the training are in Guatemala):

a. With training materials in English - $450 per training day, plus international travel, subsistence allowances and local expenses for one instructor

   30 training days x $450 = $13,500

b. With training materials in Spanish - the same as above plus cost of translating materials (estimate of cost should be sought if this option is selected)

The latter is recommended since this training is directed toward Construction Supervisors, Operations and Maintenance Supervisors and Crew Chiefs.

Construction Practices Training in the United States

Training Program - One or two experienced construction supervisors from PER-2 and/or the Construction Department of INDE should travel to a U.S. system in the Southwest for a period of six weeks to train under an experienced construction supervisor.

Estimated Costs - The following costs do not include international and local travel, subsistence allowances or personal expenses.

For the first participant - $130 per training day plus $150 for materials and supplies

Training fee - 30 days x $130 per day	$3,900
Materials and supplies	150
TOTAL	$4,050

For each additional participant - $65 per training day plus $150 for materials and supplies

Training fee - 30 days x $65 per day	$1,950
Materials and supplies	150
TOTAL	$2,100

Course Description - The training course should be essentially the same, whether given in Guatemala or in the United States. The principal difference is that the person, or persons, coming to the U.S. could observe first hand the practices and procedures of

construction mandated by the REA and the rural electric systems in the U.S. The course should treat such subjects as conformance to construction design, specifications and standards. It should also stress construction techniques, interpretation of staking sheets and inspection procedures. The course should include, but not necessarily be limited to, the following:

- construction planning
- design and specifications, materials control, the use and interpretation of staking sheets
- construction techniques
- conformance to construction standards
- construction supervision, work order procedures
- inspection procedures (pole, line, line equipment, substation)
- close-out procedures (certificate of inspection, construction inventory, final detail staking sheets, tabulation of staking sheets, inventory of work orders)
- right-of-way clearing and departmental budget

4. Rural Electrification Systems Management and Administration

Introduction - There is an expressed need within PER-2 and other units of INDE for management and administrative training. A broad spectrum of courses in electric utility management and operations are offered, which are too numerous to list. But a number of them which could be useful for INDE staff can be listed. INDE should seriously

consider which of these would be most useful. Courses could then be tailored to be given either in Guatemala or the United States and costs of each estimated. Costs will generally follow the same general pattern as for the courses outlined in Items 2 and 3 of this attachment.

General Management Course -

Concepts in Organizational Management - This course should include such topics as:

- Systemic Management of Human Resources
- The Systemic Functions of Management
- Organizing for Achievement
- Relating Purposes to Key Functions
- Designing an Organization's Structure
- Designing a Performance Evaluation Process
- The Essence, Importance and Structure of the Planning Function
- Specifications and Functioning of People in Positions

Such a course is given in the U.S. as part of a five-week course, the other three weeks of which are devoted to on-the-job training at an electric utility in a rural area. Tuition costs in 1985 are approximately $5,000 per person. The theory part of the course should be adapted to the Guatemalan situation, translated into Spanish and given in Guatemala over a three-week period.

Advanced Training Programs in the United States Offered to Overseas Electric Utility Personnel - There is a variety of training programs that should be tailored to meet the needs of INDE. These include courses in:

Financial management

Distribution system engineering

Engineering management

Transmission system engineering

Power plant project and construction management

Power plant design and technical planning for power plant construction

Engineering/construction

Operations/maintenance and administration

Such courses are generally given over a three- to four-month period.

Management Internship Program - Such a program should provide for a more comprehensive anlysis of the functions and processes of management and the examination of practical applications of these ideas to the individual participants, systems and circumstances.

The specific objectives of such a program should be:

- the development of an understanding of the basic functions of management and the ability to use effective management techniques
- the development of specific skills and understanding related to the operation of a rural electric system
- the understanding of the economic and social conditions affecting the future of their system
- the development of an understanding of how people interact in business organizations and how these interactions can be used for the benefit of the rural electric system
- the development and implementation of a program of personal development

The tuition for such a program is approximately $3,000 for the six-week period. Subsistence allowances would be additional.

5. Safe Uses of Electricity by the Consumer

Introduction - At the present time, there appears to be little or no effort on the part of INDE to educate and train the consumer in the safe use of electricity nor to make the consumer aware of the potential hazards of electricity. INDE or the agricultural extension service should also commit themselves to a program of teaching the consumer basic household and farmstead electric wiring and repair of basic appliances.

Training Program - Such a training program should be prepared for INDE in the U.S. and/or a specialist should be sent to Guatemala to assist INDE in such preparation.

The importance of such a program cannot be overstressed. It is essential to the health and well-being of the consumer.

6. Job Training and Safety Programs for Supervisory Staff, Crews and General Electric Utility Staff

Introduction - What the evaluators saw in the way of safety procedures, particularly for the construction crews, was almost nonexistent. It is imperative that INDE introduce and carry out a safety program.

Training Program - Job training and safety programs are a continuous activity within an electric utility. In U.S. utilities this is a built-in part of the overall linemen's training program. Pertinent parts of the training are also given to all other members of the utility staff. The following is suggested:

A. Safety policies should be initiated, approved and enacted.
B. A Safety Manual should be developed.
C. A Safety Training Program should be developed.
D. Both an initial and a continuous training program should be undertaken.

E. A Safety Accreditation Program should be designed, implemented and evaluated.

A specialist should travel to Guatemala first to assess present safety programs within INDE. Once the level of such programs is ascertained, a follow-up training and technical assistance program should be proposed.

INDE should use some of the technical assistance funds in the PER-2 Loan Agreement to contract a job training and safety specialist for a period of approximately three weeks to undertake such an assignment.

7. Procurement Procedures

Introduction - As outlined in this report, the cumbersome and time-consuming procurement procedures presently used by INDE have been one of the main reasons for PER-2 lagging in meeting the targets of the rural electrification program as planned. This process needs to be streamlined.

Training Program - Further examination of the procurement process needs to be made before a training program can be recommended. An international procurement specialist should be sent to Guatemala for approximately one month to examine in depth the procurement process and to recommend ways in which the process might be streamlined.

An alternative would be to have a staff member of INDE come to the U.S. for a month-long training program given by a New York organization. This firm is noted for training people in off-shore procurement procedures.

Attachment No. 10

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The following documents were read, analyzed and used in carrying out the mid-term evaluation of the Rural Electrification Program (PER-2) of Guatemala:

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Specifications and Drawings for 7.2/12.5 kV Line Construction
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