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FINAL REPORT
PHASE 1 OF THE CARIBBEAN REGIONAL
UTILITY MAINTENANCE PROJECT
under
Cooperative Agreement
No. 538-0138-A-00-8176

By and Between

Regional Development Office/Caribbean
United States Agency for International Development

and

National Rural Electric Cooperative Association, Inc.
with
QUALTEC, Inc.

June, 1990

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FINAL REPORT

PROLOGUE

Work actually began in Barbados on this project in late October 1988 with the arrival of Brac Biggers, NRECA Project Advisor. QUALTEC Training Advisor Bill J. Grass arrived and began his duties in late December 1988.

Quarterly Reports were submitted to AID covering the Fourth Quarter 1988, and First, Second and Third Quarters 1989. Thereafter, Quarterly Reports have been prepared and submitted by CARILEC Executive Manager Christopher Farrell.

Monthly financial reports have been submitted for the November 1988-February 1990 period. Due to slippages in work and needs, Phase 1 Cooperative Agreement funding was extended to January 31, 1990; thereunder, CARILEC was funded through most of January. Any balance remaining as of January 31, 1990, is to be used for clearing loose ends and preparing this Phase 1 final report.

Section I

Introduction of Final Report

Cooperative Agreement (hereinafter called "Agreement") No. 538-0138.8-A-00-8176 between USAID and NRECA was entered with the expressed purpose of creating a common services organization to assist Eastern Caribbean electric utilities in improving their operational efficiency and viability.

July 1, 1988, was the effective beginning of Phase 1. It was to have expired August 31, 1989; however, due to unavoidable delays and with the approval of USAID Regional Development Office/Caribbean (RDO/C) approval, expiration was extended to January 31, 1990. Phase 1 funding was obligated by USAID under a letter of credit in the amount of \$1,500,000.

The original project paper was jointly submitted to USAID by NRECA and QUALTEC, Inc., a training subsidiary of the Florida Power & Light Group (FPL). After NRECA and USAID executed the Cooperative Agreement, NRECA subcontracted with QUALTEC to provide a Training Advisor, a Power Plant Engineer for Grenada Electricity Services (GRENLEC) and a major portion of training programs for Phase 1 of the project. NRECA supplied an Engineer Consultant for Antigua Public Utilities Authority (APUA) and a Project Advisor.

Attachment 2 of the Cooperative Agreement described the program and project. Section II hereof paraphrases such Attachment in chart form, indicating expectations and requirements as compared to accomplishments.

Section II

Cooperative Agreement Program Description

Phase 1 Actions and Achievements

Background

For many years, Eastern Caribbean electric utilities have attempted to cooperatively satisfy common needs such as training and procurement of materials. The idea gained impetus at the First Caribbean Electric Utilities Conference in 1981, which was jointly sponsored by the Caribbean Development Bank (CDB) and the Barbados Light and Power Company Limited (BL&P). The National Rural Electric Cooperative Association (NRECA) served as a resource participant as that conference explored the common services concept.

After further discussions and meetings, and a study funded by the Canadian International Development Agency (CIDA), USAID requested that NRECA develop a proposal paper. The paper was a joint presentation by NRECA and QUALTEC, Inc. (Florida Power & Light Group subsidiary), and it led to a U.S. congressional earmark for USAID's FY88 budget.

The earmark provided for NRECA and QUALTEC to implement a project the purpose of which is creation of a self-supporting common services organization for ten Eastern Caribbean electric utilities, including Antigua, Anguilla, Barbados, British Virgin Islands, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines.

The project included grant-financed technical assistance, training, common services organization start-up and related commodities acquisition. The central objectives: improvement in service reliability and operating efficiencies within the participating utilities.

The project is divided into two parts: Phase 1, under this Cooperative Agreement, for a year beginning July 1, 1988; and, Phase 2, under a second Cooperative Agreement by and between USAID and the common services organization created in Phase 1.

Activities and Accomplishments

Under Phase 1, NRECA was contracted to assist in the establishment of a common services corporation and initiate training activities intended to increase the efficiency of trades and crafts, clerical, technical, administrative and managerial personnel. Primary emphasis was training of a cadre of local trainers capable of continuing the work begun by NRECA. Scope of training included basic skills and job safety, technical

skills, and specialized programs for management, professional and supervisory personnel.

Also, NRECA was to provide technical assistance to develop local staff capable of performing management consulting, procurement and other specialized services for participating electric utilities.

The NRECA/QUALTEC proposal submitted to RDO/C in June, 1988, established parameters, expectations, required activities and objectives for Phase 1. For ease of comparison, these items are presented in chart form as follows.

Expectation/Objective	Achievement/Accomplishment
<p>Project offices will be leased from EL&P at a modest rental; and, BL&P will avail use of its accounting/administrative systems.</p>	<p>BL&P found itself unable to supply the needed space and accounting/administrative support; however, BL&P assisted in obtaining space at the Barbados Institute of Management & Productivity (BIMAP). The initial accounting/reporting system and forms were designed by the secretary employed to support the NRECA/QUALTEC team.</p>
<p>The following actions were set forth to be accomplished during Phase 1 (essentially, Year 1) of the Project:</p>	
<p>(a) The (common services organization, or CSO) corporation will be legally instituted with charter, bylaws, etc.</p>	<p>All member (participating utility) approvals and necessary paperwork for incorporation of the Caribbean Electric Utility Services Corporation (CARILEC) were completed and filed with the Government of Barbados the first week of June 1989, by Honorable Christopher Blackman of the law firm Carrington and Sealy. Official approval was rendered July 21, 1989.</p>
<p>(b) The Director and Training Coordinator, together with adequate staff, will be working for the Corporation.</p>	<p>The Executive Manager was selected by a screening committee consisting of Mr. Joel Huggins, Manager of VINLEC (St. Vincent), Mr. Frank McConney, Managing Director of BL&P (Barbados), Mr. Bernard Theobalds, Manager of LUCELEC (St. Lucia), and Mr. Brac Biggers, NRECA Project Advisor.</p> <p>Final interviews were held in February, 1989. At its May meeting, the CARILEC board approved selection of Mr. Christopher Farrell of Trinidad. Mr. Farrell accepted a contract in June, resigned his position with the Trinidad & Tobago Electricity Commission in July, and joined CARILEC full-time on September 17, 1989.</p> <p>All parties agreed the Training Coordinator should be selected by the Executive Manager; thus, the position was advertised in November 1989, and interviews were conducted in February and selection made in March 1990. The selection process was not complete at the close of Phase 1.</p>
<p>(c) The Corporation will have established a bank account into which AID grant funds can be deposited.</p>	<p>As soon as CARILEC was incorporated and officers were elected (July 26, 1989), applications were submitted to the Canadian Imperial Bank of Commerce (CIBC) for three (3) bank accounts, one in each currency used by the project: a Barbados dollar account was opened immediately; application for an Eastern Caribbean currency account was filed in Antigua; and, application was made to the Central Bank of Barbados for opening a U. S. dollar account. The Central Bank refused in September and application was immediately refiled. Having received no response from the Central Bank, a U. S.</p>

Expectation/Objective	Achievement/Accomplishment
(c) continued....	dollar account was opened on October 13, 1989, with CITIBANK in San Juan, Puerto Rico. This account has been used as the depository for USAID funds, in accordance with RDO/C restrictions prohibiting advance of Phase 2.a funds until such account could be opened.
(d) The Corporation will have established a bank account into which dues and fees paid by member (participating) utilities are deposited.	Central Bank approved the U. S. dollar account in November; whereupon, such account began serving as depository for U.S. dollars received from sources other than USAID. (Several member utilities pay dues and training fees in U.S. dollars, especially BVI where the official currency is the U.S. dollar.) CIBC-Antigua approved the EC dollar account; thus, there were four active accounts by December. The first Phase 2.a advance was deposited in the CITIBANK account in December, and working capital was immediately transferred therefrom to the other accounts as needed.
(e) The Corporation will have collected all dues and fees owed to it.	In the July 1989 board meeting (in Antigua), dues were set at US\$1,000 per member utility per year, and training fees were set at US\$100 per participant per program. Member utilities were asked to propose official requests for membership at the October 1989 board meeting. Nine (9) utilities made such requests and were approved. Eight (8) utilities have paid the first year dues, and training fees have been paid within reasonable periods following due dates.
(f) The Corporation will have established financial controls and accounting systems acceptable to USAID which enable it to operate efficiently.	Work on this activity began in February 1989 with negotiations involving KMPG Peat Marwick of Barbados. Included were: chart of accounts; accounting manual; software selection; and, auditing and training services. Discussions by/between NRECA, RDO/C and Peat Marwick produced several drafts. RDO/C approved the system in October. Due to Government of Barbados delays in approving CARILEC requests for duty and tax free status, CARILEC has not employed an accounts office, and Peat Marwick is currently performing basic accounting, monthly financial reporting and auditing functions. In practice, the chart of accounts has been expanded to include several minor additions.
(g) The Corporation will have established an adequate billing system for its services.	The billing system is included in the overall accounting system developed by Peat Marwick, and is functioning.
(h) The Corporation will have negotiated and drafted contracts acceptable to USAID for obtaining the services of NRECA and QUALTEC for Phase 2 of the project.	CARILEC negotiated a contract with NRECA International, Ltd. In October 1989, it declined to retain QUALTEC training advisory services. This change was approved by RDO/C.
(i) At least seven (7) of the target utilities or countries will have become members of the Corporation.	Ten (10) EC utilities were eligible. St. Kitts-Nevis declined. Anguilla and BVI joined late. CARILEC Articles of Incorporation were documented by managers from Antigua, Barbados, Dominica, Grenada, Montserrat, St. Lucia and St. Vincent. These seven (7), plus Anguilla and BVI, are CARILEC's nine (9) members.
(j) The basic skills training course will be designed and eight in-country trainers will be trained.	Training details are provided in the NRECA and QUALTEC training sections of this report. There was prime emphasis on training of trainers, including: Training-of-Trainers Course in March 1989; on-the-job trainer training in eight of the utilities; and, linespeople trainer training in Louisiana, US. Minimum Agreement requirements were exceeded to a considerable degree.

Expectation/Objective	Achievement/Accomplishment
(k) At least three (3) regional consulting services will be developed and ready to offer assistance.	NRECA Engineering Consultant Jack Hicks began developing consultancy services in engineering, system planning, mapping and joint procurement. QUALTEC partially developed a consultancy service for diesel mechanics and operators. By decision of the CARILEC board (concurrent with by RDO/C) development of consultancy services was halted and postponed to a future period. (A copy of Mr. Hicks' report is included as Exhibit F hereof.)
(l) At least three (3) regional training courses will be completed.	Between January 1 and June 30, 1989, regional courses conducted were: Diesel Mechanics; Maintenance of Transformers; Customer Relations; and, System Loss Reduction Techniques. All are detailed in the NRECA and QUALTEC training sections of this report.
(m) A detailed analysis of procurement activities will be prepared and agreed to by the member utilities.	Joint procurement was analyzed but member utilities showed very little interest in pursuing this service. It is believed that the service can be developed in the future, limited only by the degree to which member utilities consent to standardization of design, construction, materials and equipment. (The analysis is part of Exhibit F.)
(n) A revised/updated projected financial analysis of the Corporation will be prepared providing evidence of financial self-sufficiency by the end of the project.	Financial requirements were studied preliminarily and a dues structure for achieving self-sufficiency was recommended; however, as CARILEC assumed responsibility for Phase 2, its board expressed the desire to drop certain original project paper plans, reevaluate member utility needs, and virtually overhaul financial planning. RDO/C acceded to this desire and, for the present, no long range financial plan is required. It is expected that such plan will be developed once the reassessment/reevaluation is completed.
In pursuit of the foregoing actions, the following activities and/or intents apply:	
1. NRECA will have primary responsibility for implementing Phase 1 of the project.	NRECA executed the Agreement with USAID, thereby accepting primary responsibility for project implementation.
2. Within one (1) month of project start-up, NRECA will execute a subcontract with QUALTEC for a major portion of the work during Phase 1.	NRECA executed such contract with QUALTEC in August 1988, included in which was a budget of US\$683,678. Thereunder, QUALTEC supplied all skills and technical training in the EC region, with NRECA supplying Customer Relations, Management and Construction Practices training, the latter of which was taught in Louisiana, US.
3. NRECA will provide a Program Advisor who will be responsible for the day-to-day activities during Phase 1, and provide technical assistance and training. The Program Advisor will supervise all other personnel working on the project, including all short-term advisors provided by NRECA and QUALTEC.	As stated in the Prologue hereof, NRECA assigned Mr. Brac Biggers as Project Advisor in October 1988, a previous appointee being rejected by RDO/C on the grounds of inexperience. Mr. Biggers employed support staff and supervised all project personnel.
4. NRECA will provide a Management Advisor to Grenada Electricity Services (GRENLEC) for a six-month period beginning not later than three months after execution of this Agreement.	GRENLEC vetoed the need for such Advisor; subsequently, Antigua Public Utility Authority (APUA) requested an engineering advisor and RDO/C asked that NRECA reallocate the GRENLEC funds to such purpose. Accordingly, Mr. Jack Hicks performed a six-month engineering advisorship that terminated June 1, 1989. Mr. Hicks established excellent working relationships with APUA personnel and his contributions were highly appreciated. (His report appears as Exhibit E hereof.)

Expectation/Objective	Achievement/Accomplishment
<p>5. NRECA, through its subcontract with QUALTEC, will provide the following:</p> <p>a. A major portion of the training, technical assistance and consulting activities.</p> <p>b. A Training Advisor responsible for Phase 1 day-to-day training activities. The Training Advisor will conduct some training sessions and work closely with training officers of participating utilities.</p> <p>c. A Powerplant Engineer to GRENLEC for a 12-month continuous period, beginning no later than one month after execution of this Agreement.</p> <p>d. Short term advisors in the areas of job training and safety as required.</p> <p>6. Except for advisor to GRENLEC, NRECA will be responsible for recruiting, and for purchasing and maintaining project office requirements to ensure efficient project implementation. This includes office rental, office equipment, furniture, office staff, motor vehicles, etc. GRENLEC (and APUA) will provide office space, equipment and secretarial services for Advisor(s) assigned to them.</p> <p>7. Prior to implementing any participant training activities, NRECA and QUALTEC will consult with RDO/C regarding regulations and procedures to be following in the implementation of the training program.</p> <p>8. Mr. Frank McConney, Managing Director of Barbados Light & Power Company, Ltd., will be the Acting Director of the Corporation until a Director is recruited. In this role he will represent the interests of the utilities during the initial stages of the project, and will coordinate communications between the utilities and NRECA and RDO/C.</p>	<p>See (j), (k) and (l) above, and the NRECA and QUALTEC training reports later herein, all of which reveal that more than 60% of all training and roughly 66% of consultancy services were provided by QUALTEC.</p> <p>An initial temporary appointee was withdrawn in November and Mr. Bill J. Grass assumed the Training Advisor position in December 1988. The Phase 1 training program was planned and executed under his direction, with all program requirements as outlined in the original Project Paper being completed as well as others that were added in the course of Phase 1. Mr. Grass left QUALTEC and the project in September 1989 (at the conclusion of the QUALTEC subcontract) -- the Training Advisor post has since remained vacant at desire of the CARILEC board with concurrence of RDO/C.</p> <p>Mr. Ronald McCuddy was assigned Power Plant Engineer for GRENLEC. He arrived in September 1988 and completed his assignment on schedule. (A final report of his work appears as Exhibit C hereof.)</p> <p>See QUALTEC training report section for details of courses and advisors/instructors.</p> <p>NRECA and QUALTEC collaborated to supply office and training equipment for CARILEC. Offices rented from BIMAP included desks and chairs; thus, it was not necessary to acquire full complement of office equipment. That which was needed was purchased in Barbados. (Project physical assets and their costs are listed in pages 9-11 hereof.) All acquired equipment/furnishings will be transferred to CARILEC ownership as soon as possible following submission of this report to, and its approval by, RDO/C.</p> <p>Throughout Phase 1, the RDO/C Project Officer was kept fully informed of all plans, actions and activities. Prior approvals were sought as and when appropriate.</p> <p>At the beginning, Mr. McConney removed himself from performing the Acting Director role; therefore, such responsibilities were borne by the Project Advisor. Still, Mr. McConney was very helpful with advice and counsel throughout Phase 1 -- when called upon he responded very amily, which has been greatly appreciated.</p>

General Comments Regarding Project Functioning

A number of delays were encountered. In the beginning, the lack of BL&P office space and administrative support required search for same. Even though BL&P was very helpful in obtaining same from BIMAP, unexpected time was required.

The task of chartering CARILEC was placed in the hands of an attorney in early January 1989; however, for reasons unknown to NRECA and its Project Advisor, virtually no action was taken for nearly three (3) months. The task was removed to another attorney

in early April and the charter was approved in July -- approval thus came right at the deadline for completion of many Phase 1 requirements that were dependent upon incorporation.

Project Activities

Seven of the nine EC utility managers attended a called meeting in November 1988. They discussed the types of training they desired (changing some earlier priorities) and the bylaws proposed for CARILEC. (At the time, Anguilla and BVI had not agreed to join CARILEC.)

After making several bylaw revisions, the group agreed to incorporate as the "Caribbean Electric Utility Services Corporation" (acronym being CARILEC) under the nonprofit corporation laws of Barbados.

QUALTEC conducted the first training course March 1989, a Training-of-Trainer (TOT) Seminar for training directors from member utilities. Nine (including Anguilla and BVI) participated. Thus began an intensive and varied series of programs through which NRECA and QUALTEC met, and exceeded, the original training objectives well within Phase 1 budget allocations. These are detailed in Exhibits B and C of this report.

The uncontrollable delays here cited prevented NRECA from meeting the June 30, 1989, deadline for several activities/requirements. Once the obstacles were removed, all Phase 1 requirements were accomplished well prior to the (extended) January 31, 1990, Phase 1 closing date. Reasons for the delays and extension of the closing were understood and approved by RDO/C.

Chronology of Events

Exhibit A hereof is a chronology of the major Phase 1 events. It indicates factors that caused inordinate delays, examples of which are: (1) NRECA had to twice request Central Bank approval of U.S. dollar accounts - it took four months for one account and three for the other; (2) Attorney inaction delayed incorporation filing three months and, then, it took seven weeks from filing to charter approval by the Government of Barbados (GOB); and, (3) As of the writing of this report, the GOB had still not acted on on CARILEC's July 1989 request for duty and tax free status as a creature of USAID funding and sponsorship.

Still, Phase 1 objectives were achieved with an excess funding balance sufficient to carry the project five (5) months beyond the original Cooperative Agreement termination date.

Project Financial Summary

<u>Line Item</u>	<u>Phase 1 Budget</u>	<u>Expended to Date</u>	<u>Balance Remaining</u>
Salaries	373,240	381,265	(8,025)
Fringe Benefits	93,500	93,111	389
Overhead	279,930	264,157	15,773
Travel & Per Diem	285,660	295,204	(9,544)
Allowance & Other Direct Costs	195,730	217,888	(22,158)
Equipment & Supplies	152,000	134,332	17,668
Fixed Fee (QUALTEC)	37,952	37,952	0
Common Services Corporation	<u>81,988</u>	<u>64,267</u>	<u>17,721</u>
TOTALS	<u>1,500,000</u>	<u>1,487,580</u>	<u>11,824*</u>

* The remaining balance is dedicated to costs incurred in preparing the Phase 1 Project Final Report.

Project Physical Assets Report

Items listed above were acquired during Phase 1 of the project and, in accordance with the Cooperative Agreement, their ownership will be transferred to CARILEC as soon as possible after submission of this report to and its approval by USAID Regional Development Office for the Caribbean. (Asset values are in US dollars -- assuming conversion @ \$1.98 Bajan per US\$1.)

Office Equipment

a. Furniture Purchased:

(2) 36" x 18" x 42" file cabinets	\$ 343.94	
(2) 2-drawer legal file cabinets	340.07	
(2) 4-drawer legal file cabinets	610.59	
(1) 36" x 18" x 72" cabinet	<u>312.60</u>	\$ 1,607.20

b. Furniture Donated From Another Project:

(2) 4-drawer legal file cabinets	n/c	
(1) Wooden desk 72" x 36"	n/c	
(2) Steel & wood desk 60" x 30"	n/c	
(2) Executive swivel chairs (orange)	n/c	
(6) Side chairs w/arms	n/c	
(2) Steel desks w/one pedestal	<u>n/c</u>	n/c

Total from previous page \$ 1,607.20

c. Office Equipment:

(1) Xerox electric typewriter	795.45	
(1) Calculator (tape type)	114.85	
(1) Fax machine	3,402.78	
(1) Xerox Copier, Model 502B	6,957.07	
(1) Toshiba T1000 laptop w/720K floppy drive, 768K RAM expansion, DOS & carrying case	1,255.00*	
(1) Toshiba external 5.25" floppy drive	350.00*	
(1) Panasonic P1524 printer w/cable	610.00*	
* DC tax on Toshiba/Panasonic items	132.90	
5.25" diskettes (10 boxes @ 10/box)	88.00	
3.5" diskettes (20 boxes @ 10/box)	397.20	
Miscellaneous items: scissors, 3-hole punch, staplers (4), baskets (8), pencil sharpener, desk caddy (2), transparent tape dispenser (2), electric extension cords, & small computer items	495.11	14,598.36

d. Training Equipment:

(1) Overhead projector (table-top)	\$ 199.00	
(1) Overhead projector (portable)	499.00	
(1) 35mm slide project (international)	499.00	
(1) Carrying case	69.50	
(6) Slide carousels	65.70	
(2) Flipchart easels	177.52	1,509.72

e. Desktop Publishing System: \$ 73,540.80

Software:

Adobe Illustrator '88
Conductor 2.0
EZ Tape
MacDraw II
MacPaint
Microsoft Word 3.0
Microsoft Word 4.0
PageMaker 3.0
Pixel Paint
Power Point
Public Pac
Datacopy Accutext
Smartcom II
Systems Disk

Hardware:

MacIntosh II Computer
Irwin Tape Back-up

Total Previous and This Page \$ 91,256.08

Total From Previous Pages \$ 91,256.08

e. Desktop Publishing System Hardware, continued

Desk PC Scan 2000
Slidewriter
MacIntosh SE with Radius 2-page Monitor
Laser Printer
SmartModem
IBM Leading Edge PC with Digitizer
Xerox Scanner, Datacopy Model 830

f. Rolling Stock:

(1) Toyota Corolla, '88 Model 12,455.05

TOTAL PHYSICAL ASSETS FOR TRANSFER TO CARILEC \$103,711.13
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EXHIBIT A

CHRONOLOGY OF EVENTS

October - 1988

- o Biggers was officially assigned to the Caribbean Project by NRECA.
- o Rented a residence.
- o Rented offices from BIMAP.
- o Applied to Barclay Bank for three bank accounts. The local account in Barbados dollars was opened immediately and application was made to the Central Bank for two foreign currency accounts.
- o Prepared bylaws to be proposed to CARILEC members.

November - 1988

- o Purchased most of the needed furniture.
- o Ordered a vehicle for NRECA
- o Held the first Managers meeting in Grenada, presented By-Law proposal. Several revisions were made.
- o QUALTEC purchased computers and other equipment for desktop publishing system.

December - 1988

- o Began recruiting for a secretary.
- o Took delivery on car.
- o Applied for registration for NRECA to do business in Barbados.
- o QUALTEC training advisor arrived in Barbados and began work.
- o Bought insurance for car, furniture, equipment, public liability and employee liability.
- o Advertised regionally for applicants for Executive Manager of CARILEC.

January - 1989

- o Finished bylaws revision.
- o Hired office Secretary.
- o Acquired furniture for the Project from USAID.
- o Delivered bylaws for review by local lawyer.
- o Dean Moody became RDO/C Project Officer responsible for the NRECA Cooperative Agreement.
- o Visited St. Kitts to promote interest in CARILEC. No go!
- o Desktop publishing system arrived.

February - 1989

- o Installed computer system.
- o Hired Computer Operator.
- o QUALTEC consultants trained project staff in the use of the

- desktop publishing system.
- o Manager Selection Committee for CARILEC met in St. Vincent to interview short list of applicants. Selected Mr. Christopher A. Farrell of T & TEC, Trinidad, and instructed Brac Biggers to negotiate a contract.
- o Negotiated with Peat, Marwick to design and implement an accounting system for CARILEC.
- o Received and installed a fax machine.

March - 1989

- o Bought a typewriter for the office.
- o Foreign currency accounts at Barclay Bank were approved by Barbados Central Bank.
- o Christopher Farrell visited the project to negotiate for the Executive Manager position. Verbal agreement was reached, pending final contract offer in writing.
- o Were notified that NRECA registration in Barbados had been approved.
- o Attorney returned bylaws stating that he could not get to them and suggesting use of another attorney. On March 23, bylaws were delivered to another attorney for review and approval. He was instructed to proceed with incorporation of CARILEC.
- o First training course, Training-of-Trainers or TOT, was presented by QUALTEC instructor Don Rochester. Persons from nine islands attended.
- o Contacted British Virgin Islands Electricity Commission about joining CARILEC. They sent Ms. Pearl Smith, Corporate Secretary to attend the TOT Course.

April -1989

- o NRECA subsidiary AHP Systems sent a representative to Barbados with a Customer Satisfaction Survey proposal. Agreement was reached for conducting a pilot test survey in Barbados.
- o Planned for Jack Hicks to do a procurement survey and Joint Engineering Services study in combination with technical assistance to Antigua.
- o Attorney Blackman completed preliminary analysis of and revised CARILEC bylaws to ensure conformity to Barbados laws.
- o Visited BVI Electricity Corporation about joining CARILEC, which it tentatively approved. Later, a BVI board decision sanctioned membership in CARILEC.
- o Jack Hicks started island visits to study needs and desires for Engineering Joint Services.

May - 1989

- o Purchased copier machine for office.
- o Received incorporation papers and bylaws from attorney.
- o Held second members' meeting in St. Vincent. Nine islands were represented. CARILEC Articles of Incorporation and

bylaws were approved. Anguilla and BVI did not vote due to lack of authority from their boards.

- o Met with Peat Marwick and AID preliminary to development of the CARILEC accounting system.
- o NRECA's Patty Smith delivered the regional Customer Relations Course in St. Vincent -- 18 people from nine utilities participated.
- o QUALTEC specialists conducted 2-day On-the-Job Training Workshops in Antigua, Dominica, Grenada and St. Vincent.
- o The Board approved the Executive Manager contract with Mr. Farrell, who attended the meeting and met all Directors.
- o Three weeks into the combined Antigua technical assistance and CARILEC study plan, RDO/C issued orders to complete the Antigua assignment before undertaking any other work. NRECA complied, moving Mr. Hicks to Barbados once the Antigua agreement was satisfied.

June - 1989

- o In the first week of June, attorney Blackman filed with the Government of Barbados for incorporation of CARILEC.
- o QUALTEC specialists conducted 2-day On-the-Job Training Workshops in Anguilla, BVI, Montserrat and St. Lucia.
- o Secured a medical insurance plan for the Executive Manager.
- o The Customer Satisfaction Survey Test Sample in Barbados had a 71% response; so, AHP was authorized to proceed with the full program.
- o Sent lineman trainers to Louisiana for training in the Loss Control Department of the Association of Louisiana Electric Cooperatives.
- o Applied to Canadian Imperial Bank of Commerce (CIBC) for the necessary CARILEC bank accounts.
- o In Trinidad, finalized details of Executive Manager contract with Mr. Farrell. He accepted the post and immediately gave two months notice of resignation to his employer.

July - 1989

- o Started interviewing for an accountant.
- o Received CARILEC's Accounting Manual from Peat Marwick and delivered two copies to USAID. Met with USAID representatives who indicated revisions desired.
- o Government of Barbados approved CARILEC incorporation on July 21.
- o In its July 24-25 Barbados meeting, the Board: elected officers to serve until the first Annual General Meeting of Members; approved a draft CARILEC/USAID Cooperative Agreement for Phase 2.a of the project; set dues and fees for the next year of operations; and, approved necessary CIBC bank accounts.
- o Attorney applied to GOB for duty and tax free status for CARILEC, and income tax exemption for CARILEC's expatriate employees.

August - 1989

- o During the first week, necessary papers were prepared and filed with CIBC for opening three bank accounts.
- o Received final revision of Accounting Manual from Peat Marwick, and sent two copies to RDO/C for final approval.
- o All Conditions Precedent for the Phase 2 Cooperative Agreement were satisfied. RDO/C prepared the final Cooperative Agreement with CARILEC and it was executed by both parties.
- o RDO/C Project Officer verbally approved the Executive Manager's Contract.
- o QUALTEC Training Advisor laid plans for conducting diesel mechanics consultancy workshops in the various CARILEC utilities. (These were later postponed by board action to reassess training priorities.)
- o Prepared a "Request for Advance" from USAID for CARILEC in the amount of \$374,650 -- for 90 days, or about one-fourth of the Agreement budget.
- o RDO/C approved extension of NRECA Cooperative Agreement to December 31, 1989.

September - 1989

- o RDO/C letter approving Executive Manager contract arrived and was immediately conveyed to Mr. Farrell.
- o On September 8, QUALTEC Training Adviser Bill Grass left Barbados and the Project.
- o Insurance bonding CARILEC employees was obtained from Fidelity Bonding - the Executive Manager is the only person bonded at present.
- o Mr. Farrell arrived September 17 and began his duties as Executive Manager.
- o Ordered a vehicle for Mr. Farrell.
- o In a September 26th CARILEC Executive Committee meeting, NRECA and QUALTEC were informed: that the Board wanted a completely different contract with NRECA; and, that it saw no need for a training advisor contract with QUALTEC.

October - 1989

- o Coordinated with USAID to provide an Embassy contractor work permit for Mr. Farrell, and to exempt his car from customs and other import costs. The work permit was granted but the duty free status for the car was refused, whereupon the order for the car was cancelled.
- o The GOB had not approved CARILEC's foreign currency accounts by mid-October; therefore, RDO/C would not process the request for a Phase 2.a advance. The Project Advisor went to San Juan and opened a commercial account at Citibank. RDO/C was notified the account number and began processing the advance payment.
- o Applied again to the Barbados Ministry of Finance for duty and tax free status for CARILEC.
- o CARILEC held its first Annual General Meeting of members in

Antigua.

- o At a Board meeting following the Annual Meeting, officers were elected for the ensuing year and the CARILEC/NRECA contract was approved in principle. The Board requested that some of the USAID "boilerplate" language be removed.
- o Al Klose of AHP presented the Customer Satisfaction Survey results, which were well-received by the Board.

November - 1989

- o Conferred and reached agreement with RDO/C on wording for CARILEC/NRECA contract. Subsequently, rewrote portions as requested by RDO/C, and resubmitted the contract for its approval. No response by month-end.
- o Sent OMO Course brochures and word that CARILEC would pay costs for participants.
- o CIBC notified CARILEC that, on November 17th, the Barbados Central Bank had approved the U.S. dollar Foreign Currency account. Also, CIBC notified CARILEC of opening of an EC dollar account in Antigua.
- o Initiated study to find indemnity insurance coverage for CARILEC's directors.
- o Most members' dues were received and deposited in the appropriate bank accounts.
- o Began advertising for post of Training Coordinator.

December - 1989

- o CARILEC/NRECA contract was sent to all Directors for final comment.
- o On December 6th, received USAID advance requested in September, and deposited it in the Citibank account. US\$25,000 was transferred into each of the three CIBC accounts.
- o One relatively minor CARILEC/NRECA contract revision was requested and made. RDO/C did not respond by month-end.
- o Without the contract, NRECA requested an extension of its Phase 1 Cooperative Agreement to March 15, 1990. RDO/C approved the extension verbally.

January - 1990

- o Began interviews for post of Training Coordinator.
- o CARILEC Chairman signed the CARILEC/NRECA contract for Phase 2.a. The fully executed documents were forwarded to James Dzierwa, RDO/C Contracts Officer. He had not studied the copies sent to RDO/C earlier. Both he and Mr. Moody raised questions about some items. They were asked to approve the document and, if needed, amendments could be added later. Their approvals had not been received at month-end.
- o Review of project reports revealed that Phase 1 funding was down to about \$12,000. RDO/C ordered termination of Phase one as of January 31, 1990, and utilization of any remaining funds for preparation of the final report and other minor closeout purposes.

Exhibit B

QUALTEC, INC., PHASE 1 FINAL REPORT

by

Fred C. Trice

Herein is a summary report of work accomplished by QUALTEC in Phase I of the Eastern Caribbean Utility Maintenance Project. It identifies problems encountered, resolutions, programs conducted and associated costs.

Summary

Due to several staffing delays, QUALTEC's efforts to begin the training activities were two months behind schedule; however, much of the preparation and planning conducted in QUALTEC's Florida offices remained on schedule.

In September 1988, Dr. Ben Hirst (of QUALTEC) visited the West Indies to determine how QUALTEC's/FPL's existing course material must be adapted for meaningful presentation. Since significant modification to the training materials would be required, it was determined that it would be cost-effective to purchase and locate in Barbados project offices onsite, desktop publishing equipment. The equipment was operational in January 1989.

In October, 1988, Mr. Don Janacek was temporarily appointed to the position of training advisor pending selection of a person more suitable for the assignment. His services were terminated in December 1988 when Mr. Bill J. Grass was approved as the onsite training advisor from QUALTEC.

When Mr. Grass took up permanent residency in Barbados in January 1989, he developed a detailed training plan and reviewed the training programs, schedules, priorities, etc. with training directors from all participating utilities' training Directors. They unanimously supported all elements.

The training plan was activated. Below are the details of training programs conducted and results achieved therein:

Train-the-Trainer (TOT)

QUALTEC training began with the "TOT" program. QUALTEC instructor Mr. Don Rochester travelled to Barbados mid-March 1989 to complete the revisions and modifications to the course and print the course materials. The course was presented March 28-31, 1989, with the following results:

- o 16 people participated
- o 13 received Certificates of Completion

- o Costs were as follows:
 - a. Modify/adapt course material: \$ 6,940
 - b. Delivery costs: \$ 2,800
 - c. Participant sustenance and facility* costs \$15,259
- Average cost per student (excluding development costs): \$ 1,129

Training facility costs were considerably higher than originally anticipated.

Participants evaluated this TOT course, giving it exceptionally high marks: on a scale of 1 (low) to 5 (high), 15 of the 16 participants gave it a rating of 5.

On-The-Job Instruction Certification

This was a two-day course presented on each of the islands (excepting Barbados). QUALTEC instructor Don Rochester conducted the course, the purpose (as stated in the original project paper) of which was to utilize the trainees to become instructors for the four (4) basic training courses that were scheduled to be taught at the various member utilities. The course was presented beginning May 8 in Grenada and concluded on June 23 in Anguilla with the following participation and results:

- o 55 employees participated
- o 53 were certified
- o Costs were as follows:
 - a. To modify/adapt materials: \$ 6,010
 - b. Course delivery: \$23,740
 - c. Participant sustenance and facility:* \$ 0
- Average cost per participant (excluding development cost) \$ 432

* Course being conducted on home islands, there were no sustenance or facility costs.

Diesel Mechanics

Although not considered so in the original project paper, participant utilities leadership placed such high priority on the Diesel Mechanics course that planned training schedules were rearranged to permit development and delivery of this program.

There were inherent difficulties exacerbated by the different kinds of diesel generators used in the various utilities. Thus, the material was developed and written to approach diesel mechanics from a generic viewpoint. Mr. Doug McCuddy, a diesel expert affiliated with QUALTEC, performed this task and then served as course instructor. The course was 4 weeks in length and was held in Grenada from May 16-June 16, 1989. The details, costs and results are as follows:

Diesel Mechanics Course, continued

- o There were 18 participants
 - o All 18 received certificates
 - o Course costs were:
 - a. Development/writing \$14,340
 - b. Course delivery \$14,639
 - c. Participant sustenance and facility costs \$40,183
- Average cost per student
(excluding development cost) \$ 3,046*

* The average cost breaks down to \$762 per participant per training week.

This course was evaluated as one of the best training programs conducted. Participants gave it overwhelmingly high marks.

Line Equipment Maintenance

This was another training program that was elevated in priority. It was given in St. Lucia on May 30 thru June 2. Mr. William Flewollen of QUALTEC modified the materials and conducted the course. Details and results are as follows:

18 employees participated	
Development costs	\$ 8,800
Delivery costs	\$ 4,368
Participant sustenance and facility costs	\$ 6,795
Average cost per participant (excluding development cost)	\$ 620

Although the course was generally well-received, it should be noted that some evaluations reflected the fact that several participants were advanced beyond the level of the material when they entered the course.

Loss Reduction Techniques

The course was presented June 6-9, 1989, by Mr. Fred Walker of Florida Power & Light, through QUALTEC, on the island of Antigua. Course details and results are:

There were 16 participants	
Development/modification costs	\$ 5,737
Delivery costs	\$ 3,859
Participant sustenance and facility costs	\$ 8,561
Average cost per participant (excluding development cost)	\$ 776

Job Training and Safety

The program was presented on each island (excepting Barbados) by a highly qualified QUALTEC apprentice training instructor. The instructor spent a total of one (1) month on each island, focusing on evaluating concern for safety and the requirements for implementing a structured Apprentice Linesmen Training Program. Program details and results are:

There were 262 participants	
Instructor consulting, training and other delivery costs	\$109,386
Average cost per participant	\$ 418

At the completion of Phase I, a number of the utilities inquired regarding the content of a Structured Apprentice Linesmen Training Program. QUALTEC strongly recommends that such a program be developed and implemented.

Technical Assistance - Grenada

A brief general report on the work performed by QUALTEC Power Plant Engineer Ron McCuddy appears as Exhibit C of this report.

General Observations, Comments and Concerns

a. Training Effort and Costs

QUALTEC trained a total of 385 employees at total costs of \$265,420, or \$689 per person. Such costs include instructor salaries, course development/modification travel and per diem for instructors and participants, training materials and supplies, and training facilities. They exclude costs of the Training Advisor, QUALTEC home office support and the desktop publishing system.

b. Training Observations

Overall, training programs were well-received and participants considered them meaningful. The basic objective -- to train trainers -- prepared 36 people from the nine CARILEC membership islands to instruct future basic training programs as they are developed.

The regional training programs created awareness in specific technical areas and developed resources not previously available in or indigenous to the EC Region. The number of inquiries received by QUALTEC instructors following the training is an indicator of a high degree of learning and application.

The job training and safety visitation and training program was very successful and has identified the needs for a Structured Apprentice Linesmen Training Program. Transmission and distribution (T&D) construction and maintenance skills

imparted by the instructors were very impressive. Although there is evidence that training has raised the level of concern for working safely, data is not sufficient for ascertaining whether training has produced a decrease in T&D-related accidents.

c. Training Recommendation

QUALTEC strongly encourages CARILEC to sponsor development and implementation of a well-designed Structured Apprentice Training Program, and consider development of a permanent Linesman/Meterman Training Center on the island of one of its member utilities.

d. Additional Thoughts and Comments

Training gained considerable momentum during the March-August 1989 period; however, QUALTEC believes that subsequent delays in decisions stalled that momentum. There is considerable risk that much ongoing data and resources are being lost, and that the upbeat morale of employees who anticipated continued training opportunities most surely will diminish. Such adverse impacts are truly unfortunate and regrettable.

QUALTEC continues to believe the EC utilities generally lack the experience and expertise necessary to develop and deliver technology transferred to the member countries; and, that USAID RDO/C should have insisted retention of both project contractors throughout the 5-year project period to ensure success of such transfer development.

QUALTEC views RDO/C Phase 1 support as being unpredictable and, in some cases, overtly questionable. The project itself was difficult but very doable; however, lack of RDO/C insistence upon adhering to original project purposes has diminished returns that would otherwise have been achieved and maintained.

QUALTEC is concerned that future project results will show the lack of a full-time, professional Training Advisor to work with CARILEC staff and assist in coordinating selection and placement of expatriate instructors who understand and adapt easily to EC Region needs.

INSTRUCTOR'S REPORT OF TRAINING

Course: Train the Trainer
Conducted at: Barbados, for CARILEC
Date(s): March 28-31, 1989
Instructor: Don Rochester
Participants Hubert Jn. Baptiste
Seymour Blackman
Lenox Browne
Timothy Chaderton
Evan Goddard
Glenn Gooding
Joseph Jones
Godric Pursoo
Martin Richards
Gavin Richardson
Anthony Seale
Pearl Smith

Following a Training Managers Meeting in the morning, the Train the Trainer course convened at 1:00 PM, March 28, 1989, in the Worthing Suite of the Sandy Beach Hotel in Worthing, Christ Church, Barbados. The course ran for 18 total class hours, following the Agenda attached. The course adjourned at approximately 11:15 AM, March 31, 1989.

Eleven of the 12 participants in this iteration of the Train the Trainer course were not typical of the intended target population. Although these participants are responsible for training at their utilities, most were engineers and/or managers who had never received formal training in instructional skills. Consequently, they had a strong interest in the Train the Trainer course, and their work reflected that interest. The participant who was typical of the intended target population was a subject matter expert in his technical area (lineman) and had recently been selected to be an instructor.

During the 18-hour class time, each participant gave three presentations: (1) a self introduction, (2) a prepared 5-minute overview of one of his or her courses or of his or her job responsibilities, and (3) an 8- to 10-minute guided discussion which went into more detail on the same subject used for the second presentation. Each participant performed well.

The final hour of the course was devoted to soliciting and receiving written feedback from the participants concerning their perspective of the effectiveness of the course. Two instruments were used to solicit this feedback. One instrument, the Participant/Instructor Log, allowed each participant, as well as the instructor, to enter suggestions/comments regarding content, format, sequencing, spelling, etc., at any time throughout the duration of the course. The second instrument, the Course Reaction Questionnaire, solicited more specific information regarding adequacy of objectives, instruction, time, and practice for each of the five sections of the course. The participants were asked to rate these areas using a 7-point Likert-type rating scale (1 = poor; 7 = excellent). In addition to the rating scale, each of the five sections of the questionnaire provided space for the participants to write additional comments and/or suggestions. Also, a general comments area was included following the fifth section of the questionnaire. The feedback was consolidated and analyzed to determine the short-range effectiveness of the course, and to determine what changes might be necessary before offering the course again.

TRAIN THE TRAINER

Worthing Suite, Sandy Beach Hotel
Worthing, Christ Church, Barbados
March 28-31, 1989

AGENDA - Day One

1:00 - 1:15	Welcome
1:15 - 1:45	Expectations/Course Objectives
1:45 - 2:30	Introduction - Presentation #1
2:30 - 2:45	Break
2:45 - 4:00	Understanding the Adult Learner; The Instructor's Role

AGENDA - Day Two

9:00 - 9:30	Analyze the Target Population
9:30 -10:00	Set Training Objectives
10:00 -10:30	Research the Subject Matter
10:30 -10:45	Break
10:45 -12:00	Prepare a Lesson Plan
12:00 -12:45	Lunch
12:45 - 1:30	Prepare a Lesson Plan (Continued)
1:30 - 2:00	Practice and Control
2:00 - 2:15	Break
2:15 - 4:00	Presentation #2

TRAIN THE TRAINER

Worthing Suite, Sandy Beach Hotel
Worthing, Christ Church, Barbados
March 28-31, 1989

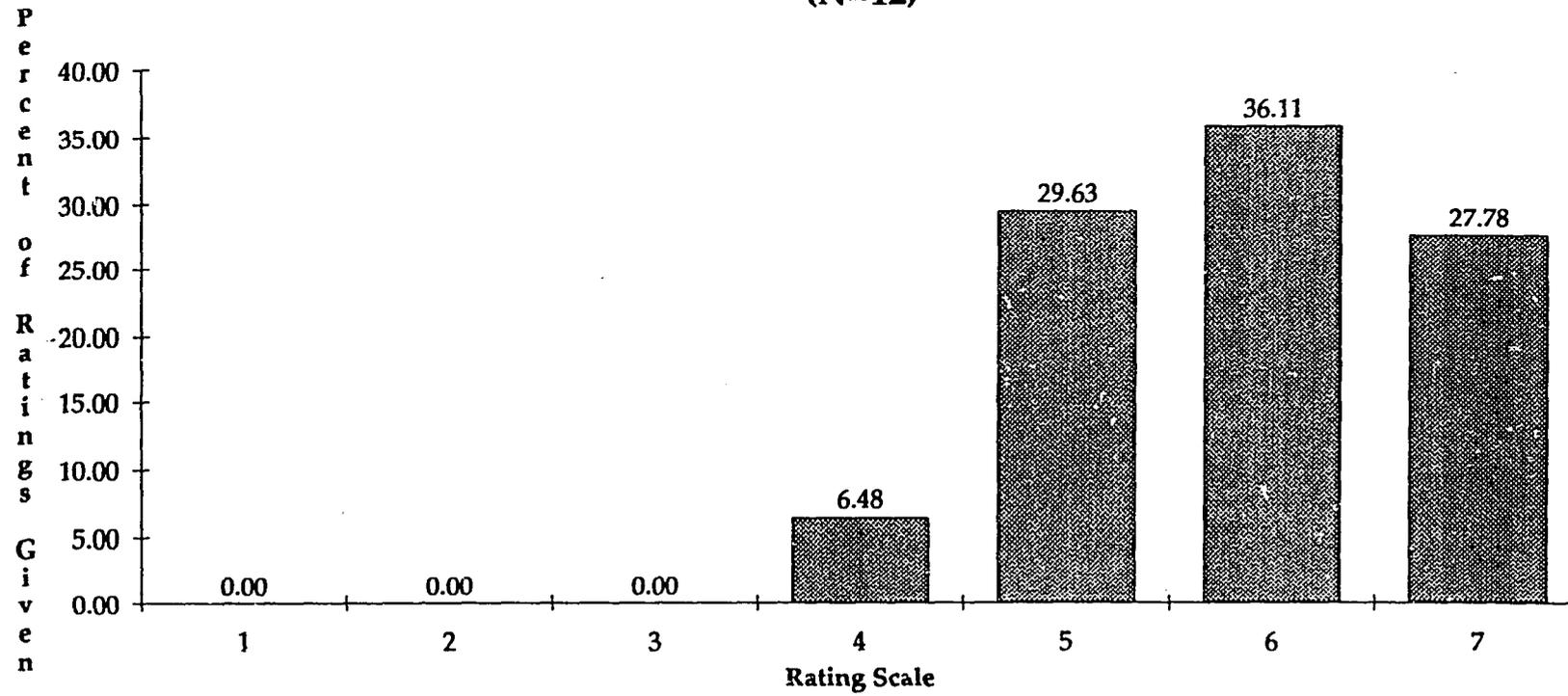
AGENDA - Day Three

8:00 - 8:30	Practice and Control
8:30 - 8:45	Concentrate on Content Elements
8:45 - 9:15	Concentrate on Vocal Elements
9:15 - 9:30	Break
9:30 - 11:45	Setting the Environment
11:45 - 12:30	Lunch
12:30 - 1:00	Stage Fright
1:00 - 2:30	Communication Skills
2:30 - 4:00	Interaction with Participants: Questioning/Listening

AGENDA - Day Four

8:00 - 8:30	Evaluation and Revision
8:30 - 9:00	Final Preparation Time
9:00 - 9:15	Break
9:45 - 10:30	Controlling Personal Agendas
10:30 - 11:45	Presentation #3
11:45 - 12:30	Lunch
12:30 - 3:00	Presentation #3 (Cont'd)
3:00 - 3:15	Closure and Course Evaluation

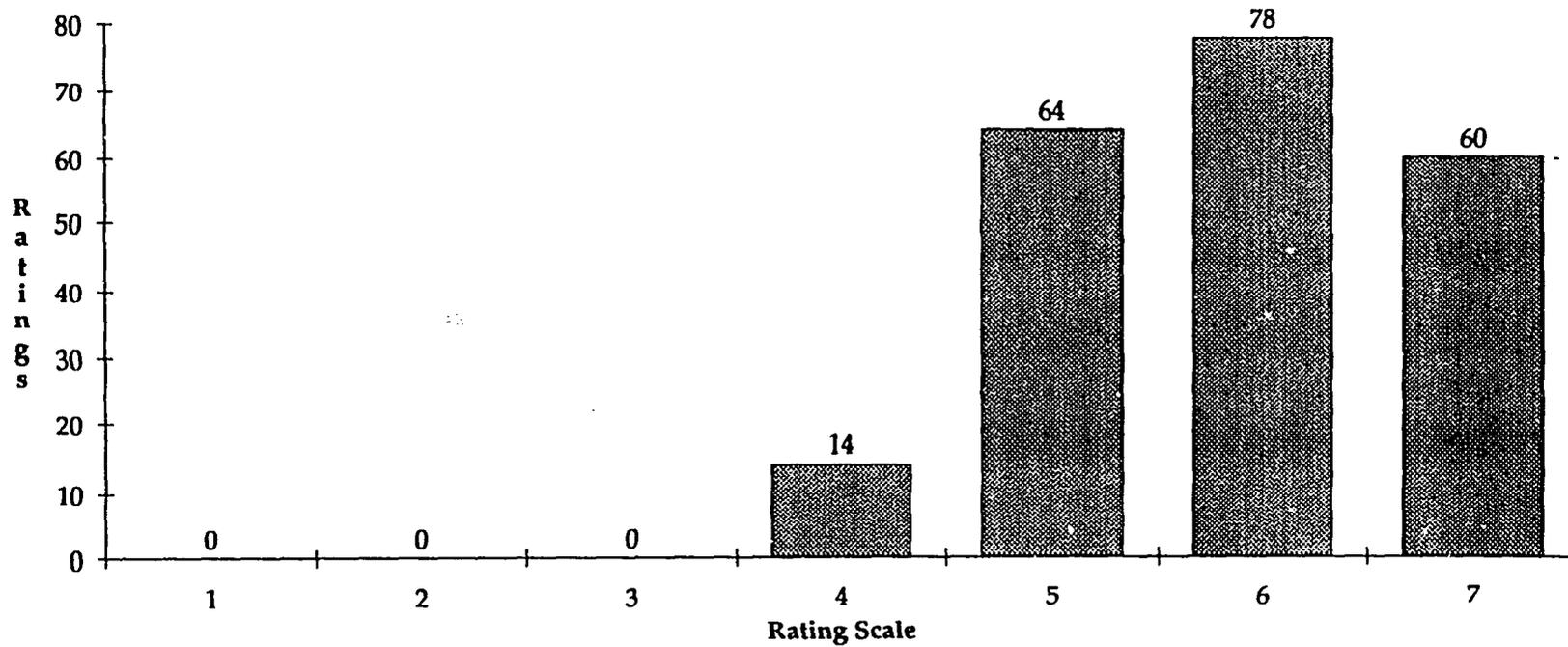
**TRAIN THE TRAINER
BARBADOS
March 28-31, 1989
(N=12)**



B/10

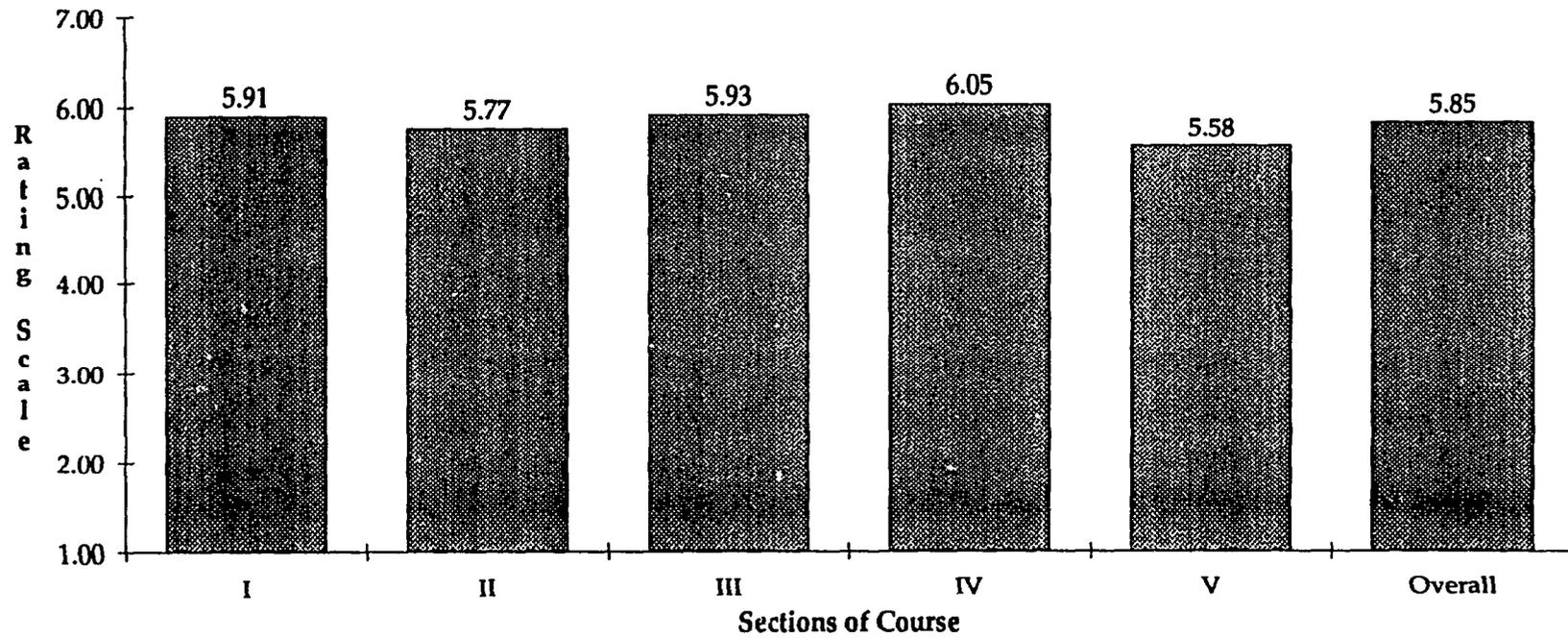
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**TRAIN THE TRAINER
BARBADOS
March 28-31, 1989
(N=12)**



B/11

**TRAIN THE TRAINER
BARBADOS
March 28-31, 1989
(N=12)**



18/12

28

**TRAIN THE TRAINER
COURSE REACTION COMMENTS**

BARBADOS, SANDY BEACH HOTEL, 28-31 MARCH, 1989

1. Require at least one more day to comfortably cover the major topics without the pressure of completing so that participants may make travel times.
2. Insufficient time for general discussion at the end. (Instructor's note: Section V, Evaluation and Revision)
3. This course is a must for every utility which is serious about training.
4. The course was properly organized
5. Everyone was cooperative causing the course to run smoothly.
6. The course was interesting, stimulating, and appropriate.
7. Instructor was very good.
8. There was a great amount of material and everything was very well put together.
9. All areas were superb.
10. I was extremely impressed with the instruction provided both in terms of the materials and in terms of the delivery/presentation of the material.
11. A bit more time could be allotted for the program; however, you already have indicated this.
12. A more detailed index/table of contents would have been useful in finding sections quickly when preparing for the presentations. In spite of this, a good program.
13. Well organized and structured with useful handouts which can be used during actual TOT programs run in-house.
14. Insufficient markers, etc., available for final production.
15. For a first-time exposure, it has created a better appreciation as to what proper preparation means.
16. In addition the general provide a useful means of meeting key persons in various utilities.

MEMORANDUM

FROM: Don Rochester

Date: July 9, 1989

TO: Bill Grass

SUBJECT: Training Report - CARILEC OJT Workshops

Bill, attached is a report of the OJT workshops I conducted in the various electricity utilities throughout the West Indies. If you have any questions, please don't hesitate to call!

B/14

TRAINING REPORT

ON-THE-JOB TRAINING WORKSHOPS

Conducted by

Don Rochester of
QUALTEC, Inc.

for

CARILEC

May 8 - June 23, 1989

B/15

INTRODUCTION

During the period May 8 - June 23, 1989, Don Rochester, a QUALTEC representative, conducted On-the-Job Training workshops for eight electricity utilities throughout the West Indies. This report summarizes the locations, number of participants/graduates, and feedback from those workshops. The countries visited and the dates of the workshops were as follows:

Dates	Countries
May 8 - 9	Grenada
May 11 - 12	Dominica
May 24 - 25	Antigua
May 30 - 31	St. Vincent
June 5 - 6	Montserrat
June 8 - 9	St. Lucia
June 19 - 20	Tortola, BVI
June 22 - 23	Anguilla

18/16

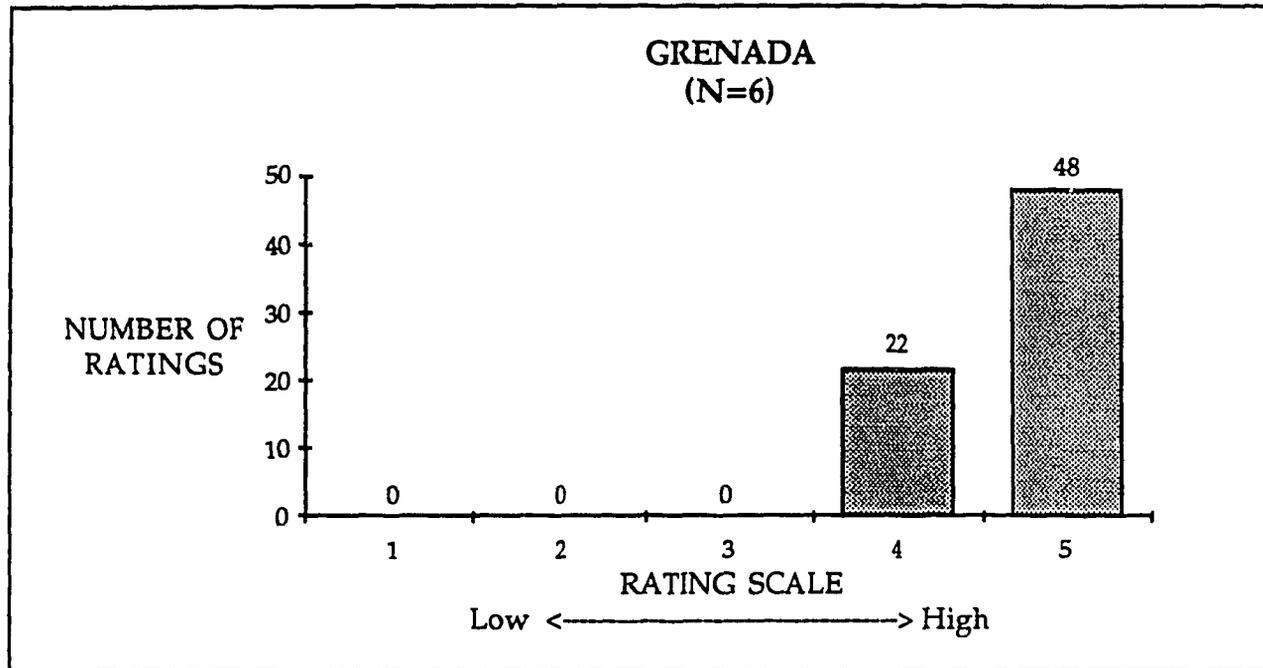
LOCATION/DATES: GRENADA/May 8 - 9

NUMBER OF PARTICIPANTS: 6

NUMBER OF GRADUATES: 6

FEEDBACK:

Questionnaire Results:



Write-in Comments:

- Successful - "Learning to state the task by steps before doing it."
- "The procedure for carrying out a comprehensive demonstration/ practice & performance evaluation."
- "Task Performance Evaluation"
- "All aspects of this course were most successful."
- ". . . the hands-on training with the trainer and trainee."
- ". . . demonstrating the mode of carrying out an evaluation and . . . demonstrating by the trainer . . . along with actual explanation . . . by the tutor."
- "The involvement of the 'trainees' in simulated TPE to give hands-on experience"

1
B/17

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GRENADA (Continued)

Need Improvement - "Time factor (days)"

"Aspects dealing with motivation to on-the-job training"

"There should be more time set aside for the course."

"The time . . . could be improved to three (3) days. More emphasis could then be given to some subpoints."

"The time factor could be longer"

"Longer period"

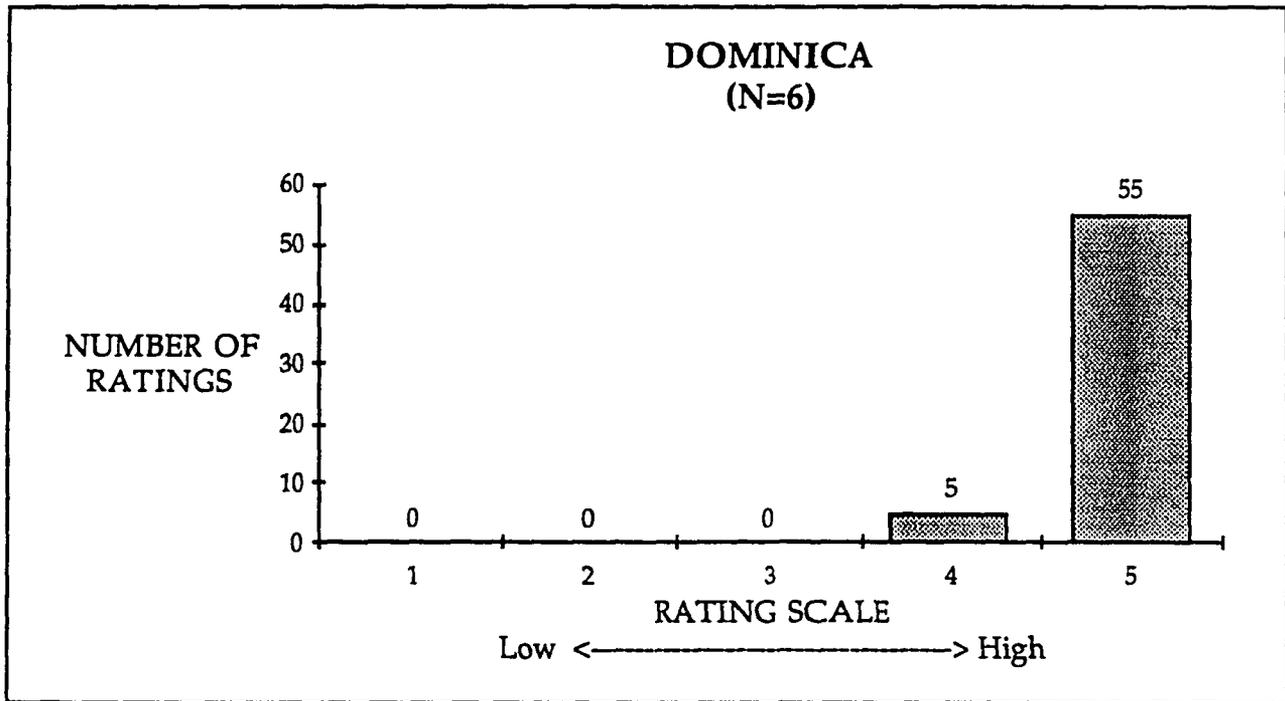
LOCATION/DATES: DOMINICA/May 11 - 12

NUMBER OF PARTICIPANTS: 6

NUMBER OF GRADUATES: 6

FEEDBACK:

Questionnaire Results:



Write-in Comments:

Successful - "... all aspects."

"... the purpose of proper on-the-job training by the instructor or trainer. Also the need to keep personal feelings (out) in evaluation of trainee's performance."

"... perfect as is and is understandable to both trainer and trainee."

"The practice and evaluation session was a great success."

"Carrying out of the demonstrations, conducting of the practical, that is, trainer trainee and the evaluation."

"The course in its entirety was a success."

"The demonstration/practice sessions. . . ."

DOMINICA (Continued)

Need Improvement - "The more advanced aspects so that you can be exposed to the continuing factor."

"The cassette needs to be recorded to fit the VHS recorder."

(INSTRUCTOR'S NOTE: This was done upon return to states)

"Too short. . . ."

"The course could be lengthened by one day. . . ."

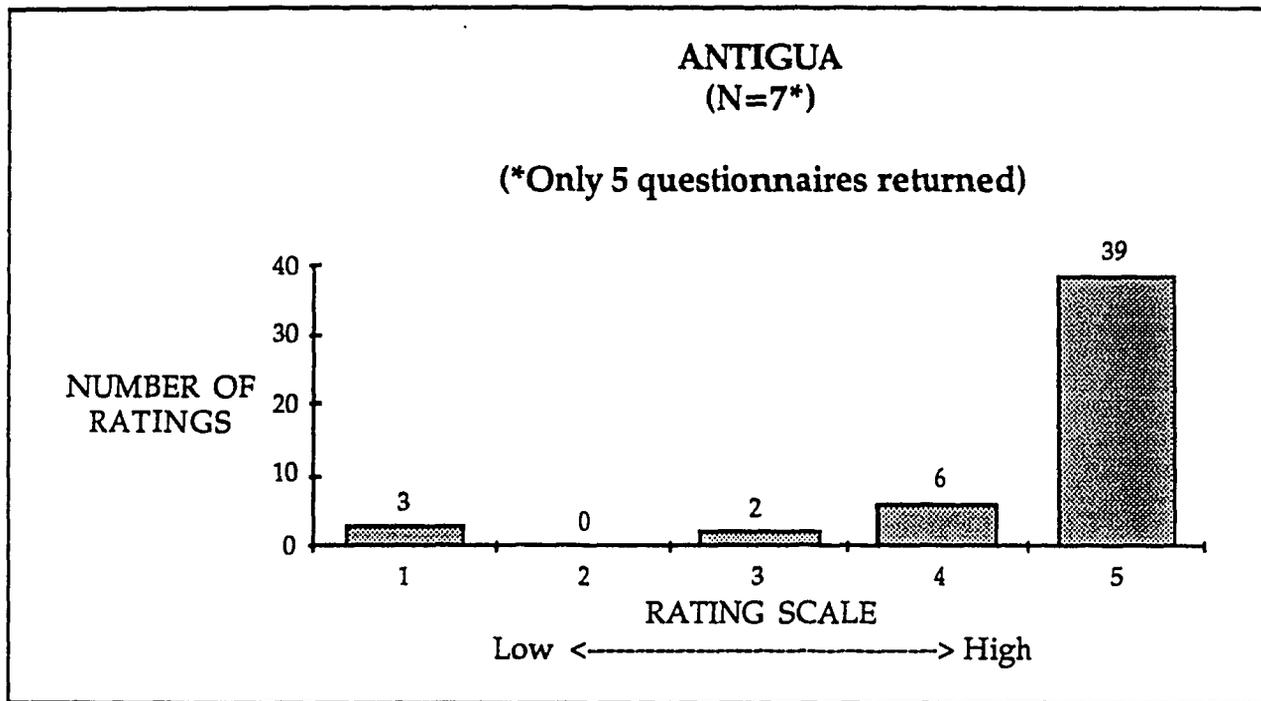
LOCATION/DATES: ANTIGUA/May 24 - 25

NUMBER OF PARTICIPANTS: 7

NUMBER OF GRADUATES: 7

FEEDBACK:

Questionnaire Results:



Write-in Comments: None

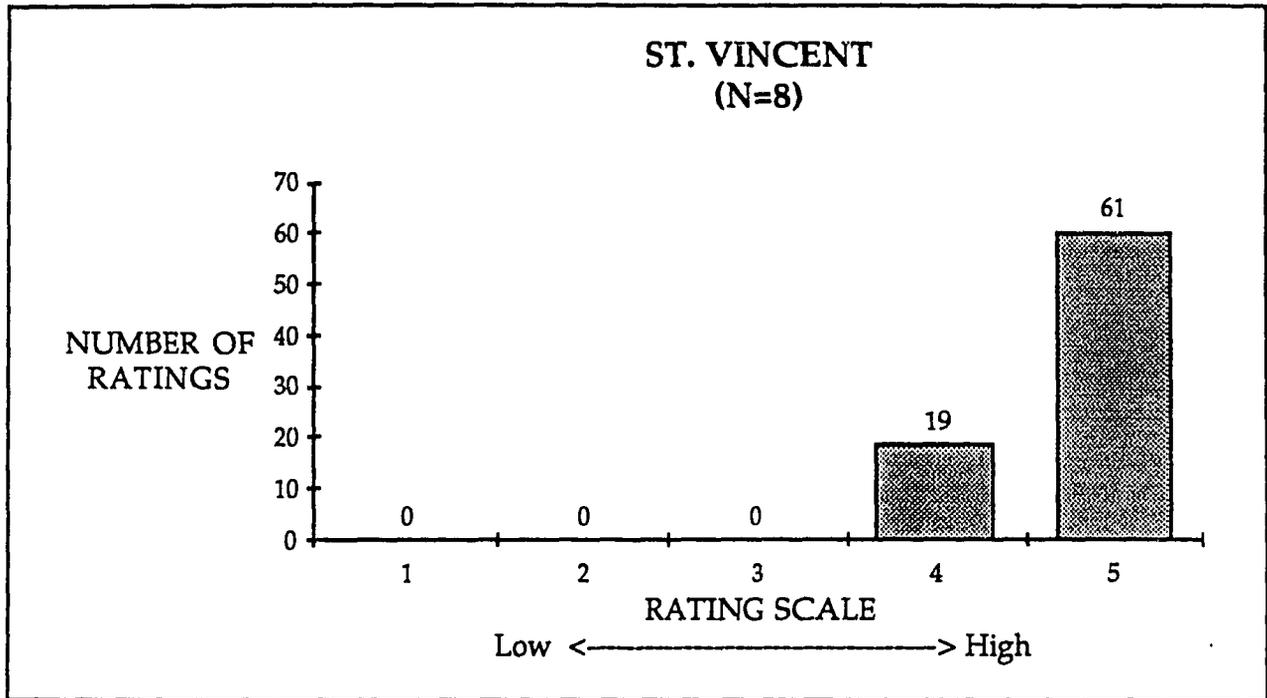
LOCATION/DATES: ST.VINCENT/MAY 30 - 31

NUMBER OF PARTICIPANTS: 8

NUMBER OF GRADUATES: 8

FEEDBACK:

Questionnaire Results:



Write-in Comments: None

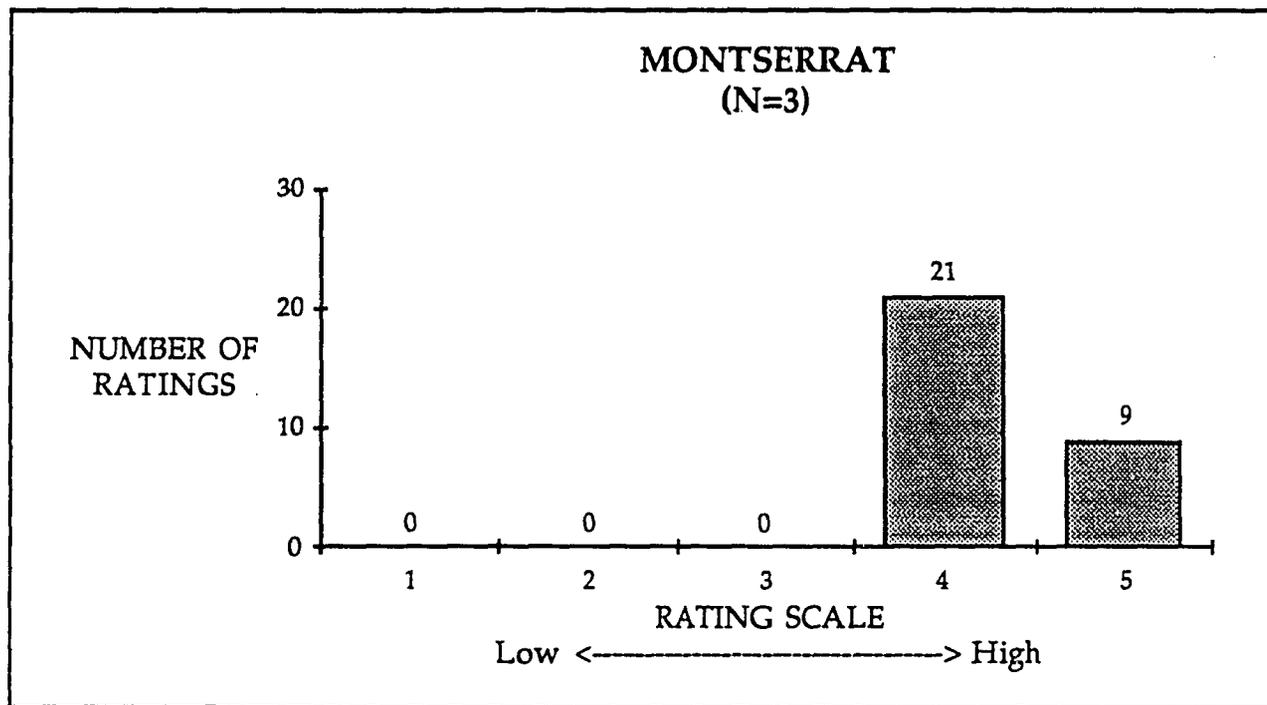
LOCATION/DATES: MONTSERRAT/June 5 - 6

NUMBER OF PARTICIPANTS: 5

NUMBER OF GRADUATES: 3 - Two participants did not complete the workshop. Mr. Lennox Browne was briefed on what these two participants need to do in order to complete the workshop requirements and get credit for the course. Anticipate getting correspondence from Mr. Browne verifying that the two incompletes have completed requirements.

FEEDBACK:

Questionnaire Results:



Write-in Comments: None

7
10/23

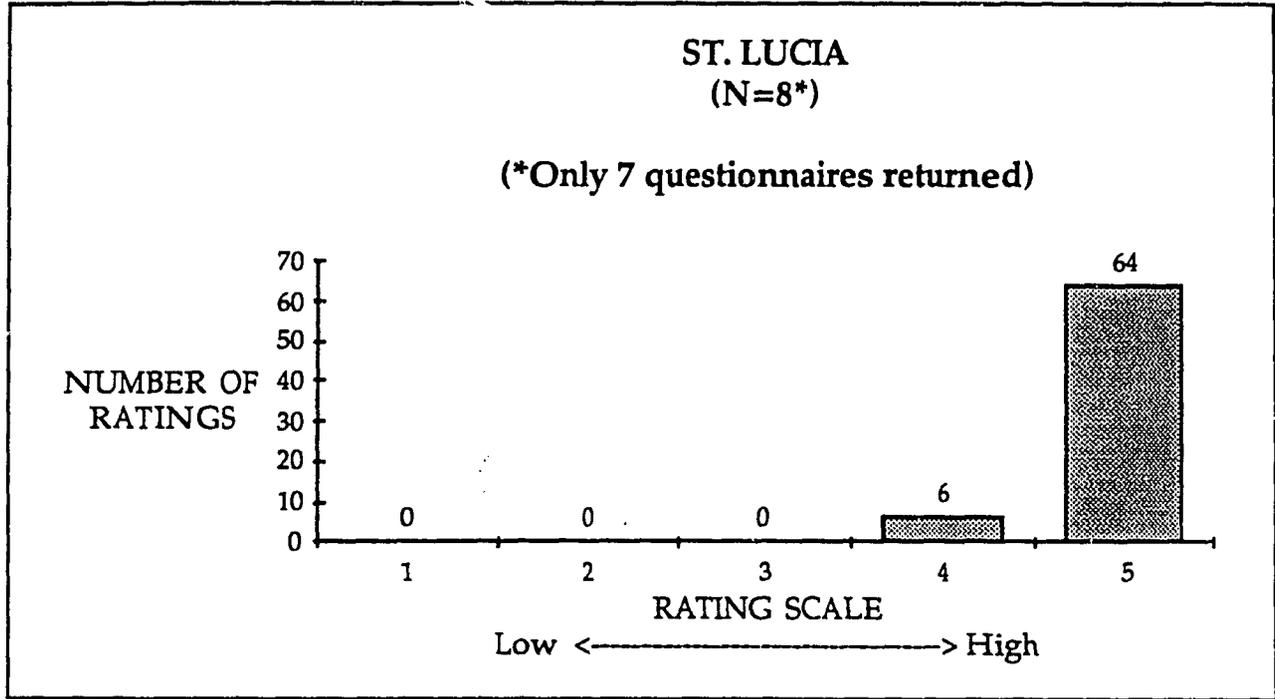
LOCATION/DATES: ST. LUCIA/June 8 - 9

NUMBER OF PARTICIPANTS: 8

NUMBER OF GRADUATES: 8

FEEDBACK:

Questionnaire Results:



Write-in Comments: None

8
B/24

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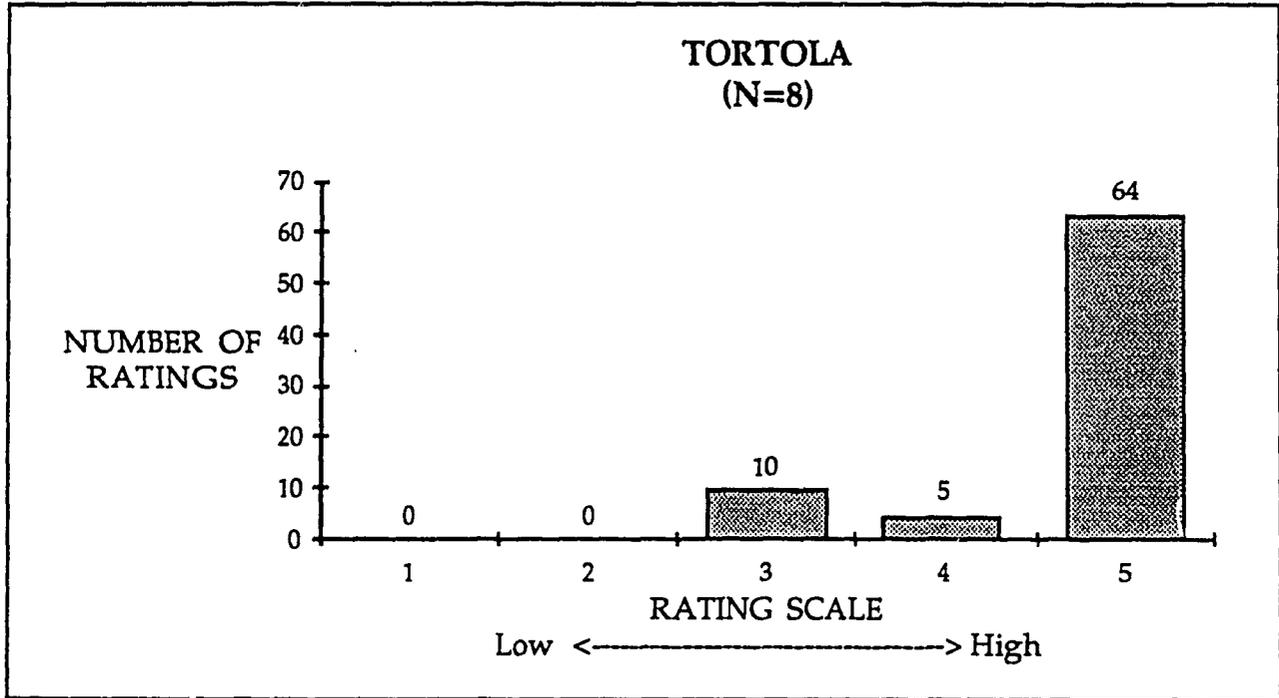
LOCATION/DATES: TORTOLA/June 19 -20

NUMBER OF PARTICIPANTS: 8

NUMBER OF GRADUATES: 8

FEEDBACK:

Questionnaire Results:



Write-in Comments: None

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B/25

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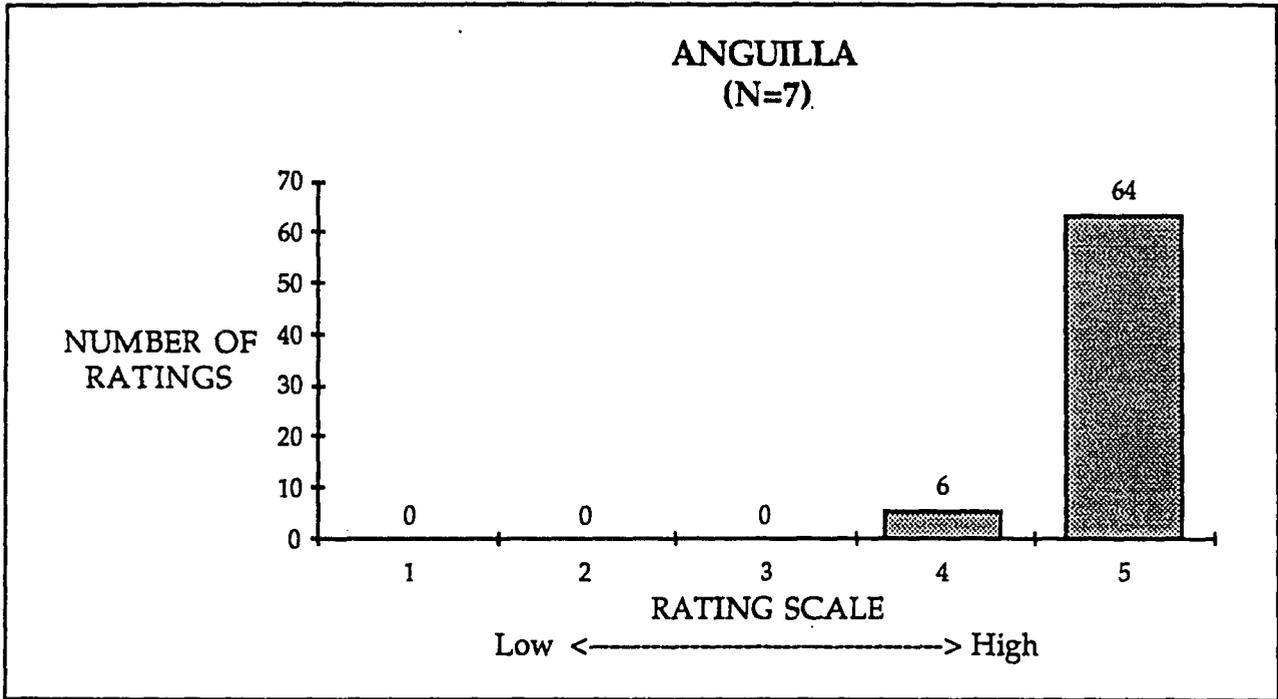
LOCATION/DATES: ANGUILLA/June 22 - 23

NUMBER OF PARTICIPANTS: 7

NUMBER OF GRADUATES: 7

FEEDBACK:

Questionnaire Results:



Write-in Comments: None

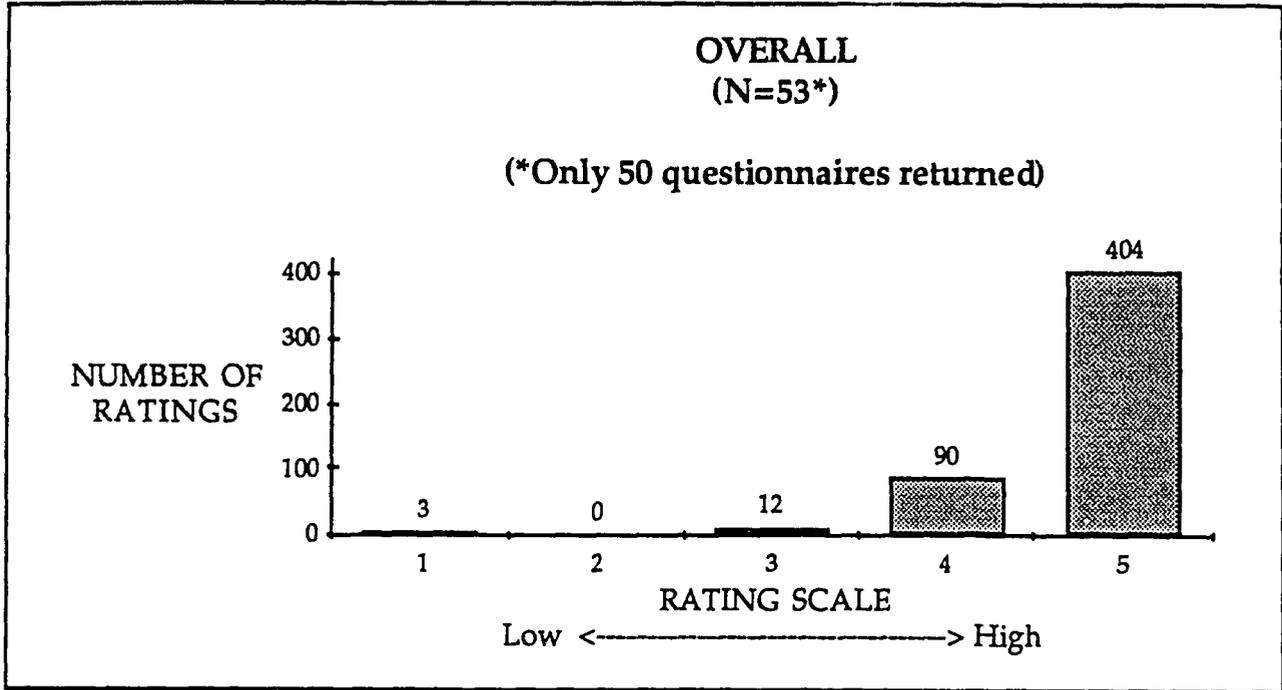
OVERALL

NUMBER OF PARTICIPANTS: 55

NUMBER OF GRADUATES: 53

FEEDBACK:

Questionnaire Results:



SUMMARY OF OBSERVATIONS

General - Participants, their supervisor's, and management were both enthusiastic about and pleased with the course. Most participants indicated that they would like to have additional training - other courses in subject areas dealing with "training" as well as a follow-on (more advanced) workshop to this one. Through discussions with participants during the workshop, and with management during entry and exit briefings, I detected a high degree of interest in job-related training. The general feeling I got was one of "Give me the knowledge, skills and tools necessary to do my job, and I will do a good job."

Need for written, job-related procedures - Virtually every company needs to strengthen their infrastructure. Almost no procedures exist to provide guidance and direction for workers to do their jobs. Hence, standardization and quality of work can not be guaranteed. Traditionally, training has been a generation-to-generation "word of mouth" program. The "old hands" use the younger (newer) employees as helpers. While "helping" the trainee is expected to observe and "pick up" whatever they can.

Need for Job/Task Analysis (JTA) - In order for any OJT program to be successful, the organization must have conducted a comprehensive job/task analysis (JTA), and have on hand the analysis records. Viable on-the-job training depends on each training-intensive task having its steps, standards, skills, and knowledge requirements (among many other things) determined and recorded. These records then become the basis for designing, developing, and conducting training. None of the organizations visited have even begun a job/task analysis. Most of them do not have the expertise to conduct a JTA. However, almost unanimously, the participants *want* to do whatever it takes to have

Exhibit C

FINAL REPORT

QUALTEC POWER PLANT ENGINEER TECHNICAL ASSISTANCE

for

GRENADA ELECTRICITY SERVICES, LTD.

Synopsis

In accordance with USAID RDO/C's request, QUALTEC provided a Power Plant Engineer, Mr. Ron McCuddy, for Grenada Electricity Services, Ltd. (GRENLEC). He arrived in September 1988.

Initial evaluation identified a total disregard for operating hours and scheduled maintenance. With the assistance of QUALTEC's software group, he developed the specifications for a PC-based Maintenance Hour Reporting System and Inventory Ordering Report. This has been invaluable in developing responsibility for availability and is presently providing a formal structure for plant maintenance.

He spent considerable time resolving all issues concerning the 5 MW GM Diesel unit supplied by USAID. He was successful in regaining partial warranty from GM for an estimated savings of US \$26,100 to GRENLEC.

Toward achieving improved system reliability, Mr. McCuddy wrote technical specifications for a power station monitoring system (SCADAM), including: identification of points to monitor; types of sensors; and, routing and installation of sensor wells. Funding for installation of a scadam was not available during Phase I but should be considered in future funding plans.

He assisted GRENLEC in several projects not anticipated in the original project paper, such as: conducting a seminar on Routine and Preventive Maintenance to personnel of the Regional Water Commission (funded by CDB); assisting in the design of a sewage lift station; and, design of a street light circuit around the inlet.

GRENLEC reported to QUALTEC that Mr. McCuddy's work was most helpful and should be considered highly successful. The total cost of this year of effort was US \$138,737.

Mr. McCuddy's work in Grenada is summarized in greater detail on the following pages.

QUALTEC, INC.

An FPL Group company

Summary of Mr. Ronald McCuddy's Work in the Caribbean

September 1988

Arrived September 9th in Grenada, met with USAID (Mike Quinn and Peter Orr). Met with Mr. G. Bowen, who discussed my duties and the problem with the G.M. Diesel Generator. (Mr. Bowen out of country for the next six weeks.)

The next few weeks were spent becoming familiar with the Station, Personnel, and doing a complete review of the problem regarding the 2.04 mw G.M. Diesel Generator.

After reviewing all of the correspondence regarding the Diesel Generator, it seems to be a design problem with the engine. G.M. admitted that they had been working on the problem for several months, due to a similar problem with an engine in Australia.

Grenlec had experienced broken or burnt exhaust valves five times over a 5 month period, (August 1987 thru January 1988) and again in May 1988. Each time field men were dispatched to assist repairs. The last two breakdowns they came to the conclusion that the "cause" was high sulphur content of the fuel and refused to honor the warranty. This conclusion was based on MS/PSD having the carbon samples "analyzed". The reports had not be sent to Grenlec.

Both Shell Oil Company and Spectron Carbinde Inc. refuted this claim, which shows a sulfur content in the fuel of .31%, which is within the .5% maximum guidelines recommended by G.M. Several facts lead Mr. McCuddy to believe that the fuel is not the cause.

1. Deteriorating piston rings, liners, bearing failure and oil pump failure would be evident in the engine, if there was a high sulfur in the fuel. Which it did not.
2. All of the other engines at the station were using the same fuel, yet not having any problems.

MK/PSK Field Representative listed the possible cause of failure as possible foreign material being trapped between the valve and valve seat causing pressure and thus causing erosion of the valve and cylinder head.

On May 22, 1988, MK/PSD replaced all the injectors on the engine with a resigned model and since then Grenlec has not experienced any broken or burnt valve problems.

C/2

This does not indicate that all of the previous valve problems were related to the faulty injector design.

The Manufacturer has a formal report of the investigation and the problem. U.S.AID and Grenlec should insist on a copy of this report. G.M. resolved the design problem with new injectors, but not solve the warranty problem.

Mr. McCuddy suggested that the warranty on the valve train and injectors be extended one year from the installation of the new injectors. This warranty should cover any damage to the pistons, liners, cylinder heads and components due to failure of the valve train or injectors. Why should Grenlec lose the benefit of a warranty because of Manufacturer's design problems.

The 2.04 mw G.M. set has operated since this replacement took place without valve failure.

October 1988

In October 1988, Mr. McCuddy started a review of the Maintenance Program and Plant Operating Procedures in order to start drafting some Training Programs for the Plant Operators and Maintenance Groups.

The Preventive Maintenance Program is computer based along with the engine hour management program, these programs will be developed with the capability of incorporating spare parts reporting and stock level determining in order to maintain the correct number and types of spare parts.

Also an overhaul parts list for the scheduled overhauls in order to give sufficient time to order the parts will be generated.

November 1988

In November 1988, Mr. McCuddy spent several weeks numbering the equipment for reporting purposes in order to complete the maintenance reporting system.

The Stores Operation would be a min-max-reorder system utilizing continuous inventory, but cross-tied to the maintenance program in order to avoid depleting inventories. The Stores Operation will also have the capability to search by part number, item number or bin number and cross reference each.

Qualtec's Computer Services Division inspected the Philray 1800 P/C that Grenlec has available to see if it has capability and capacity to run the programs, which it does.

C/3

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Grenlec acquired a Video Training Library consisting of twenty-four (24) full length Video Training Manuals and Instruction Guides. They have also received a 35mm Slide Library on Repair Procedures on the 5mw, GM Diesel Generator. This equipment is useless until a TV Video Player and Slide Projector is purchased.

During November the specifications on the Engine Hour Management and Inventory Control Programs continued.

December 1988

The Maintenance Reporting System is running trials until January 1989, when the actual time keeping will begin.

The rebuild of Unit 9 was completed in December 1988, thus allowing excess capacity over the holiday season. The exciter of Unit 6 is out for rewind and due back by the end of the month.

The G.M. set of Unit 10 will be shut down and used for peak demand until it can be serviced. The conduit will be replaced with external cabling during servicing to prevent further trouble. Performance has been satisfactory since the AVR cables have been re-routed outside of the conduit. All wiring will be replaced with external cabling during servicing.

The development of the Engine Monitoring and Reporting System has been started and will be microprocessor based. Mr. Bowen would like this in place by July 1, 1989. The system desired will monitor all of the engine/generator operating parameters, alarm in the event of pre-faults and do chronological reporting on power house events.

January 1989

Met with General Motors in regards to the request for reinstatement of the warranty on the G.M. Engine. G.M. was unaware of the continuing difficulty of getting responses from MK/PSK. MK/PSK did agree to warranty the Bridges, Valves, and Injectors until May 1989. This warranty is a standard warranty on new parts issued to the end user (Grenlac) which guarantee all G.M. parts from defects of design deviations and workmanship. This warranty is from G.M. General Motors has requested that Grenlec deal directly with them in regards to parts for this engine, they were also distressed to hear that MK/PSK had been charging 60-65% higher prices for parts than G.M. did. General Motors is aware that they were the victim of poor P.R. from MK/PSD.

Request for Proposal on a Computerized Monitoring Reporting System for the Power Station was started this month. This system would monitor all of the functions of the Engine/Generators. It will be designed to provide the maximum power availability to the grid in

the event of trouble in the station. It will also provide hard copy reports as to where the problem is, how to restore lost production as quickly as possible.

The system will be designed to do the normal daily reporting functions and take this task away from the Station Attendants.

First draft on the Request for Proposal for the Microprocessor Based Monitoring System is completed. RFP written to be issued by Grenlec, but can be modified to be used by USAID.

February 1989

Met with Qualtec, Inc. and USAID (February 8) to discuss a Needs Analysis of the region for Technical Services and Microprocessor Based Station Monitoring System.

Met with NRECA and QualTec, Inc. on February 14 in Barbados to discuss the progress of the project, future plans for the development of the Training Programs and the Technical Services requirements that may develop from the Needs Analysis.

Mr. Dennis Campbell, Chairman of the Board (Grenlec) requested that Mr. Ron McCuddy be the Primary Resource Speaker on the Maintenance and Preventative Maintenance at a Seminar in Grenada in March. This seminar is for the Regional Water Commissions will be attended by Maintenance Supervisors, Foreman, Lead Mechanics, funding by CDB. Mr. McCuddy's part in the seminar will be for 13.5 hours. Topics include: Maintenance Concepts, The Role of the Supervisor in Maintenance, Computer Applications and Preventative Maintenance.

Grenlec has acquired a complete Video System for Training purposes including a 60" Projector Color TV, a VCR and Video Camcorder. This system will be used to utilize a set of Video Training tapes on Maintenance and Electricity that Grenlec purchased from Tel-a-Train.

Progress has been made with MK/PSD as a serviceman to repair the problems with the transformer and wiring on the G.M. set is scheduled to come. G.M. is apparently having some effect.

Grenlec has the nucleus of the Diesel Engine Training Course, but would take about 4-6 weeks to develop it into a course we could use.

Grenlec will continue having capacity problems while Unit 6, 7, and 10 are being overhauled. Work on Unit 7 scheduled to start this month and take 4 weeks.

Demand has risen to 8.3 megawatts on 2/23/89 which is 28% higher than all forecasts.

C/5

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March 1989

Completed the CNC Regional Seminar on Maintenance and Maintenance Management, held the training workshops as mentioned above in February 1989 summary.

The Video System scheduled to be installed this month still has not arrived, thus delaying Video Training Session.

GM put the pressure on MK/PSD to correct any deficiencies in the G.M. set.

Construction continuing on the new 5 MW Unit with the existing building being torn down and a new one erected before actual assembly starts.

Preliminary designs for the A.I.D. Sewage Lift Station Electrical Requirements has begun. Initial design parameters requires a 100 H.P. pump motor with a 100 KW Backup generator. This would not fit into the system, so a re-design utilizing a straight Diesel Pump Hook Up without electric motor has started. This is the best alternative to adding another Lift Station.

Operating Costs would be lower to the C.W.C. utilizing diesel directly; electrical cost if \$.1934 U.S. KWH and the fuel Conversion/Maintenance cost of straight diesel is around \$.11 U.S.

Engine overhauls are progressing smoothly with No. 7 being down and expected to be completed by month end. No. 10 (G.M.) is scheduled next with No. 6 to follow. No. 5 will be ready for overhaul by the time No. 6 is finished and completed by end of September. This schedule will allow Grenlec to be in good shape engine wise until the 5 Megawatt is on line.

Sent a telex to MK/PSD requesting they reimburse Grenlec for the last V.R. Transformer that they supplied. They stated that the tranformer failed due to high ambient temperatures in an un-ventilated enclosure. Our argument was that MK/PSD knew that before building the set and failed to take the appropriate actions in their design to ventilate the enclosure.

MK/PSD is scheduled to come down in May to correct the situation, which includes relocation of the V.R. Transformers to a ventilated area. Continuation of the present location being unventilated would cause continuing failure during the high summer temperatures.

Grenlec requested that designs be done to add under floor conduit to the 5 KV installation to facilitate wiring of the SCADAM.

April 1989

Work continues on the lift station design for the A.I.D. financed

Point Saline sewage line project, even though requirements have doubled, project still manageable. Taking more time then scheduled.

Started formal proposal for SCADAM and met with Dr. Keith Mitchell, the Minister of Public Works to determine the course for implementation.

Completed the underflow design for the conduit for the 5 Megawatts unit. Thermo walls were ordered from Omega.

Started to assist on the re-write of the Diesel Engine Training Program.

May 1989

Continued to assist in developing the diesel engine mechanics course, which is scheduled to start May 17th. Problems developed in the copying process and had to extend work to other vendors in order to meet the schedule. Copies had been in total disarray and required a lot of time to correlate, and whole sections were missing.

Final preparation of the design and specification for the Grand Anse Lift Station project will be completed by the end of the May.

Grenlec No. 7 experiencing problems with engine during overhaul. Small cracks in one of the inboard bearing housing were found. A company from the U.S. was contracted to ultra-sound the block. This delay has set back the overhaul schedule for Units 5, 6 and 10.

Programming of the "Engine Hour Monitoring Program" has started but going slowly with Unit 7 problems.

June 1989

The "Diesel Engine Mechanics Course" has been very successful. Did reach a part that the students has no knowledge of. Mr. Gene Tuttle of the U.S. Embassy was the principle speaker at the graduation and was extremely complimentary on the instructors merits of reaching the students. Students were extremely interested in governors and fuel systems.

The lift station design for the Grand Anse sewer project are completed. Specification on the diesel engines for the pumps for the lift system No. 4 are not in yet.

No. 7 engine is still down for repair awaiting oversize bearings to arrive from England. As soon as No. 7 is running, No. 10, the G.M. set will be shutdown for overhaul. MK/PSD has been notified so they can work on it in July.

July 1989

Information from the pump manufacturers to complete the lift station design is not in yet. Will take 6 to 8 hours to complete once information is received.

Keeping in touch with MK/PSD in regards to their work schedule to do the repairs on the G.M. unit.

MK has agreed to reimburse Grenlec for the last transformer that they had to pay for.

Reporting procedures for accounting to report back to the power plant in order to prevent orders from falling thru the cracks have been established.

MK has scheduled to install a larger transformer and move it to a ventilated position.

Installation of the new 5 MW Unit is going slowly. The building isn't finished yet and don't expect the machine to be on line much before January and February 1990.

This leaves Grenlec behind the power curve a little bit until they finish rebuilding No. 7, No. 10, No. 6, and No. 5. This rebuilding program is expected to take about four weeks for each engine if there are no problems. No. 7 has taken longer because of the grinding that they had to do to bring one of the crankpins back to tolerance and order undersize bearings. Expedited the bearings for No. 7 in order to have the work done before MK arrived.

More problems with control wiring inside the conduit that the wiring for the AVR was in. This is the same wiring that is connected to the transformer that kept burning out. Routed the wiring for the AVR outside and overhead and haven't had any more problems, however, now we're having trouble with the overspeed trip circuits. The overspeed has tripped several times and shut the engine down. The only problem is that its strictly electrical and the mechanical trip didn't operate. There seems to be an intermediate short or ground inside the conduit. In any case, because of the excessive amount of wiring in this conduit and the past problems with AVR controls, we insist that the control wiring inside the conduit be replaced by MK.

August 1989

Returned to the states.

Exhibit D

NRECA TRAINING REPORT

NRECA conducted three training activities during Phase 1 of the Project. They are summarized herein.

Consumer Relations

"Service Excellence: Gaining the Utility Edge" is a training program conducted for the EC Region in St. Vincent May 8-12, 1989. A full report is included as a part of this exhibit. A brief summary of details and results is as follows:

There were 17 participants from eight EC utilities	
All 17 received certificates	
Development/modification costs	\$ 0.
Delivery costs	\$ 5,658
Participant sustenance and facility costs	\$10,669
Average cost per participant	\$ 960

Participants all rated the program "Good" to "Excellent", the top ratings on a 5-point scale.

Lineman Trainers - Job Safety and Training

The program was conducted June 12-30, 1989, in Louisiana, USA, by Ms Jean Phillips under contract to NRECA. The full report is included as part of this exhibit. Summary details and results are as follows:

There were 9 participants, each from a different EC utility	
All 9 were certificated	
Development/modification costs	\$ 0
Delivery (tuition, fee, etc.) costs	\$11,045
Participant sustenance and facility facility costs	\$21,976
Average cost per participant	\$ 3,669
Average cost per participant per training week	\$ 1,223

Review of evaluation provided in the enclosed report.

Organization, Management & Operations of Electric Utilities

The 7-week OMO course is directed at people in or being groomed for top management positions in utilities. It is offered regularly by NRECA in the US and operates under a preset tuition/fee structure. Opportunity to send participants was offered to all

CARILEC member utilities. Three did so. The program was conducted in Washington, DC, and Texas. Details and results are:

There were 3 participants	
All 3 were certificated	
Delivery costs	\$11,850
Participant travel, sustenance and facility costs	\$12,869
Other costs	\$ 638
Average cost per participant	\$ 8,452*
Average cost per participant per week	\$ 1,207

* Original budget was \$8,950 per participant.

Participants rated the course highly and stated it is very applicable to their utility operating management needs.

General Comments on Phase 1 Training

Generally speaking, Phase 1 training efforts accomplished more at less cost than was anticipated in either the original project paper or the Cooperative Agreement budget. Still, there were some communications difficulties:

- o Some mutual agreements reached during preparation, presentation (to RDO/C) and negotiation (with RDO/C) were misunderstood by the utility managers. The resulting confusion made it necessary to stop and completely review the project some nine months after it started.
- o While inter-island communications are generally good, they are subject to system overloads and information does fail to reach desired parties in the utilities. This led to misunderstandings and, in a few cases, the wrong people being selected for certain training programs.
- o NRECA and QUALTEC began the project with plans based upon training priorities as set forth in the original project paper. These changed somewhat during the November 1988 utility managers meeting, and were altered again when the Training Directors met early in 1989. The changes were accommodated but there were subsequent misunderstandings (about the priorities) which hopefully can be avoided in the future.

As CARILEC approached the beginning of Phase 2.a (the second project year), its leadership opted for review of training priorities. This is probably a very wise decision but it did basically halt all training activity for the months of September-December 1989, and only three smaller programs were conducted in January-March, 1990. There has occurred a considerable loss of momentum in the training effort.

In February 1990, CARILEC issued specifications on training programs requested by its member utilities. Several firms

were invited to submit tender offers and decisions are expected in late May for program delivery during the following 18 months. If continued with sufficient lead times between requests for tenders and course delivery dates, this procedure should enable CARILEC to reduce lag time and avoid losses of momentum in the future.

Service Excellence

GAINING THE QUALITY EDGE

Activity Summary and Course Evaluation

By
Patty Smith

NRICA Management Services Division

11/15/88

D/A

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SERVICE EXCELLENCE
GAINING THE UTILITY EDGE

A Training Program
for the
Eastern Caribbean Regional
Training Center

May 8-12, 1989
St. Vincent, W.I.

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List of Participants who attended the Customer Relations Course

St. Vincent - May 1989

<u>DATE</u>	<u>NAME</u>	<u>COMPANY</u>
5/9/89	Evan W. Goddard	B'dos Light & Power
5/9/89	Freddy Adamson	B'dos Light & Power
5/9/89	Primrose Lewis	Antigua Public Utility
5/9/89	Mike Ford	Antigua Public Utility
5/9/89	Gwyllyn Hoyte	MONLEC
5/9/89	Olvin Ramsay	MONLEC
5/9/89	Beryl Smith	BVI Elec. Corp.
5/9/89	Eric Turnbull	BVI Elec. Corp.
5/9/89	Cyril Maynard	Anguilla Public Works
5/9/89	Wilfred Richardson	Anguilla Public Works
5/9/89	Connie Toulon	DOMLEC
5/9/89	Desire Daniel	DOMLEC
5/9/89	Linda George-Francis	GRENLEC
5/9/89	Helen Williams	GRENLEC
5/9/89	Patricia Tyrell	VINLEC
5/9/89	Louise Browne	VINLEC
5/9/89	Yvonne Raguette	VINLEC

SERVICE EXCELLENCE

GAINING THE UTILITY EDGE

Eastern Caribbean Regional
Training Center

St. Vincent, W. I.

May 8-12, 1989

Service Excellence: Gaining the Utility Edge was presented to seventeen participants representing eight Eastern Caribbean Utilities on May 8-12, beginning on Monday, May 8, at 1:00 p.m. and concluding on Friday, May 12 at 12:00 noon. VINLEC, the St. Vincent Electric Utility, was the host and the course was held on-site at their training facility.

Material for the training program is based on the book, Service America! Doing Business in the New Economy by Karl Albrecht and Ron Zemke. The workshop is designed to help managers and the management team understand the importance of a customer service orientation to the success of any organization. As a result of attending the training course, participants should be able to recognize the significance of a customer orientation to their organizations and to identify the appropriate changes needed at their utilities. The electric utilities themselves should realize the benefits of implementing a service management approach through increased customer satisfaction (i.e. fewer complaints on service, greater acceptance of rate structures), improved employee attitudes and skills, and an increase in bottom-line profitability.

Each participant received a 120-page notebook with lecture notes, exercises, and articles from national publications, including many written by electric utility professionals. In addition, extensive use of videotapes, discussion groups, and individual exercises helped to create a learning environment for the participants to gain new information and to apply it to their own systems.

The group of participants and the utilities they represented made for a very mixed audience. Of course, most of the systems represented are government-owned and the politics of the situation creates some interesting customer relations problems. Some of the systems, notably the Anguilla system, are experiencing tremendous growth and development which brings on a different set of circumstances from the others. Barbados Light and Power, because of its size, financial situation and the very nature of an investor-owned organization, must be considered unique, too.

D/7

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The range of experience and job position of the participants varied greatly. One person had just started to work for the company while most had years of experience in their present positions. A few were mid-management level and supervised many employees. Only one answered directly to the chief executive officer. Most were front-line employees with no major decision making responsibilities.

The service management concept presented many challenges to the participants. Most of the utilities had apparently never considered a customer service orientation as the basis for their business and, as a result, a good deal of time was spent in discussion of the many and varied practices each one followed. The two representatives from Barbados Light and Power added much to these discussions. Light and Power has focused on customer service for several years now and the changes and benefits they discussed added credibility to the concept.

The entire group proved to be highly participative which helped them, not only to understand the concept, but to buy into the idea as well. They were all very honest and forthright in their comments which enabled them to develop realistic goals for much needed changes at their respective utilities.

There were two major problems. One was the position level of the participants who were sent to the training course. Out of the group of seventeen, three could be considered decision-makers with access to the policy-making process. The course material was written for the top management level within an organization. To meet the needs of the attendees, two adjustments were made: 1) more time was allowed for discussion to increase understanding and to enhance individual ownership of the service management philosophy and 2) a module on one-on-one customer contact skills was taught on the last day instead of the planned material. Of course, this problem impacted the direction and depth of the discussions as well. If participants feel powerless to bring about some of the organizational changes being discussed, they quickly become frustrated and non-participative. To avoid this problem, individual change was emphasized rather than overall organizational change.

The second problem had more to do with logistics. Several of the course evaluations contained negative comments about the accommodations, transportation, lunch arrangements, and lack of hospitality on the part of VTNLEC. Specifically, the problem with the hotel concerned the operating hours of the restaurant. The participants found the serving hours of the dining room did not coincide with their schedule. As a result, the group purchased groceries and had breakfast and dinner together in the apartment which the representatives from Barbados Light and Power rented at the hotel site. (I was told everyone took a turn at cooking and cleaning!) Lunch was provided on-site by a local caterer and, although the food was always good, lunch was always late-- by as much as an hour one day. The same problem occurred with the contractor who provided morning and evening transportation. The group had as long as thirty minute delays in the afternoon. All of these logistical problems conveyed a lack of organization

D/8

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on the part of the host utility. Although VINLEC's General Manager welcomed and also bid adieu to the group and generously provided the time and attention of Horace Louis, the group wanted more from the utility in terms of making them feel welcome.

There are just a few changes needed in order to eliminate some of the problems encountered in this program. Guidelines on whom to send to a course should be sent to each utility well in advance of the actual training course. Advance registration should be required of the utilities to ensure appropriate selection has been made. If the registration list does not indicate this has been done (job titles, education level, years of experience, brief description of job responsibilities should be requested), there are two choices available. The utility can be contacted in order to aid them in their selection or the course instructor can be alerted and asked to adjust the training course to meet the needs of the expected attendees.

Advance registration would take care of another problem. Participants could be asked to bring with them material appropriate to the class topic. For example, it would have been helpful if each participant had brought copies of the utility's customer policies to the Service Excellence course. This would facilitate the learning process and prepare the people for the training course. In addition, they should be encouraged to bring material about the utility and about the island itself.

The host utility should be issued very specific guidelines to follow for training room setup, refreshment breaks, transportation, hotel accommodations, island and utility plant tours, and luncheon plans. For example, even with a small group of seventeen, some of the people had very specific requests for the luncheon meal -- no fried food, vegetables only, must be at 12:00 noon (a medical condition). A wide variety of choices must be made available. For morning and afternoon breaks, the host needs guidelines on what beverages to serve, when and even how to serve (make the refreshments available in another room and don't interrupt the class). The guidelines will help the host utility know what is expected; avoid awkward, lengthy and unnecessary delays; and allow the instructor to concentrate on the delivery of the course. When the host utility contracts with any outside vendor, punctuality must be stressed and required.

One very special thing happened that week which greatly contributed to the success of the training program. The Light and Power apartment provided a gathering point for the group before and after class where shopping, cooking, eating, exercising, and discussions could all take place, resulting in a camaraderie which will last a lifetime. The group also pooled their resources (with some financial aide from VINLEC, I think) and held a party at the hotel the last night inviting all of the VINLEC employees whom they had met during the week. It was a great occasion. All of this "togetherness" produced an esprit de corps which was evidenced by the level of participation in the classroom and by the mutual respect shown by all class members. A scheduled get-together on the first night and last night and an appropriate gathering place provided during the week could help to foster this same cohesiveness among other groups.

D/9

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To summarize, the Service Excellence course went very well. By the end of the week, I felt a new (and rather radical) concept had been introduced to the group which would provide enormous short and long range benefits to their electric utilities. The participants became committed to the idea and set goals and made plans to bring about the much needed changes to achieve service excellence back home. Several mentioned the desire for a follow-up course to further elaborate the concept and to provide a means to check-up on their progress.

The problems experienced can all be remedied. More attention to detail will solve most of them. Sending out more advance information prior to the training program and working closer with the host utility will result in better training programs and strengthen the relationship between the utilities and the Eastern Caribbean Training Center.

D/10

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Service Excellence

GAINING THE UNLIMITED EDGE

Evaluation of Course Material and Instruction

Business Training

May 1989

D/11

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NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good Average Fair Poor

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Contents suitable for my background and experience	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Program was well placed within allocated time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. To what extent will you apply the content of materials presented?

Frequently Sometimes Maybe later Not at all Don't know

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. How would you rate the facilities and arrangements for this program?

Excellent Good Average Fair Poor

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

More information should be given to the Instructor about the West Indies.

7. Other Comments: I think NRECA is doing a good job in providing providing training for all its utilities, we have learnt a lot about each other's utilities, how we handle our problems, they are similiar, but for some of us there is room for improvement.

Name: Lewis
(Optional)

Title: Antigua

D/12

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NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent ___ Good Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input checked="" type="checkbox"/>	___	___	___
B. Contents suitable for my background and experience	___	<input checked="" type="checkbox"/>	___	___
C. Program was well placed within allocated time	___	<input checked="" type="checkbox"/>	___	___
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	___	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

	Excellent	Good	Average	Fair	Poor
Patty Smith:	___	<input checked="" type="checkbox"/>	___	___	___

5. How would you rate the facilities and arrangements for this program?

Excellent ___ Good Average ___ Fair ___ Poor ___

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

(information)
7. Topics relating to West Indies compiled before the program. As this program is too Americanized, the West Indies differs from the USA. Other Comments: Poor organization - (needs to be improved) by hosting country - "St. Vincent Electricity Services"

Name: Linda George-Francis
(Optional)

Title: Secretary/Officer Supervisor

Has nothing to do with the program itself. But on the effort placed in making our visit comfortable.

D/13

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NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent ___ Good Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	___	<input checked="" type="checkbox"/>	___	___
B. Contents suitable for my back-ground and experience	___	<input checked="" type="checkbox"/>	___	___
C. Program was well placed within allocated time	<input checked="" type="checkbox"/>	___	___	___
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	___	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	___	___	___	___

5. How would you rate the facilities and arrangements for this program?

Excellent ___ Good ___ Average ___ Fair Poor ___

If any category is rated below average, please explain Accommodation, transportation and extra course activities.

6. Topics you would like to have included in a similar program next year:

7. Other Comments: Careful screening of participants should be done before confirmation

Name: Freddy Adamson
(Optional)
Title: Emergency Services Sup.

D/14

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent ___ Good Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	___	<input checked="" type="checkbox"/>	___	___
B. Contents suitable for my background and experience	<input checked="" type="checkbox"/>	___	___	___
C. Program was well placed within allocated time	___	___	<input checked="" type="checkbox"/>	___
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	___	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	___	___	___	___

5. How would you rate the facilities and arrangements for this program?

Excellent Good ___ Average ___ Fair ___ Poor ___

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

I personally feel that the information and materials provided were quite adequate.

7. Other Comments: I also feel that the time was a bit short so we didn't get to elaborate on some topics. I would suggest a follow up course.

Name: Olvin Livingston
(Optional)
Title: Ramsay

D/15

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good Average Fair Poor

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Contents suitable for my background and experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Program was well placed within allocated time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Participants were encouraged by instructions to take active part	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. To what extent will you apply the content of materials presented?

Frequently Sometimes Maybe later Not at all Don't know

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. How would you rate the facilities and arrangements for this program?

Excellent Good Average Fair Poor

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

7. Other Comments: Nice having you Patty

I learnt a lot on this course and thanks to you.

Name: Turnbull B.V.I.E. Corp.
(Optional)
Title: Consumers Relation

D/16

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent ___ Good Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly</u> <u>Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly</u> <u>Disagree</u>
A. Subject matter adequately covered	___	___	<input checked="" type="checkbox"/>	___
B. Contents suitable for my background and experience	___	<input checked="" type="checkbox"/>	___	___
C. Program was well placed within allocated time	___	<input checked="" type="checkbox"/>	___	___
D. Participants were encouraged by instructions to take active part	___	<input checked="" type="checkbox"/>	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

	Excellent	Good	Average	Fair	Poor
Patty Smith	<input checked="" type="checkbox"/>	___	___	___	___

5. How would you rate the facilities and arrangements for this program?

Excellent ___ Good Average ___ Fair ___ Poor ___

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

Building a System for Utility-----

7. Other Comments: _____

Name: Wilfred Richardson
(Optional)

Title: Elec. Inspector

D/17

69

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good Average Fair Poor

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Contents suitable for my background and experience	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Program was well placed within allocated time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. To what extent will you apply the content of materials presented?

Frequently Sometimes Maybe later Not at all Don't know

4. Please rate the instructor's presentation and clarify:

Patty Smith Excellent Good Average Fair Poor

5. How would you rate the facilities and arrangements for this program?

Excellent Good Average Fair Poor

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

7. Other Comments: There should be a follow-up. At that time we should explain or discuss whether the service strategies we implemented work. Excellent course.

Name: Michael C. Ford
(Optional)

Title: _____

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good Average Fair Poor

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Contents suitable for my background and experience	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Program was well placed within allocated time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Participants were encouraged by instructions to take active part	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. To what extent will you apply the content of materials presented?

Frequently Sometimes Maybe later Not at all Don't know

4. Please rate the instructor's presentation and clarify:

Patty Smith Excellent Good Average Fair Poor

5. How would you rate the facilities and arrangements for this program?

Excellent Good Average Fair Poor

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

Continuation -----

7. Other Comments: -----

Name: Cyril Maynard
(Optional)

Title: Senior Clerk

D/19

11

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good ___ Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input checked="" type="checkbox"/>	___	___	___
B. Contents suitable for my background and experience	<input checked="" type="checkbox"/>	___	___	___
C. Program was well placed within allocated time	___	<input checked="" type="checkbox"/>	___	___
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	___	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

Patty Smith Excellent Good Average Fair Poor

5. How would you rate the facilities and arrangements for this program?

Excellent Good ___ Average ___ Fair ___ Poor ___

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

7. Other Comments: I think there was not enough time to fully cover all aspects of the course in a boarder sense.

Name: Gwyllyn Hoyte
(Optional)
Title: MONLEC

D/20

7/2

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good Average Fair Poor

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Contents suitable for my background and experience	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Program was well placed within allocated time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Participants were encouraged by instructions to take active part	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. To what extent will you apply the content of materials presented?

Frequently Sometimes Maybe later Not at all Don't know

4. Please rate the instructor's presentation and clarify:

Patty Smith Excellent Good Average Fair Poor

5. How would you rate the facilities and arrangements for this program?

Excellent Good Average Fair Poor

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

How to Deal with Customers who are not Responsive.-----

7. Other Comments: _____

Name: Yvonne Ragguett
(Optional)
Title: Office Clerk

D/22

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good ___ Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly</u> <u>Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly</u> <u>Disagree</u>
A. Subject matter adequately covered	___	<input checked="" type="checkbox"/>	___	___
B. Contents suitable for my background and experience	___	<input checked="" type="checkbox"/>	___	___
C. Program was well placed within allocated time	___	___	<input checked="" type="checkbox"/>	___ <i>(Not Instructor's fault)</i>
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	___	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	___	___	___	___

5. How would you rate the facilities and arrangements for this program?

Excellent ___ Good ___ Average Fair ___ Poor ___

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

7. Other Comments: Transportation and the lunch were not ready on

made time and the Instructor's plans difficult. We lost approx. one hour in total over the week due to late transportation.

Name: Evan W. Goddard
(Optional)

Title: Customer Service Supervisor

D/23

15

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good ___ Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input checked="" type="checkbox"/>	___	___	___
B. Contents suitable for my background and experience	___	<input checked="" type="checkbox"/>	___	___
C. Program was well placed within allocated time	<input checked="" type="checkbox"/>	___	___	___
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	___	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	___	___	___	___

5. How would you rate the facilities and arrangements for this program?

Excellent ___ Good ___ Average ___ Fair Poor ___

If any category is rated below average, please explain ~~Not well organized~~

The host country should do more to make participants feel more relax during their stay.

6. Topics you would like to have included in a similar program next year:

7. Other Comments: Transportation was always late, the Personnel Officer was not organized.

Name: Beryl Smith
(Optional)
Title: Accounts Officer

D/24

76

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent ___ Good Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	___	<input checked="" type="checkbox"/>	___	___
B. Contents suitable for my background and experience	___	<input checked="" type="checkbox"/>	___	___
C. Program was well placed within allocated time	___	<input checked="" type="checkbox"/>	___	___
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	___	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	___	___	___	___

5. How would you rate the facilities and arrangements for this program?

Excellent ___ Good Average ___ Fair ___ Poor ___

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

Dealing with difficult customers-----

7. Other Comments: Material was too Americanized e.g.-----

Should come from the Caribbean.-----

Name: Desire Daniel-----

(Optional)

Title: Asst. Cashier-----

D/25

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good ___ Average ___ Fair ___ Poor ___

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly</u> <u>Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly</u> <u>Disagree</u>
A. Subject matter adequately covered	___	<input checked="" type="checkbox"/>	___	___
B. Contents suitable for my background and experience	<input checked="" type="checkbox"/>	___	___	___
C. Program was well placed within allocated time	___	___	<input checked="" type="checkbox"/>	___
D. Participants were encouraged by instructions to take active part	___	<input checked="" type="checkbox"/>	___	___

3. To what extent will you apply the content of materials presented?

Frequently Sometimes ___ Maybe later ___ Not at all ___ Don't know ___

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	___	___	___	___

5. How would you rate the facilities and arrangements for this program?

Excellent ___ Good Average ___ Fair ___ Poor ___

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

Dealing with the angry customer-----

7. Other Comments: Generally the course was well delivered and I strongly recommend we have much more similiar programs in the future .

Name: Connie Toulon
(Optional)

Title: Senior Consumer Service Cl

D/26

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good Average Fair Poor

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Contents suitable for my background and experience	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Program was well placed within allocated time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. To what extent will you apply the content of materials presented?

Frequently Sometimes Maybe later Not at all Don't know

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. How would you rate the facilities and arrangements for this program?

Excellent Good Average Fair Poor

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

Mock sessions and more group work-----

7. Other Comments: That standard was of a very, very high

that should be continued say annually-----

Name: Pat. Tyrrel-----

(Optional)

Title: Consumers Clerk-----

D/27

19

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Program Evaluation

Program Title: SERVICE EXCELLENCE - GAINING THE UTILITY EDGE

1. Overall, in helping me to improve my own performance, I would rate the educational value of the seminar as:

Excellent Good Average Fair Poor

2. Please check to what extent you agree or disagree with the following statements as related to this program:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
A. Subject matter adequately covered	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Contents suitable for my background and experience	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Program was well placed within allocated time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Participants were encouraged by instructions to take active part	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. To what extent will you apply the content of materials presented?

Frequently Sometimes Maybe later Not at all Don't know

4. Please rate the instructor's presentation and clarify:

	<u>Excellent</u>	<u>Good</u>	<u>Average</u>	<u>Fair</u>	<u>Poor</u>
Patty Smith	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. How would you rate the facilities and arrangements for this program?

Excellent Good Average Fair Poor

If any category is rated below average, please explain _____

6. Topics you would like to have included in a similar program next year:

7. Other Comments: Although it was an excellent course the time was not enough.

Name: Louise Browne
(Optional)
Title: C.R.O.

D/28

Service Excellence

GAINING THE UTILITY EDGE

Expense Report

NRECA Management Services Division

May 1989

D/29

81

COURSE: Customer Relations

LOCATION: St. Vincent

TERM: May 8 - 12, 1989

SPONSOR: NRECA

INSTRUCTOR: Patty Smith, Washington D.C.

Hotel Accommodation for Trainees
Conference Facilities
Transportation to school site
Per Diem for food and expenses

Airline tickets

BVI (2)
Montserrat (2)
Grenada (2)
Antigua (2)
Anguilla (2)
Dominica (2)
Barbados (2)

Local
Currency

\$10,063.31
\$2,366.15
\$400.00
\$6,272.00

Converted to
US Dollars

\$3,754.97
\$882.88
\$149.25
\$2,340.30

\$1,088.00
\$713.81
\$149.25
\$467.91
\$595.90
\$526.87

Instructor/Development Costs

\$5,658.04

Interim Total

\$16,327.18

D/30

82

LINEMAN TRAINERS

JOB SAFETY AND TRAINING

A Training Program

for the

Eastern Caribbean Regional

Training Center

June 1974 - 39 1083

Baton Rouge, Louisiana
USA

PUBLISHED BY

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION

1500 MASSACHUSETTS AVENUE, N.W.
WASHINGTON, D.C. 20005

No Copyright

June 1974

D/31

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List of Persons who attended the Job Safety and Training Course

Baton Rouge, Louisiana - June 1989

Participants

Gavin Richardson
Earl Gardner
Hamish Moore
Oliver Skelton
Lennox Jeremiah
Raymond Lewis
Joseph Jones
Antonius Haynes
Glen Gooding

Company

Anguilla
Antigua
Barbados
British Virgin Islands
Dominica
Grenada
Montserrat
St. Lucia
St. Vincent

LINEMAN TRAINERS

JOB SAFETY AND TRAINING

Activity Summary

and

Course Evaluation

by

James Phillips

NRECA International Programs Division

June 1989

JOB SAFETY TRAINING PROGRAM

Schedule

Week 1 June 12-16/89

Location: Association of Louisiana Electric Cooperatives, Inc.
Baton Rouge, Louisiana

Program:

1. Introduction to Course.
2. Basic Electricity
3. Cardiac Pulmonary Resuscitation (CPR) and Pole Top Rescue.
4. Grounds and Grounding
5. Knot Tying.
6. Hazard Recognition.
7. Care of Rubber Goods and Personal Protective Equipment.
8. Traffic Control.
9. General Safety Procedures.
10. Assembling An In-house Training Program.

Week 2 June 19-23

Location: Lamar Salter Vocational Technical School
Leesville, Louisiana

Program:

1. Bucket Truck Rescue Techniques.
2. Changing out Insulators, Cross Arms, etc., on Distribution and Transmission Systems.

Note: Trainees will be involved with linemen from other utilities during this week of training.

D/34

86

Week 3
June 26-30

Location: Is being arranged at one of the following.

Southwest Louisiana Electric Membership Corporation
Lafayette, Louisiana

Dixie Electric Membership Corporation
Baton Rouge, Louisiana

Program:

1. Transformer Banking.
2. Voltage Regulation.
3. Circuit Breakers and Fusing.
4. Circuit Reclosers.
5. Lightning Arrestors.

Note: For at least a portion of this week, trainees will work in line crews of the utility.

D/35

89

Report to NRECA
on
Eastern Caribbean Region Training Program
Hosted by
The Association of Louisiana Electric Cooperatives
June 1989
Submitted by
Jean F. Phillips

Course Preparation & Administration

I prepared an intensive 3-week training program for the 9 Caribbean electric utility trainers who participated in this program. I understood that each of these representatives was in Louisiana to study our training programs and to apply what was learned to his own training program. With this in mind, I prepared teaching materials for each unit covered. Each participant was then able to bring two notebooks of materials back with him to use if he wanted to. I also gave each participant a video tape with some of our training videos for his own use.

During the first week, we taught classes on various subjects, then went over the materials we use in the more extensive training we do here. For example, we spent about an hour on a basic electricity course which might really have taken six hours to present to our linemen. But the participant did end up with our complete course outline, hand-out material and audio/visual support. This week allowed us to share material and ideas about training in general. Most of the participants were quick to ask questions which encouraged good discussion. It was a fully-packed, but I think very successful week.

The second week was spent at one of our actual schools, our linemen's bucket truck training school. During this time each participant took part in the hands-on practice of the safe methods of doing basic utility work from a bucket truck, bucket truck rescue procedures, truck inspection procedures, etc. The Caribbeans were exposed to the procedures from each of our different cooperatives as well as seeing how we put on a week-long school for over 50 students. I feel the educational benefits were very good.

During the third week, we visited three of our cooperatives, observing their own training programs. Each cooperative approaches its training a little differently. For instance, at South Louisiana Electric in Houma, they were able to see the most well-developed lineman apprenticeship program of any of our cooperatives. At Southwest Louisiana Electric they observed the cooperative with some of the most advanced training apparatus designs. We tried to show them some of the better programs available through the individual cooperatives.

Problems Encountered

I was asked to mention any of the difficulties we had with the program. It was a new experience for me, and I will try to outline the problems I encountered so that the administrators of this program can view the effort from my perspective (someone doing this for the first time).

In general, I think more written correspondence might lower the potential for miscommunication. One thing which we learned ought to be sent to the host state is a description of what types of individuals will be involved and what the explicit goals of the training should be.

From the very beginning there was a misunderstanding about who the participants would be for our course. In my conversations with Charles Overman of NRECA, a training program for linemen was discussed. All of the preparation was geared to that level for weeks in advance of their arrival. In a conversation with someone in the Caribbean, less than one week prior to the participants' arrival, we learned we had trainers coming. That meant we had to spend several more days and into the weekend preparing the teaching materials mentioned above and changing our entire training program to suit "trainers of linemen" rather than "linemen."

Caribbean Training Program

Problems Encountered (continued)

The participants themselves did not seem clear about their purpose in Louisiana. There was a great deal of confusion on the first day because of this lack of understanding. Some participants said they were just told a week in advance that they were coming, while others seemed to have been given more advanced notice. But they all seemed uncertain about the purpose of their stay here.

My role (and that of my assistant) was also misunderstood by some of the participants. We took our role as hosts seriously, trying to accommodate our guests as well as possible. We took them to shopping malls after work when they asked, took them to New Orleans over one weekend, and had them over for a swimming party at my home one evening. I understand that those things are not part of the contract, nor were we expected to entertain for this three-week period. However, there did seem to be some expectation of such by some of the participants.

I think it is once again a matter of communication. I got the feeling that many of these gentlemen were just not prepared for this experience. Perhaps someone could give them an orientation prior to leaving their homes, telling them what to expect at airports and hotels and what to expect from their hosts.

Recommendations

The problems mentioned in the section above centered around two things which I think would make future training easier on all involved: better communication between the host and the administrators of the program and an orientation for the participants.

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Caribbean Lineman Training
June 12 - 30, 1989

Week 1 (June 12-16, 1989) ALEC Baton Rouge

Monday

9:00 a.m.

Coffee

9:30 a.m.

Introduction to Program

Description of the Louisiana Training Program

Electricity Basics

Noon

Lunch

1:00 p.m.

Grounds & Grounding Procedures

Care & Use of Personal Protective Equipment

Tuesday

8:30 a.m.

General Safety Procedures

Traffic Control

Noon

Lunch

1:00 p.m.

Ropes & Knots

Hazard Recognition

Wednesday

8:30 a.m. - 4:30 p.m. First Aid/CPR

Thursday

8:30 a.m.

Pole Top Rescue

Noon

Lunch

1:00 p.m.

Lineman Safety & Procedures

Friday

8:30 a.m.

Lineman Safety & Procedures

Noon

Lunch

1:00 p.m.

Putting Together In-House Training

Week 2 (June 19-23, 1989) Lineman Training School

Lamar Salter Vo-Tech, Leesville

Hands-on Practice:

(Bucket Truck Rescue; Changing out Insulators, Cross Arms, etc.

on both Transmission & Distribution Systems)

Week 3 (June 26-30, 1989)

Monday & Tuesday - SLEMCO

Wednesday & Thursday - SLECA

Friday - DEMCO

°Transformer Banking

°Regulators

°Breakers

°Reclosers

°Lightning Arrestors

(Some time spent working with crew from host cooperative)

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LINEMAN TRAINERS

JOB SAFETY AND TRAINING

Expense Report

11-1-1959

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Exhibit E

USAID/NRECA TECHNICAL SUPPORT PROJECT

for

ANTIGUA PUBLIC UTILITIES AUTHORITY

November 1, 1988, to June 8, 1989

(Complete copy of the original report appears
herein.)

USAID - NRECA
TECHNICAL SUPPORT PROJECT FOR
ANTIGUA PUBLIC UTILITIES AUTHORITY

REPORT OF ACTIVITIES IN ANTIGUA
FOR NOVEMBER 1, 1988 TO JUNE 8, 1989

1. EXECUTIVE SUMMARY
2. BACKGROUND
3. TRANSMISSION PROJECT ACTIVITIES
4. DISTRIBUTION PROJECT ACTIVITIES
5. COMPUTER PROJECT ACTIVITIES
6. REFERENCE MATERIAL AND WORKSHOP/
TRAINING ACTIVITIES
7. RECOMMENDATIONS

NRECA-IPD TRANSMISSION/DISTRIBUTION PROJECT
ST JOHN'S, ANTIGUA, WEST INDIES, JUNE, 1989

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1. EXECUTIVE SUMMARY OF SERVICES PROVIDED BY NRECA-IPD TO ANTIGUA PUBLIC UTILITIES AUTHORITY FOR TECHNICAL SUPPORT

1.1 SUMMARY OF NRECA-IPD CONTRIBUTIONS TO APUA UP TO END JUNE 1989

(1) CONSULTANCY SERVICE PROVIDED

In the period from November 1, 1988 to June 8, 1989, NRECA-IPD provided 130 man days of services to APUA.

(2) ENGINEER/ASSISTANCE/TRANSMISSION

- o Reviewed system protection scheme.
- o Aided in Rework of Crabbs Peninsula 69kV bus.
- o Encouraged use of split bus on 69kV at Crabbs.
- o Aided in the energization of a 69 kV Substation.

(3) ENGINEER/ASSISTANCE/DISTRIBUTION

- o Helped stake 9.0 miles of distribution line.
- o Staked 19 terminal outlets to departing lines.
- o Demonstrated 3 different methods of Voltage drop computations.
- o Aided in the location/restoration of a major cable fault.

(4) ENGINEER/TRAINING

- o In February we began training a local EE Engineer educated in US by USAID sponsorship program.
- o Mechanical Design - REA Bulletin 160-2.
- o Field Training in line staking.
- o Familiarization with 69kV Transmission & Substations.
- o Taught use of Personal Computer/Software.

(5) COMPUTER/TRAINING

- o Class on Intro to Computers.
- o Class on Intro to Computers continuing with Intro to Lotus (personnel department).
- o Individual work with Public Relations Director on use of Word Processing and Desk Top Publisher.
- o Aided in Budget preparation using Lotus.
- o Demonstrated use of Scott DPA programs to engineering personnel.
- o Instructed the use of dBASE III+.
- o Interruption Reporting - Operations.
- o Personnel Records - Personnel.

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(6) SOFTWARE

- o Provided First Publisher (Desk Top Publishing).
- o Purchased & installed Estimator (Material, Cost & Time Program).
- o Purchased & installed Inventory (Record keeping of stores).
- o Purchased Lotus Project Management Program.
- o Installed PRIDRP a basic Voltage Drop Program.
- o Installed SECDRP a basic Secondary Drop Program.
- o Provided a copy of Scott Demo DPA programs.
- o Prepared a Feeder Map of Antigua with Autocad.

(7) PUBLICATIONS/REFERENCE MATERIAL

- o Numerous REA Bulletins.
- o Westinghouse Engineering Books.
Electric Distribution System.
Transmission and Distribution
- o National Electrical Code Handbook (6 copies).
- o REA's Mechanical Design Manual REA Bulletin 160-2.
- o Overhead Specifications REA Bulletin 50-3.
- o Underground Specifications REA Bulletin 50-6.
- o List of Materials (Acceptable) REA Bulletin 43-5.

(8) WORKSHOPS/TRAINING

- o Use of Construction Drawings as related to List of Acceptable Materials.
- o Proper deadending of ACSR conductor.
- o Selected proper range of compression fittings and recommended procedures for secondary/service connections.
- o Conducted an overview of the elements of line staking for a technician from APUA and Jack Ryan from MONLEC of Montserrat.

1.2 SUMMARY OF APUA CONTRIBUTIONS TO NRECA-IPD TECHNICAL SUPPORT PROJECT**(1) TRANSPORTATION SERVICES PROVIDED**

In the period of November 17, 1988 thru June 89, APUA provided the Trans/Dist Engineer a 85 Chevrolet Cavalier vehicle and the necessary fuel, oil, tires, and maintenance required.

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(2) REPORTS

- o Stan Jones, Mechanical Engineer provided his monthly Operation & Interruption reports each month.
- o Peter Benjamin, Acting Manager Electric provided a copy of the Loss Reduction Study by Enertech.
- o Milton Rogers, former General Manager now Consultant, historical electric background data collected over the past years.

(3) OFFICE FACILITIES

- o Office space, including desk & file.
- o Use of IBM/System 2 Series 50 computer at APUA Hqs.
- o Use of copy equipment at both APUA Hqs and Cassada Gardens Operations Center.
- o Use of FAX in Hqs to communicate with Washington and Barbados.
- o An outside line for overseas calls.

(4) PERSONNEL

During the consultancy with the Antigua Public Utilities Authority one must acknowledge the cooperation received from the following individuals:

- o Peter Benjamin, Acting Manager Electric, for his cooperation and help during the 6 month consultancy.
- o Michael Ford, Public Relation Director, who acted as tour guide for familarization of facilities and physical characteristics of the island.
- o Stan Jones, Mechanical Engineer, and Tony Ramsey, Crabbs Peninsula Diesel Mgr for tour of APUA's facilities and operations on the island of Barbuda. (Appendix B, B-1)
- o Edric Robinson, Electrical Supt for his help and info regarding the electric system on the island.
- o Joseph Richards, Trans/Distr Supervisor for technical knowledge of APUA's system.
- o Victor Mead for his work on the Enertech Study
- o Earl D Gardner, Electrical Engineer Trainee for his patience, cooperation, and enthusiasm for a rewarding training session.

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2. BACKGROUND

The International Program Division of the National Rural Electric Cooperative Association was called upon to provide a Transmission/Distribution Engineer to assist in the day to day operations of the Electricity Division of the Antigua Public Utilities Authority.

Mr Robin Yearwood, Public Utilities Minister had requested assistance from Eric Sandberg, US Embassy of Antigua, who forwarded his request to USAID in Barbados. AID in Barbados responded that a proposed electrification program had technicians available through NRECA and requested a Scope of Work. Mr Yearwood provided a Table of Organization, Job Description, and statement of problems. Excerpts from Mr Yearwoods letter:

Current Problems

The Manager and Mechanical Engineer of the Electricity Division have resigned and they are short of a Transmission & Distribution Engineer. There is a dire need to prepare and carry out a program of maintenance on the transmission and distribution lines and the generating stations as we are presently faced by many outages due to one or the other of these failing and causing power interruptions.

Type of persons required

Practical help in the form of personnel is therefore needed in a mechanical engineer and a transmission and distribution engineer experienced in utility systems. Ideally three persons will be needed while APUA is endeavouring to recruit replacements.

NRECA-IPD provided an engineer, Jack K Hicks, on site 1 Nov 88. In the early stages of the consultancy the main effort was directed towards familiarization with the electric system and its operation. In addition one was afforded the opportunity to become personally acquainted with the key engineers and supervisors.

The overall objective was to aid APUA as an additional engineer and in turn observe APUA's construction, operation, and maintenance programs, while helping correct the programs shortfalls. A copy of the Scope of Work is listed in Appendix A, A-1.

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3. TRANSMISSION PROJECT ACTIVITIES

3.2 ENGINEER/ASSISTANCE/TRANSMISSION

The 69 kV protection scheme was reviewed and found to be very minimal. Initially upon energization of Crabbs Peninsula Diesel Plant (1970) a 5.75 mile double circuit 69 kV link to Cassada Gardens was installed. The concept was to use only one line at a time with the option of using either line while maintaining the other. The breaker was on the 11 kV bus at the Diesel plant with a mechanically operated switch at the 69 kV side of the transformer. This scheme worked adequately until the completion of the Crabbs Peninsula Steam Station known as Tango.

In reading the design Specifications for the electrical outgoing circuits of the new plant Foster-Wheeler assumed they would terminate in a 69 kV substation. However, due to lack of money or good operating experience with the existing 69 kV link no 69 kV substation was installed. Therefore, the 69 kV transformer breaker was the only means to isolate a fault on the 69 kV system. Only one 69 kV underground transmission line was energized due to the limitation of the 69 kV transformer - 9.0 MVA at Cassada Gardens.

During a series of interruptions by an unexplained tripping on the generator breaker at Tango in August 88, an oil pump was inadvertently left off and a steam turbine was damaged. This turbine is presently being reworked in Norfolk, VA and expected to be back in service by July or August 1989. This unfortunate incident might have been avoided had a 69 kV substation been installed at Crabbs Peninsula.

In order to utilize both 69 kV transformers at Tango the 69 kV bus was reworked with existing material available. A number of schemes were discussed and the physical/electrical arrangement was selected that would best meet the needs by using available 69 kV switches (Appendix B, Exhibit B-1). In addition, a 69 kV SF6 breaker was installed on the Crabbs Peninsula end of the Ring Bus. The final installation of the SF6 breaker and energization is expected to be completed by the end of June.

In discussions on optimizing the operation of the Steam plant between Mel Hill, Foster-Wheeler Team Leader, Earl Gardner, APUA Engineer, and Jack K Hicks, Trans/Dist Engineer NRECA it was decided to split the so-called bus and allow one 69 kV transformer to supply the 5.75 mile unprotected bus and the other to supply one side of the ring bus. This would allow Tango to maintain some load in case either station transformer breaker tripped.

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Also it was determined that once the ring bus is completed the under-frequency relays on each transformer at Tango could be set to allow a timed dropout and in turn maintain load on Tango. Mel Hill, Team Leader of Foster-Wheeler operating group, recently received authorization to increase the generator relay setting and they in turn endorsed the proposal for under-frequency relay settings on the transformers at Tango. This would keep the station on the line and eliminate the 3-6 hour startup time required for a steam station. Again, all these proposed changes are in a sense stop-gap-measures until a 69 kV substation could be installed at Crabbs Peninsula.

In order to determine the phasing of the circuits between Feeders #4 & #5, the 11 kV circuits were checked at the open point. It was ascertained that the rotation was correct and a slight modification on Feeder #5 would place like phases opposite one another. The phasing was then traced to Collins sub for energization of the 69 kV sub. One must remember that on initial phasing a 30 degree phase shift will exist due to Delta/Wye conversion to 69 kV at Tango while Collins has a Wye/Wye 3ph transformer.

4. DISTRIBUTION PROJECT ACTIVITIES

4.3 ENGINEER/ASSISTANCE/DISTRIBUTION

In order to train a new engineer, Earl D Gardner, and at the same time assist in the duties of a distribution engineer, approximately 9.0 miles of 3ph line was staked. Also staking sheets were prepared, specifications provided for the units staked, and list of acceptable materials compiled for each individual line.

The line included both single circuit and double circuit 3ph construction. The lines departed from five 69 kV substations. In addition the departure structures UM2-7 (THREE-PHASE CABLE POLE - UNDERGROUND SOURCE) - nineteen in total were under construction at the substation sites.

The complexity of the staking projects varied from direct cross country line staking to passing thru villages with minimal line location options and horizontal/vertical clearances. This provided an opportunity to teach more complex line location techniques. In addition, REA Bulletin 160-2 (Mechanical Design Manual for Overhead Distribution Lines) was used as a reference manual and a copy of this bulletin provided to APUA.

Ruling Span calculations were made for each line segment and sagging charts/methods discussed.

One particular line segment (Collins to English Harbor) provided an opportunity to demonstrate three different methods of calculating the Voltage Drop in the 5.38 miles of 3ph line with various conductor values. They were:

Scott DPA to demonstrate the total voltage drop.

PRIDRP a basic language program using REA Bulletin 45-1 methodology.

GRPVD another basic language program using concentrated load techniques.

A Scott Demo package was installed on APUA's Engineering Computer at St John's headquarters. (Appendix A, Exhibit A-2) PRIDRP and SECDRP with documentation was installed in an engineering directory on the computer at St John's and Cassada Gardens. (Appendix A, Exhibit A-3) Earl F Gardner, Engineer Trainee was introduced to these various programs and instructed as to their use.

On March 20th the 69 kV system along with Tango (Steam Plant) were interrupted by a underground fault between the Cassada Garden 69 kV substation and the 11 kV bus at the Cassada Gardens Diesel Plant. This provided an on site review of APUA's methods for fault location, repair, and restoration of the system. It again demonstrated the lack of overall supervision, the minimum concern as to the seriousness of the outage and resources to speedily restore the system.

The cables were isolated and checked with a megger, which indicated essentially no dead short. In turn they were energized from the 11 kV side and they indicated no shorts, however we could not hear the transformer hum. It was ascertained that the breaker on the 11 kV bus was not closed, the breaker was energized and closed into the fault. The short still existed and what was believed to be the initial cause of the fault, a termination, was OK. It was now determined the cable was faulted inside the riser conduit. The cable was removed and found to be faulted. In visiting with the crew that worked the outage, they were asked "What did you learn from this incident?". The answer was that you can't depend on a megger to indicate a cable fault. If a Hypot tester had been used, a low dc resistance reading would be indicated. This points out the need for a thumper for cable fault location.

In the restoration of Tango (Steam Plant), the 69 kV line, and phasing of various plants, the need for a so-called System Operator was apparent. The System Operator would have the knowledge and authority to coordinate the many facets required to integrate the APUA electric system.

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4.4 ENGINEER/TRAINING

On February 1st, Earl D Gardner, joined APUA at Cassada Gardens as Transmission/Distribution Engineer Trainee. Earl had originally trained as a Meteorologist in England, then worked at Antigua's Airport Weather Station. He then decided on a career in Electrical Engineering and attended Case University in Kingston, Jamaica. He received a USAID Sponsorship of further education in the United States. After attending the State University of New Mexico for ten months, he received a BS in EE. After returning to Antigua, Earl taught at the College until Jan 31st 1989 and in turn joined APUA.

The initial area of training and study was Mechanical Design Manual for Overhead Distribution Lines - REA Bulletin 160-2. The subjects were the many aspects of line design in preparation for actual field staking. Key areas were Control Points, Ruling Spans, Guying Requirements and Sag amounts/methods.

As previously mentioned actual line staking consisted of field staking of 9.0 miles of 11 kV circuits. The longest being 5.38 miles to Nelson's Dockyard in English Harbor from Collins substation. Staking sheets were compiled for each line segment and a list of materials. Use of a surveyors transit including line, angles, offset lines, and wiggle-in-line techniques were taught. Also angle determination by use of a compass and measurement by 66x66x determine-angle method.

The Crabbs Peninsula 69 kV rework to accommodate the unenergized 69 kV underground and station transformer along with the 69 kV Tower-Ring Bus scheme was used to familiarize the trainee with the modifications required.

The engineer trainee was shown the components of a typical 69 kV substation. Procedure required for switching, Y-Y and Y-Delta connections and associated phase shift if any. Five substations were visited during the staking phase and studied as to the 69 kV transmission layouts, along with Cassada Garden Load Center.

5. COMPUTER PROJECT ACTIVITIES

5.5 COMPUTER/TRAINING

In December a class on Introduction to Computers was held at APUA Hqs for eight employees including six from electric, one from water, and one from telephone departments. This class was conducted at the end of the day at 4:00 pm for eight sessions. Each of the participates had an opportunity to use an IBM PC or a Toshiba Laptop.

In January and February another afternoon class was held again at the end of the day for three employees of the Personnel Dept and Mgr, again on Intro to Computers plus Lotus.

Michael Ford, Public Relations Director, was taught the use of the IBM PC at APUA Hqs in the area of Word Processing and the Desk Top Publishing. He has prepared a Quarterly APUA Newsletter using this software package.

Aid was given in the preparation of the annual budget, by providing a historical background of kWh generated and a forecast of future years estimates. Help was also given to those compiling the lotus worksheet in the area of familiarization of spreadsheets. (See Appendix B, Exhibit B-2)

Instruction in the use of the Scott DPA programs was provided to Peter Benjamin and Earl D Gardner. We prepared a Feeder Map of Antigua in Autocad. (See Appendix B, Exhibit B-3)

The software program dBASE III+ was used to jointly develop a program in conjunction with Monsterrat (MONLEC) to aid in Interruption Reporting. In addition we helped prepare a personnel records program for employee records by department.

5.6 SOFTWARE

A few reasonably priced programs were provided to aid in the operation of the Electric Division:

These were First Publisher, small desk top publishing program; Estimator, a material, cost, and time program; Inentry, a material record keeping program; and Project Calc, a Lotus project management add on.

We also provided a basic program called PRIDRP that is developed from REA Bulletin 45-1 (Voltage Drop Calculations) and installed this program on the IBM PC at APUA Hqs and a NEC-XT at Cassada Gardens.

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A copy of SECDRP, a basic Secondary Voltage Drop program, which takes into consideration all conductors from the transformer to building wire within the homestead, was installed on both computers.

A demonstration package of Scott DPA programs was installed on the IBM Model 50 at APUA Hqs. In addition the Section and Node data from the Enertech Loss Study was used to create a working program for the first substation to be energized (Collins).

7. REFERENCE MATERIAL AND WORKSHOP/TRAINING

7.1 REFERENCE MATERIAL

Numerous REA Bulletins were requested of NRECA to aid APUA in the development of Interruption Reporting, Maintenance of Distribution lines, etc. In addition a couple of Westinghouse Engineering Books that were extra from the Cooperative in the States were provided.

Electric Distribution System (Green book).
Transmission and Distribution System (Blue book).

NRECA provided (6 copies) of the National Electrical Code Handbook, to be used by the wiring inspectors.

The following specific REA Bulletins were obtained for the engineering staff at APUA:

REA Bulletin 160-2 - Mechanical Design Manual for Overhead Distribution Lines.

REA Bulletin 50-3 - Specifications and Drawings for 12.5/7.2 kV Line Construction.

REA Bulletin 50-6 - Specifications and Drawings for Underground Electric Distribution.

REA Bulletin 43-5 - List of Materials Acceptable for Use on Systems of REA Electrification Borrowers.

It was very apparent that a very minimal amount of reference material was available at APUA Hqs. This also applied to catalogs from various suppliers in the States. With the addition of the REA List of Materials at least a correct catalog number and manufacturer could be specified upon ordering items.

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7.2 WORKSHOPS/TRAINING

A demonstration package was assembled showing how to select an item from the construction assembly and then trace the item to the List of Materials (Acceptable). The choices of manufacturers were then listed with the associated catalog numbers. In the past APUA has relied on the Distributor such as PECO in Miami to select the catalog number and manufacturer.

In viewing the distribution line throughout the island, it became apparent that the method of deadending aluminum primary conductor was a local adaptation. No doubt at some previous incident the conductor slipped thru the deadend shoe and lost the sag. However, to eliminate this possibility after coming thru the shoe the conductor was wrapped (5 or 6 turns) around the tension portion of the line and then used as a portion of the jumper. This is definitely a no-no as to handling of aluminum conductor.

In the rework of the 69 kV Crabbs Peninsula bus, an opportunity was provided to instruct the foreman and linemen on that project to eliminate the wrap and correctly use a deadend clamp for aluminum or ACSR. It is hoped that the correct practice will continue.

As APUA was using some compression fittings and had a Burndy Hydraulic tool a program of providing each of the line trucks a Manual compression tool was recommended. In addition most of the Islands are using some form of Burndy's compression fittings. A program of tools and connectors was recommended for use by APUA (Appendix B, Exhibit B-4).

A short line staking seminar was held to help inform some of the local technicians such as Victor Mead and Jack Ryan, engineer from Monsterrat (MONLEC), the concepts of a 3 man staking crew. The subjects covered were the actual staking of the lines, the recording of info on the staking sheet, and preparation of the bill of material using the program 'Estimate'.

The practice of using the foreman to 'peg' the pole locations and line design seems to be common throughout the islands. It was indicated that with the cost of poles and associated line material the lines should be correctly designed to be cost effective.

7. RECOMMENDATIONS

7.1 STAFFING OF OPERATIONS - CASSADA GARDENS

- a) A staffing report was done by Hagler & Bailey when they completed a cost of service study and recommended levels of proposed rates. Therefore, it was not necessary nor did they indicate any need for a staff requirements study.
- b) However the following observations were listed that might provide better performance:
 - 1) The need for additional supervision at starting time - 7:00am.
 - 2) Additional supervision would help the crews get organized and leave for the job site on time.
 - 3) Let the dispatcher field the telephone calls for supervisory personnel.
 - 4) Use of a bulletin board to post locations of crews and type of work in progress.
 - 5) Returning to Hq for lunch and subsequent scattering of crews make for long lunch breaks.

7.2 TRANSMISSION

- a) It is imperative that a properly designed 69 kV substation be installed at Crabbs Peninsula with adequate 69 kV breakers. This would eliminate the possibility of another incident that damaged the 9.0 MVA Turbine at Tango. (See Appendix A, Exhibit A-4)
- b) With the availability of 50-2 poles, that a transmission line be constructed to Friars Hill Power station and the substation located on the property or close proximity taking into consideration the prevailing winds.
- c) Obtain some top and side mount Post insulators for replacement on the existing double circuit 69 kV line to Cassada Gardens.
- d) Until an adequate substation is installed at Crabbs Peninsula - operate the lines with a split bus so that each generator transformer provides service to different sections of the 69 kV system.

7.3 DISTRIBUTION

Probably the most important point is the use of a multi-grounded Y on the 11 kV side of the substations. With the use of Y - Y transformations at the 69 kV subs, one should take advantage of the grounded Y system. This means that on all new line departures from the substations the neutral should be used as in a C1 assembly. The following advantages would be realized:

- 1) Fuse coordination would be easier to develop.
- 2) Under fault conditions, transient voltages would be less severe.
- 3) Lightning arrestors could be selected with a lower sparkover value.
- 4) Only single cutouts and arrestors would be required.
- 5) Existing 6.6 kV transformers could be utilized on phase to ground voltage.

In the case of the Mill Reef area, single phase URD cable and transformers were installed and a theoretical ground was established by only a driven ground. This is essentially the same as the Australian SWER system, known as Single Wire Earth Return, and across an open neutral or ground lead full phase to gnd potential can develop. It can become a very lethal voltage across a neutral or the case of an URD transformer, developing a dangerous potential to ground. Therefore it is recommended that the neutral be extended to Mill Reef and tied to the neutral of the URD system.

It is recommended that REA Bulletin 50-3, Specifications for Drawings for 12.5/7.2 kV Line Construction continue to be used for assemblies.

The maximum horizontal span for double circuit 3 phase construction should be kept to 150-175ft spans. For standard 3 phase assemblies such as C1, C2, C3, etc. the normal span length should be limited to 150-225ft for the extreme windloading conditions of the Caribbean.

In observing the slack anchor lines and the leaning poles it is evident that the guys are moving. This could be because of improper installation, disintegration of the coral rock, or deterioration of the expandable anchor itself. No expanding anchor tools, such as a "Molly-Buster" were seen and therefore the anchor might not have been fully expanded during installation. Also an anchor auger was not observed, so it was assumed that the hole dug for the anchor was with a regular pole hole auger. This creates too large a hole and if not compacted would allow the anchor to move.

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7.3 DISTRIBUTION - CONTINUED

In addition, the deterioration of the coral rock could also cause the anchor to move. In Miami, FP & L uses a concrete cone in coral covered by concrete and this method for handling coral is also used in Barbados. Possibly the anchor is disintegrating due to natural rusting or cathodic current in the guy leads. This problem should be investigated and steps taken to correct the problem.

Management and Supervisors are very aware of the need to implement an Inspection and Maintenance Program for the distribution lines. (See REA Bulletin 161-3) The problem of initiating such a program becomes an exercise in finding the time, available equipment, and manpower. With the construction of the Nelson Dockyard line, the energization of the new 69 kV subs and associated terminal structures, and normal construction it becomes a matter of priority. A program of Line Inspection and Maintenance must be instituted, however it will have to fit into the priority of APUA's overall goals.

Once the 69 kV subs are energized and feeder data such as kWh, kW, and kVAR becomes available, a program for the installation of capacitors on APUA system should be started. This would not only reduce system losses and aid voltage drop, but would have a short payback period.

Electric meters are the cash register of APUA's system. A complete metering program needs to be adopted from the record keeping and testing of the new meters to the actual change out of obsolete and periodic testing of all existing meters. A supervisor needs to be directly responsible for the program and employees. A computer program in dBASE might be set up to aid in the task of record keeping. Probably this program of upgrading all metering would have the largest payback of any program that might be adopted.

The methods used for connecting and sleeving conductors are unacceptable! The use of parallel groove clamps to splice primary and secondary lines and wrap the strands in the form of a "Western Union Splice" in lieu of a tension sleeve is not acceptable. Thru the years it has become an accepted fact that there is only one way to connect aluminum conductors and that is to compress them. A program should be adopted to equip each service unit and construction crew with a mechanical compression tool and appropriate compression connectors to cover the range of conductors used. (See Appendix B, Exhibit B-4)

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7.3 DISTRIBUTION - CONTINUED

Transformers are being purchased with taps so that difficult voltage conditions can be aided with tap changes. However, with the addition of the new 69 kV substations with Load Tap Changing equipment there will be no problems of voltage control on the feeders. It would then be advisable to set all taps to neutral position and in the future purchase transformers without taps. Today in the United States most utilities do not purchase transformers with taps!

In staking of the distribution lines it is apparent that there is need for a surveyors transit to be used. Presently the alignments are being attempted with an ordinary level, which introduces significant error in alignment.

7.4 COMPUTER ACTIVITIES

A fast backup program should be acquired along with extra 1.4 megabyte diskettes for backing up the IBM 50 PC at APUA's Hq. A regular schedule of backup should be adopted for all programs and data including individual PC computers.

There is a need for a computer in the dispatcher's office that will have the account numbers used by APUA's billing system for location purposes. In addition the computer could be initially used to log outage reports.

A database should be set up for meters and transformers as provided to APUA.

Consider using the teaching facilities of MicroCom for education in dBASE, Lotus, and Word Processing.

The software should be acquired for a database program such as dBASE III+.

The reference manuals, technical books and journals, and other information should be assembled at one location. Catalog appropriate material and add to the library by a purchase of books and magazine subscriptions each year.

7.6 FINAL

The Antigua Public Utilities Authority has all the components of a first rate electric system. However, it seems to lack the determination of pulling the system together and reaching this goal. APUA has a good mix of generation with both diesel and steam, a 69 kV transmission system, five 69/11kV substations with 60 MVA of capacity, an extensive distribution system providing a network that covers the island, and new operations center located at Cassada Gardens.

These are all plus items for any electric utility, but the level of initiative and dedication of many employees makes it difficult to move forward. The lack of concern for equipment, material, APUA's image to the public, the worthwhile goal of uninterrupted service, and a full days work for a fair days pay are all elements of many problems facing the utility.

Training programs such as CARILEC for Management to Lineman will aid in the education of employees. Additional hands-on training will be needed to instruct the line personnel of the approved safety methods to conduct their day to day work.

If Antigua is to become a tourist capital of the Caribbean, APUA will have to provide the quality of electric service the tourist expects. The hotel and resort operators need and depend on uninterrupted service.

USAID - NRECA
TECHNICAL SUPPORT PROJECT FOR
ANTIGUA PUBLIC UTILITIES AUTHORITY

APPENDIX A

NRECA-IPD TRANSMISSION/DISTRIBUTION PROJECT
ST JOHN'S, ANTIGUA, WEST INDIES, JUNE, 1989

E/18

Scope of Work

The Transmission and Distrution (T & D) Engineer will advise and assist the Electric Division Manager in the operation, maintenance, and construction activities of the Antigua Public Utilities Authority.

The T & D Engineer will be headquartered at Cassada Gardens Operation Center and work with assigned personnel. In addition from time to time the T & D Engineer will visit APUA Hqs and consult with other staff members of the Electric Division, General Manager, and Minister regarding matters of concern for APUA.

The following are specific areas of effort that are to be considered in the proposed work plan:

- 1) Staffing of the Engineering and Operation sections at the Cassada Gardens Operations Center.
- 2) Training of an engineer for distribution line staking and exit circuits for five new 69 kV substations, including the use of staking tables, guying requirements, staking sheet preparation, use of REA Spec Sheets, and approved material requirements.
- 3) Rework of existing 69 kV facilities at the Crabbs Peninsula switchyard to accomodate an additional 69kV tower line with associated switchgear.
- 4) Review the existing outage records and reports. Advise how they might be enhanced utilizing the current REA Bulletin as a reference and institute a data base software program.
- 5) Using the data contained in Enertech Consultants study dated June 1986, determine the optimum length of the revised feeders with five 69 kV substations.
- 6) Model the revised system feeders utilizing Voltage Drop techniques similar to those employed in the Enertech study.
- 7) Assist the Electric Division Manager in preparation of a new service request system, whereby the level of activity and backlog is readily available.
- 8) Aid in the training of personnel in the use of the personal computer and following software:
 - a) Spreadsheets and templates.
 - b) Word Processing and Desk Top Publishing.
 - c) Material estimating programs.
 - d) Project Management.
 - e) Monthly Operations Report
- 9) Suggest methods of computerizing the transformer and meter records maintained at the Operations center.

- 10) Train personnel in the design of primary and secondary circuits using REA design parameters with PC software. Instruct staff in the use of monitoring equipment provided.
- 11) Acquaint personnel to REA Bulletins, Uniform Standard of Materials, Engineering software, and other reference standards available.
- 12) Using spreadsheet software prepare a planning and budget template to aid in the preparation of an annual budget and in turn project revenue, expenses, kWh sales, and kW demand.

In addition be available for major system emergencies to observe problems first-hand and advise prompt restoration procedures. The overall approach demands a degree of flexibility to be able to respond to the day to day needs of the Electric Division Manager.

National Rural Electric Cooperative Association
International Program Division
1800 Massachusetts Ave, NW
Washington, DC 20036

8 April 1989

MEMO: Use of the Scott Directory Demo CD\SCOTT
TO: Antigua Public Utilities Personnel
FROM: Jack K Hicks, Consultant

The following comments should be taken into consideration when using the Scott Demonstration Package installed on the Engineering Computer at APUA Headquarters:

- 1) SCOTT is a family of computer programs for the engineering of the distribution primary system. DISTRIBUTION PRIMARY ANALYSIS AND GRAPHICS (DPA/G) is commonly referred to as DPA Programs.
- 2) The DPA/G programs are divided into three categories. The following is a list of the programs in each group:
 - a) Establishing the Database -- CRECON, EDTCON, CREATE, DATAIN, CHECK, BALMAP, PHSCHK, KHWIN, ALLOC, ALREA
 - B) Database Maintenance and Listing -- CHANGE, PRINTR, TLIST, SUBDEM, LSHIFT, IMPED, PRFILE, CONVRT, REPGEN
 - c) Analysis and Switching Studies -- BALVOL, BALREA, PHSVOL, PHSREA, CAPLOC, FAULT, SWITCH, PLTGEN
- 3) With the demonstration package installed, you should be able to model the feeders out of the Collins & Swetes Substation. If the R & X values are obtained, then the fault currents at each of the assigned Nodes will be available.

The so-called RAN files are a demo package, while the ANT files are actual values for the Antigua Public Utilities Authority of one or two substations. (Use Control Record 2) We would urge you to use this package to become familiar with the DPA/G family of programs.

If the program files become lost, remember the demo package has a set of original files on 5 1/4" Disks that can be converted to 3 1/2" to reinstall on the main computer. However, there are no programs to allow you to CREATE the so-called ANT files or allocate feeder demand.

E/21

National Rural Electric Cooperative Association
International Program Division
1800 Massachusetts Ave, NW
Washington, DC 20036

8 April 1989

MEMO: Use of the Basic Voltage Drop Programs
TO: Antigua Public Utilities Personnel
FROM: Jack K Hicks, Consultant

The following comments should be taken into consideration when using the various Primary and Secondary Basic programs:

- 1) PRIDRP is a primary drop program that is modeled after REA Bulletin 45-1, which has been in use for over 30 years by REA Consultants. The basic impedance values, Ra & Xa are taken from the Westinghouse Distribution System Manual Pages 534 of the Appendix. The values of Ra & Xa are for 25 Degrees C (Small Currents).

The Voltage Drop Factors are also described in REA Bulletin 45-1 and a Lotus Template has been created that allows various inputs of Primary Voltages and Power Factors. (See Lotus Template - VDFACTORS)

The voltage values will be slightly less than those derived from the GEPVD Basic program or Scott family of programs. The reason is that those values for Ra & Xa were for 50 Degrees C (75% Capacity) used in GEPVD & Scott give an additional value of voltage drop. The matter of judgement must be used to determine the % of loading and load factor of the feeder.

- 2) GEPVD is a simple basic program for figuring concentrated loads in a single section format. The impedance values were also obtained from the Westinghouse Distribution System Manual and equivalent spacing similar to REA lines. The program has been revised to take into consideration the Conductors used in Antigua and the equivalent spacing.
- 3) SECDRP is a sophisticated program to obtain an analysis of Secondary voltage problems, including 1ph & 3ph analysis of all conductors from the Transformer to and including the Building Wire.

You must remember that Basic Programs can be easily modified, however you should keep a backup of the originals in case the modifications cause an indicated error in the program. These programs can be used for quick answers for both PRIMARY and SECONDARY estimates or problems.

E/22

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National Rural Electric Cooperative Association
International Program Division
1800 Massachusetts Ave, NW
Washington, DC 20036

2 June 1989

MEMO: 69 kV Switchgear

TO: Peter Benjamin, Acting Manager Electric

FROM: Earl D Gardner and Jack R Hicks

During our visits with Mel Hill, Team Leader of Foster-Wheeler, he told us about a 66 kV substation that was dismantled and placed in containers adjacent to a power station in Bahrain. This sub had approximately 16 - AEG 66 kV (110 kV) SF6 Switchgear with the associated steel, bus, insulation and accessories.

Mel indicated that it might be possible to obtain the material for the cost of shipping. He contacted Bahrain and found it was still sitting in containers in the switchyard. The following is the address that one might write to:

Abdulla Juma, Director of Electricity
Ministry of Public Works, Power & Water
PO Box 2
Manama, Bahrain
Arabian Gulf

The unit could be installed at Crabbs Peninsul and surplus breakers used on the 69 ring bus.

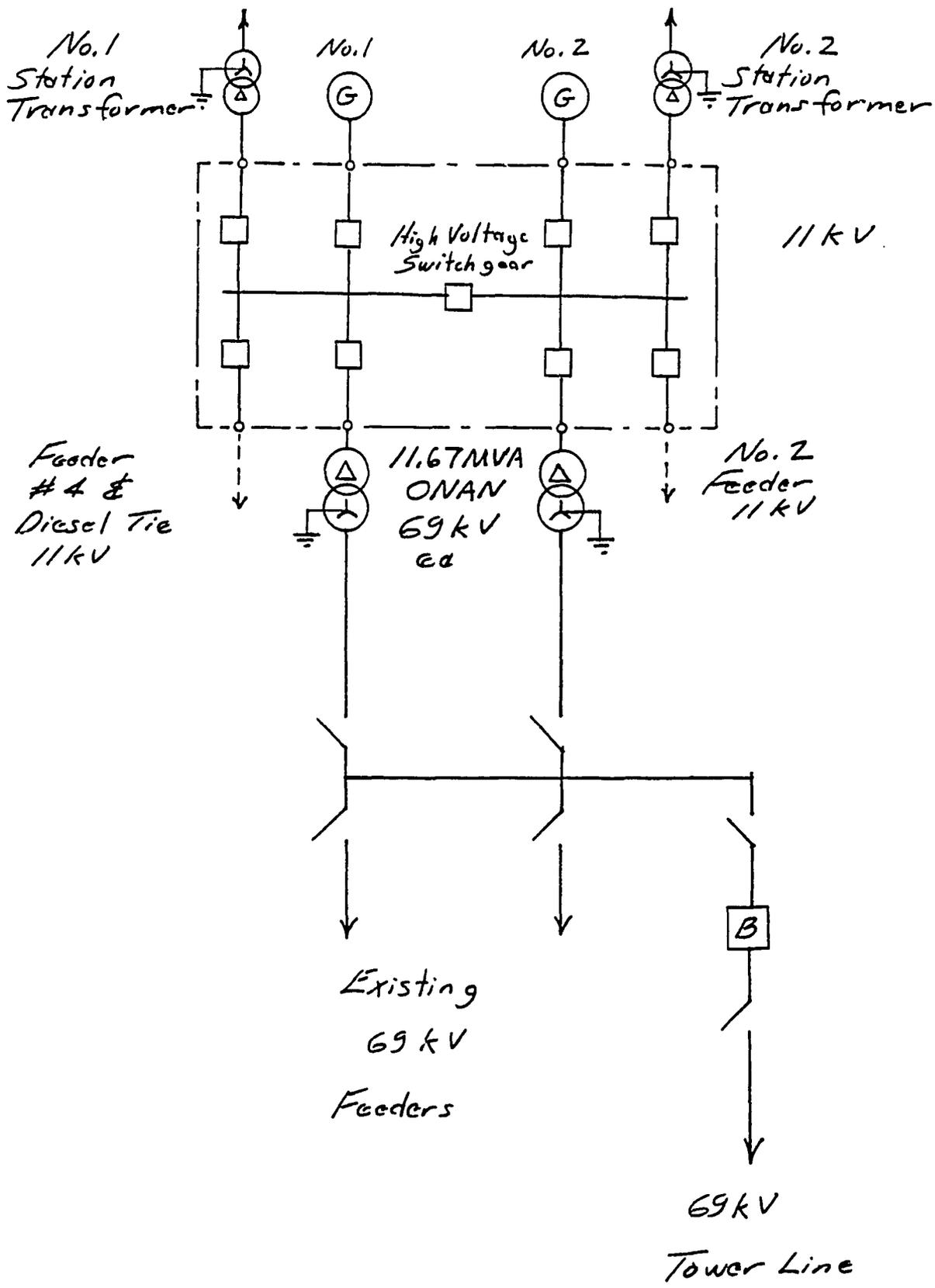
We would encourage an engineering study be completed for the installation of the substation and a contractor used to build the substation. With adequate breakers available consider installing 5 - SF6 units at Crabbs, 3 outgoing and 2 on the underground to TANGO.

E/23

USAID - NRECA
TECHNICAL SUPPORT PROJECT FOR
ANTIGUA PUBLIC UTILITIES AUTHORITY

APPENDIX B

NRECA-IPD TRANSMISSION/DISTRIBUTION PROJECT
ST JOHN'S, ANTIGUA, WEST INDIES, JUNE, 1989



42 SHEETS 3 SQUARE
42 SHEETS 3 SQUARE
42 SHEETS 3 SQUARE
42 SHEETS 3 SQUARE
NATIONAL

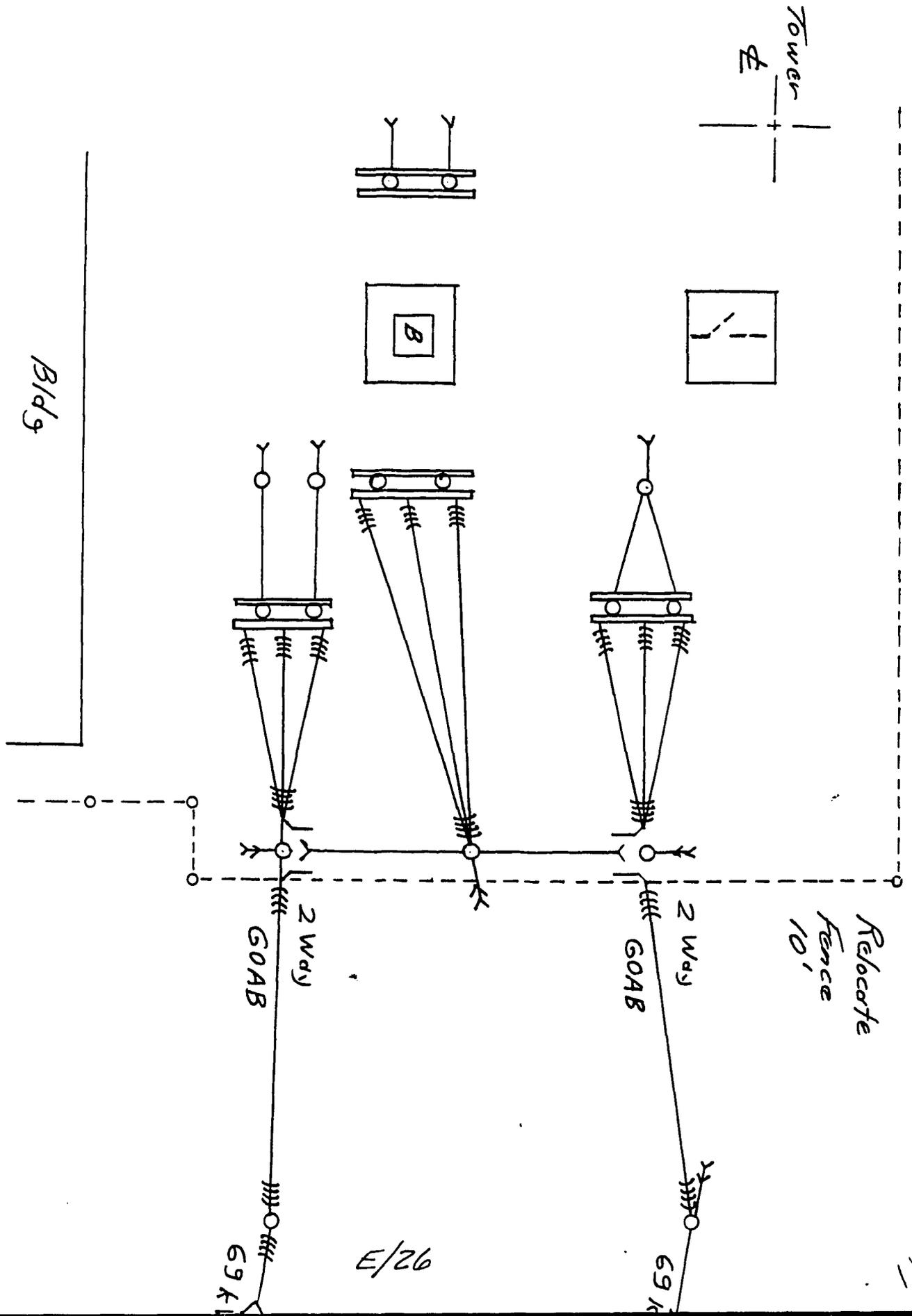
E/25

Final
Scale 1" = 20'

Crabbs
Peninsula

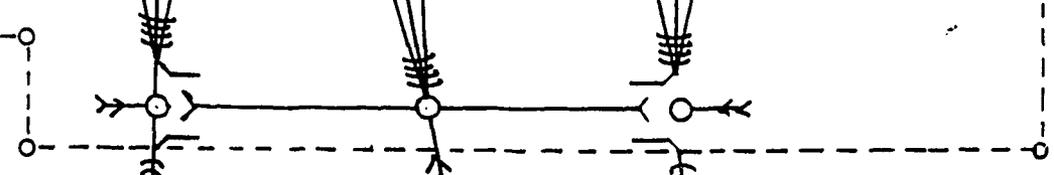
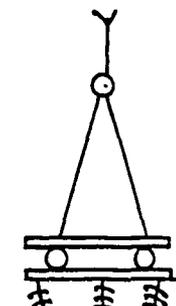
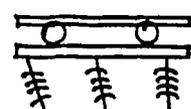
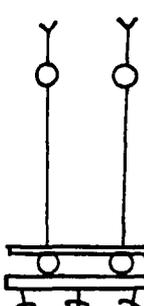
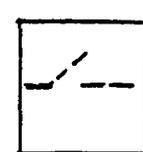
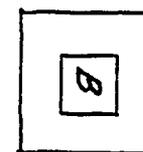
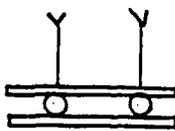
Hicks, Jack
21 Dec 88

30 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 100 SHEETS 5 SQUARE
18E 41
NATIONAL
ELECTRICAL CONTRACTORS ASSOCIATION



Bldg

Tower
7



GOAB
2 Way

GOAB
2 Way

Relocate
Fence
10'

69 K

E/26

69 K

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BUDGET1

GENERATED POWER		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	PROJECTED 1989
kWh	Jan	3,912,810	4,248,500	4,484,590	5,084,090	5,274,410	5,539,220	6,170,510	7,099,090	7,483,290	8,741,000	9,477,569
	Feb	2,670,910	4,031,950	4,136,780	4,697,420	4,810,820	5,333,970	5,680,140	6,311,990	6,696,260	8,056,000	8,678,216
	Mar	3,889,210	4,384,000	4,813,730	5,039,760	5,631,600	5,728,950	6,279,940	7,075,330	7,422,670	8,556,060	9,485,642
	Apr	3,550,640	4,312,000	4,435,610	4,489,470	5,266,440	5,555,370	6,128,850	7,082,975	6,353,210	8,453,150	9,082,713
	May	2,940,310	4,526,180	4,713,540	5,042,680	5,442,890	5,806,800	6,455,320	7,274,675	7,039,890	8,954,170	9,612,225
	Jun	3,516,085	4,360,820	4,485,480	4,761,230	5,338,460	5,288,010	6,323,010	7,018,840	7,396,610	8,783,380	9,417,170
	Jul	4,349,890	4,565,370	4,823,060	5,056,830	5,742,860	5,746,840	6,754,830	7,520,260	7,820,420	8,781,000	9,907,780
	Aug	4,409,620	4,649,260	4,918,900	5,239,640	5,769,360	5,912,490	6,903,020	7,597,660	8,214,520	8,231,540	9,971,593
	Sep	3,609,580	4,438,630	4,617,830	4,750,890	5,371,720	5,631,410	6,267,220	7,138,480	7,906,590	8,252,310	9,521,639
	Oct	4,029,550	4,433,370	4,734,720	4,964,990	5,620,200	6,095,540	6,563,310	7,709,780	7,108,680	8,966,160	9,859,117
	Nov	3,846,940	4,390,490	4,961,010	4,740,460	5,584,930	5,266,900	6,408,190	7,083,920	8,169,900	8,716,240	9,643,146
	Dec	4,141,950	4,327,010	5,080,970	5,113,320	5,666,860	6,194,330	6,611,020	7,523,870	8,972,680	8,930,910	10,343,190
	Total	44,867,495	52,667,580	56,206,220	58,980,780	65,520,550	68,099,830	76,545,360	86,436,870	90,584,720	103,421,920	115,000,000
PEAK DEMAND kW	Jan	7,490	8,100	8,975	9,775	10,640	11,100	11,740	13,010	14,165	15,940	16,276
	Feb	6,705	8,075	9,025	10,140	10,475	10,965	11,930	12,820	14,205	15,940	16,253
	Mar	7,200	8,225	9,660	9,725	10,300	10,833	11,900	12,905	14,080	15,170	16,013
	Apr	7,200	8,345	8,660	9,930	10,070	11,220	11,740	12,999	14,030	16,530	16,415
	May	7,200	8,125	8,975	9,670	10,140	11,715	11,260	13,710	13,170	15,860	16,217
	Jun	7,205	8,090	8,400	9,165	10,180	10,520	12,550	13,080	14,260	16,050	16,401
	Jul	7,870	8,810	8,895	9,640	10,650	10,450	13,240	13,530	14,240	15,970	16,640
	Aug	7,625	9,640	8,820	10,050	10,280	10,600	12,950	13,950	15,370	15,350	16,835
	Sep	7,185	8,530	8,900	8,975	9,900	10,650	12,040	13,330	14,880	16,320	16,588
	Oct	7,575	8,570	9,595	9,240	10,375	10,960	12,060	13,680	16,150	15,820	16,946
	Nov	8,000	8,570	9,620	9,410	10,600	11,190	12,175	13,950	16,400	16,600	17,352
	Dec	8,150	9,030	10,040	9,975	10,815	11,710	13,350	14,680	17,450	16,010	18,064
	Total	89,405	102,110	109,565	115,695	124,425	131,913	146,935	161,644	178,400	191,560	200,000
AVERAGE DEMAND	7,450	8,509	9,130	9,641	10,369	10,993	12,245	13,470	14,867	15,963	200,000	
PEAK DEMAND IN kW	8,150	9,640	10,040	10,140	10,815	11,715	13,350	14,680	17,450	16,600	18,064	
ANNUAL LOAD FACTOR %	62.84%	62.37%	63.91%	66.40%	69.16%	66.36%	65.45%	67.22%	59.26%	71.12%	72.67%	

National Rural Electric Cooperative Association
 International Program Division
 1800 Massachusetts Ave, NW
 Washington, DC 20036

1 June 1989

MEMO: Use of Compression Fittings

TO: Peter Benjamin, Acting Manager Electric

FROM: Jack K Hicks, Consultant

A program should be adopted to provide the crews of APUA with a mechanical compression tool and a complete supply of compression connectors to properly install connections on the system.

The following are recommendations to adopt the program:

- 1) Tools - Burndy MD6-8, HYTOOL Hand operated - Cost of approximately \$250 US per tool. Tools needed - 12.
- 2) One extra die set (W-BG) for each unit.
- 3) Use the YHO & YHD 7 Connector Program to cover #6 solid thru 3/0-4/0 ACSR - 7 connectors are YHO-100,150 YHD-200,250,300,350,400. (See Attached Connector Selector Guide)
- 4) For duplex, triplex, or bare aluminum secondary - use the following reduced tension splices:

YSS6RG2 - 6 ACSR - 900LBS
 YSS4R - 4 " - 1000 LBS
 YSS2R - 2 " - 1600 LBS
 YDS25AT - 1/0(7) - 2000 LBS

- 5) For additional service drop connectors - INSULINK

ES4W6W - 6 ACSR - 8 STR
 ES2W4W - 4 " - 6 STR
 ES2W2W - 4 " - 4 STR
 ES2R4W - 2 " - 6 STR
 ES2R2W - 2 " - 4 STR
 ES25R2R - 1/0 " - 2 STR
 ES25R25R - 1/0 " - 1/0 STR

- 6) Full Tension Sleeves - Use your Burndy Hydraulic tool - purchase splices such as YDS-RL - the mechanical tool MD6-8 will splice up to 1/0 ACSR with seperate dies. However, the MD6-8 will splice up to 4/0 all aluminum compressed & compact conductors.

E/29

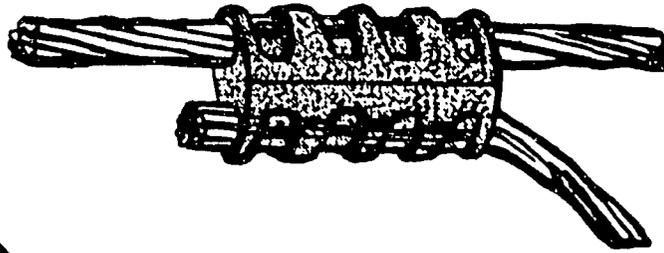
122

Recommend that APUA first go into a secondary and primary compression program using Burndy's 7 Connector Program and use the reduced tension sleeves for duplex, triplex, and quad. Later using the full tension sleeves with MD6-8 by additional die inserts, but again in the immediate future purchase full tension sleeves as recommended using the Hydraulic tool at hand.

E/30

123

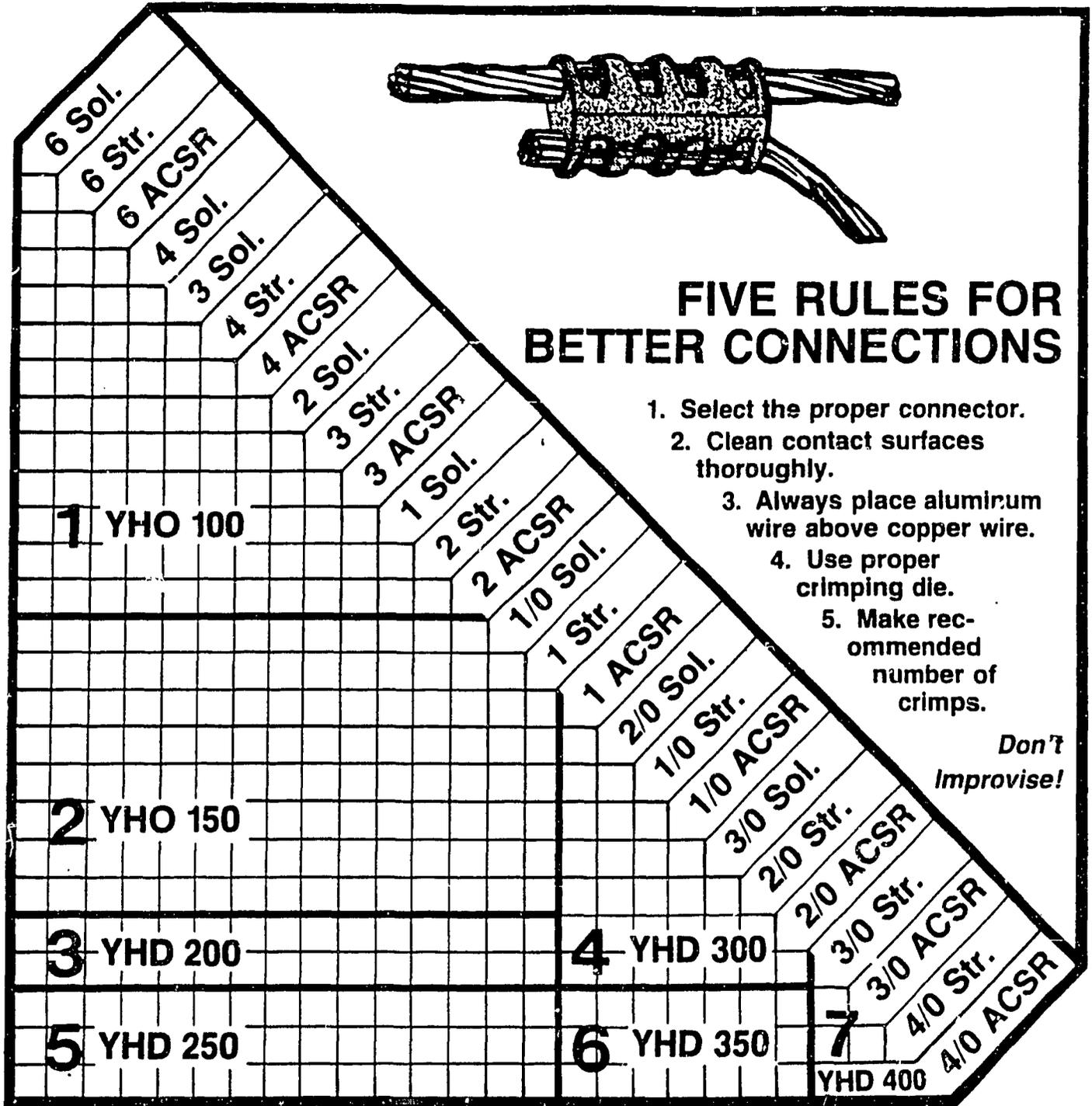
SEVEN CONNECTOR SELECTOR CHART



FIVE RULES FOR BETTER CONNECTIONS

1. Select the proper connector.
2. Clean contact surfaces thoroughly.
3. Always place aluminum wire above copper wire.
4. Use proper crimping die.
5. Make recommended number of crimps.

*Don't
Improvise!*



THREE SIMPLE SELECTION STEPS

1. Follow down from the smaller wire.
2. Across from the larger wire.
3. Intersection is in the area of the proper connector.

Examples:

- A. For #2 ACSR to # 1/0 Str. select No. 2 connector.
- B. For #1 Str. to #1 Str. select No. 2 connector.

**For Compression
Tap Connectors
Burndy "HYCRIMP"**

E/31

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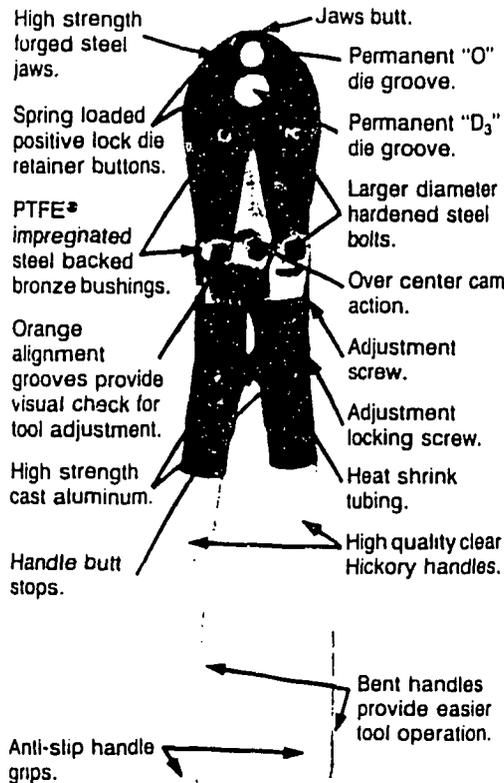
TYPE MD6-8 HYTOOL Hand-Operated Tool

Installs full range of connectors (Taps, Splices, Terminals): #14 through 4/0.

Applications: Full Tension and Non-Tension

The MD6-8 has a five (5) year warranty and is designed to provide over 90,000 reliable crimps installing full tension and non-tension connectors.

The MD6-8 installs almost all of the line, pole and house connections in the Burndy Compression Connector Program with only one (1) extra die set (W-BG). The tool has two (2) permanent die grooves, "O" and "D₃", for distribution tap connectors. The "D₃" groove also serves as a seat for die inserts to install additional splices, taps and terminal connectors. The die inserts snap into the D₃ groove easily with one hand and lock securely in the tool with the spring loaded positive lock die retainer buttons.



Specifications:

- Crimp force : 9,000 lbs.
- Weight : 6 lbs.
- Length : 25½ in.

To Check Tool Adjustment:

Simply close the tool handles until the jaws initially butt. When the orange alignment grooves are in line, the tool is in correct adjustment.



Visual adjustment alignment grooves.

MD6 Tool Specifications:

MD6 Standard MD6 with permanent "BG" (5/8") and "D₃" grooves. Installs Cablelok Crimpit and HYCRIMP Tap Connectors with one additional die insert (W-O). All other tool features and connector ranges are the same as the MD6-8 described above.

MD6-4 Standard MD6 jaws with permanent "BG" (5/8") and "D₃" grooves and straight fiberglass handles 19" long. Fiberglass rated at 100KV per foot for 5 minutes.

MD6-14 Standard MD6 jaws with permanent "BG" (5/8") and "D₃" grooves and straight fiberglass handles 19" long including bent aluminum grips. Fiberglass rated at 100KV per foot for 5 minutes.

MD6-12 Standard MD6-8 jaws with permanent "O" and "D₃" grooves and straight fiberglass handles 19" long. Fiberglass rated at 100KV per foot for 5 minutes.

MD6-6 "Snub-Nose" variation of MD6 has a permanent "D₃" groove in jaw. Recommended for use where space for tool jaw is limited. The "D₃" groove accommodates the complete line of type "W-" die inserts. All other tool features and connector ranges are the same as the MD6-8 described above.

Benefits:

- Proper crimps are assured with butting steel jaws.
- No additional dies required for "O" and "D₃" size tap connectors.
- Increased strength and greater bearing area is provided with larger steel bolts.
- Fast, easy, one-hand die insertion.
- No lost dies with spring loaded positive lock die retainer buttons.
- Easy visual field check for proper tool adjustment with orange alignment guide lines.
- Over 90,000 crimps provided with Teflon impregnated steel backed bronze bushings.
- Full crimp force assured with over center cam action.
- Easy tool adjustment with allen wrench screws.
- Operator protection provided with butt stops and heat shrink tubing.
- Long life expectancy provided with select clear hickory handles and light weight high strength alloy aluminum castings.
- Easier tool operation is provided with bent handles and anti-slip grips.
- The "D₃" groove accommodates the complete line of type "W-" die inserts.

Quality Unsurpassed!

Life cycle tested under full operating forces for over 90,000 cycles successfully without adjustment or any parts replacement.

For Use On:

- Copper, Aluminum, ACSR, Copperweld, Alumoweld, Steel, 6201, 5005. Compressed and compact conductors.
- Copper Taps: #10 sol. — 2/0 str.
- Aluminum, ACSR Taps: #14 sol. — 4/0 ACSR
- Stirrups: #6 ACSR — 4/0 ACSR
- Overhead Full Tension Deadends, Full Tension Splices, Non Tension splices, and Terminals Conductor Range: #10 str. — 4/0 ACSR
- Code conductor connectors: #6 — 4/0 str. Copper and Aluminum



Easy die insertion/removal.

E/32



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Exhibit F

JOINT SERVICE PROJECT REPORT

on

COMPUTERIZED ENGINEERING STUDIES

for

CARILEC ELECTRIC UTILITIES

(Complete copy of the original report appears
herein.)

**JOINT SERVICE PROJECT
REPORT**

ON

**COMPUTERIZED ENGINEERING
STUDIES**

**FOR
CARILEC ELECTRIC UTILITIES**

**BY
NATIONAL RURAL ELECTRIC
COOPERATIVE ASSOCIATION**

JUNE 1989

#11

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REPORT ON
COMPUTERIZED ENGINEERING STUDIES

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PART I - INTRODUCTION

Purpose and Scope

This report concerns an investigation of the proposal for Joint Service Agreements between the members of Caribbean Electric Utilities Corporation CARILEC and CARILEC itself. CARILEC proposes to act on behalf of its members to develop services that cannot economically be provided individually, but only as a group.

In addition, the on-site discussions with Management and Staff gave more insight as to requirements and shortcomings within the island utilities. The on-site visits allowed a cursory view of electric facilities, general plant such as headquarters, warehouse, computers, power plants, feeders, and transportation equipment.

The purpose of the study is to investigate the proposed Joint Service Projects of Joint Procurement of Materials, Protection Coordination, Distribution Primary Analysis (DPA), and Standardization of System Specifications. Many other ideas for additional Projects and Seminars were suggested by Managers and Staff throughout the islands and this report lists these suggestions.

The CARILEC utilities visited were:

- Anguilla Public Works Department
- Antigua Public Utilities Authority
- Barbados Light & Power Co., Ltd.
- British Virgin Island Electric Corporation
- Dominica Electricity Services, Ltd.
- Grenada Electricity Services, Ltd.
- Montserrat Electricity Services, Ltd.
- St. Lucia Electricity Services, Ltd.
- St. Vincent Electricity Services, Ltd.

The only utility within the Organization of Eastern Caribbean States not visited was St. Kitts Electricity Department.

In order to make recommendations it was necessary to determine commonness of materials, the existing use of Protection Coordination and Distribution Primary Analysis software by the utilities, and current Standards as to Line Specifications drawings. In view of the discussions with Management and Staff throughout the Islands, conclusions are drawn as to whether the proposed joint service projects are desirable on the basis of what is needed.

PART II - REVIEW OF VARIOUS PROPOSALS

Joint Procurement of Materials

The idea was advanced that the proposal be limited to six items (Poles, Conductors, Cables, Insulation, Transformers, Crossarms). These items probably represent 80 percent of the costs and only account for 2 to 3 percent of a utility's total inventory items. The recommendation was also made to see if any Soft Financing for Material is available from countries proposing to supply tender.

Protection Coordination

The concept of CARILEC purchasing software for a member utility and the utility aiding other utilities in Load Flow and Sectionalizing Studies was advanced. The overall coordination problem divides itself into two areas.

Supply Side Coordination

Substation Breakers
Power Plant Station Breakers

Load Side Coordination

Fuse Size Selection
OCB's if used (very few)

Available Software - OECS Utilities

Antigua & St. Vincent have CADPAW (Westinghouse)
St. Vincent has CAPTOR relay curve plotting software
Barbados - Load Flow Fortran Program on Mainframe
BVI - LF(Load Flow - Kennedy & Donkin)

The need for a Load-Flow program would be for those utilities with transmission facilities and those with multi-source plants which form a network. The load side coordination on the feeders could be solved with FAULT, a DPA program.

An Electrocom Demonstration Software Package was obtained and passed on to Roger Thorpe, Planning Engineer at Barbados Light & Power Co. for evaluation.

Distribution Analysis

A majority of the islands participated in Loss-Reduction Studies done by Enertech, CSI, and Kennedy & Donkin using Scott & Scott DPA funded by CARICOM in the mid 80's. The Feeder, Conductor, Section, and Node data was compiled and used for computation of the study. Today, this data could be used from the original studies to set up the FEEDER, SECTION, and NODE files to use in any DPA analysis program, taking into consideration the line revisions.

The following utilities are using some form of DPA:

Antigua - Scott Demo Package
Barbados - Scott DPA & Mapping Package
BVI - Electrocom DPAS
Montserrat - Reviewing Scott DPA
St. Lucia - Electrocom DPAS

The loss studies funded by CARICOM gave an understanding of the use of Distribution Primary Analysis Programs to the participating utilities.

CARILEC Engineers Section

Throughout the Islands in visiting with Electrical and Generation Engineers a constant request for an annual meeting of engineers to present papers, exchange of ideas, and invite outside reference speakers was brought forth. Also at a recent Seminar on System Losses held at Antigua this same theme of "Engineer Meetings" was emphasized.

Other Joint Effort Projects

While visiting with Management and Staff it became apparent that certain organizations had key employees with expertise in certain areas. Using this know-how a team of three or four individuals could be assigned a project to develop and report to CARILEC their progress and in turn their efforts would benefit all utilities in CARILEC. The following are some of the projects discussed:

Uniform Interruption Reporting
Lotus Template for Generation Plants
Standards

- 1) British & U.S.
- 2) List of Acceptable Material

Staking or Pegging Sheets

PART III - OTHER IDEAS ADVANCED

While interviewing the Managers, Staff, and Employees, comments and thoughts were brought forth by various individuals as to their ideas on joint service projects that would aid their individual island utilities.

Mapping

While reviewing the utility operations, not all, but the majority were lacking in good operational maps. Many comments on the need for assistance in mapping were echoed by the utilities in CARILEC. Therefore it only seems reasonable to develop a uniform program of Computer Aided Drafting that would be applicable for member utilities.

Employee Search

It was suggested that CARILEC might act as a clearing house for utilities looking for additional trained help. If a monthly newsletter was published, a section of help wanted or those looking for jobs could be included.

Available Contractors

CARILEC might keep a listing of contractors working for utilities within the Caribbean and adjacent islands.

Volunteer Programs

A volunteer program such as Retired Executive or Vista might be utilized to encourage trained utility personnel to work short-term assignments in the Caribbean.

Annual Statistical Survey

It was suggested that CARILEC institute an annual survey of key utility data, compile the information, and distribute the results to members' utilities.

Seminars

The following subjects were discussed as possible seminar presentations:

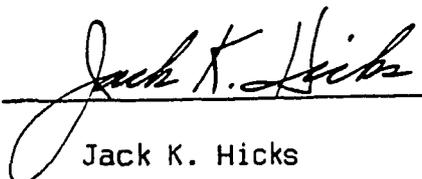
Programming in dBASE III+
Mechanical Design for Overhead Distribution Lines
Forecasting Techniques using a Personal Computer
Capacitors - Use and Placement
Pole Seminar - Timber Products Inspection, Inc. - TPI for WQC
Distribution Engineering & Analysis
Project Management

PART IV - SUMMARY AND CONCLUSIONS

1. Caribbean Electric Utilities (CARILEC) could undertake a Joint Service Project for the purchase of materials on a joint procurement basis. Initially the number of items should be limited to six items (Poles, Conductor, Crossarms, Cables, Insulation, and Transformers). (See Exhibit A-1)
2. CARILEC should sponsor a seminar for those that have software on Load-Flow Analysis. It would be preferable that an instructor familiar with CADPAW (Westinghouse) be obtained and the seminar be structured to teach both Load-Flow Theory and the use of CADPAW or another specific software package. If CARILEC were to purchase a Load-Flow program it would be our recommendation to acquire PC Power Flow Program from Electrocom International, Inc.
3. CARILEC may consider purchasing Scott & Scott DISTRIBUTION PRIMARY ANALYSIS (DPA), provided that a host utility would agree to provide service to other member utilities. (See Exhibit A-2)
4. CARILEC should initially sponsor a meeting of member utility engineer's for the formation of a CARILEC Engineer's Section. (See Exhibit A-3)
5. CARILEC should consider, at an appropriate time, purchasing the mapping package of Scott & Scott to add to its family of programs. (See Exhibit A-4)
6. A joint service project instituted for programming Interruption Reporting with dBASE III+ by a team of knowledgeable employees of CARILEC utilities would be useful. The end result would be a uniform method of determining interruption hours.

It is concluded that the proposed recommendations of Joint Projects will provide a substantial benefit and overall savings to the member utilities of CARILEC.

Respectfully Submitted
NRECA - Int'l Program Division

By 
Jack K. Hicks

APPENDIX

JOINT SERVICE PROJECT
REPORT

ON

COMPUTERIZED ENGINEERING
STUDIES

FOR
CARILEC ELECTRIC UTILITIES

BY
NATIONAL RURAL ELECTRIC
COOPERATIVE ASSOCIATION

JUNE 1989

F/9

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JOINT PROCUREMENT OF MATERIALS

CARILEC could act as an agent for its member utilities and institute a limited program to evaluate the results. To do this a procedure similar to the following could be employed.

1. Prepare a questionnaire for CARILEC members to respond asking the following questions:
 - a. A three-year purchase history if available for poles, crossarms, conductor, cable, insulation, and transformers, including:
 - (1) Poles - type of preservative (Creosote, Penta, & CCA) Drilling Specifications, and sizes/classes used.
 - (2) Crossarms material, - size and drilling specifications.
 - (3) Conductor - Code name/size/type.
 - (4) Cable - Specifications for Primary and Secondary - Underground/Overhead.
 - (5) Insulation - Insulator types, both Pin and Suspension, including specs.
 - (6) Transformers - Overhead and Pad-mounted - 1ph and 3ph - Primary/Secondary Voltage - taps.
 - b. Compile results of the questionnaire to assess possible levels of combined tendering.
2. Host a one day joint meeting of purchasing agents from each utility to propose the program, report levels of possible purchases, receive comments, and appoint a small working committee to aid CARILEC staff in launching the effort.
3. Prepare a short list of possible suppliers at meeting of purchasing agents.
4. Prepare and submit proposed tender to list of approved suppliers.
5. Consider hosting another one day meeting of purchasing agents to report results and decide course of further action.

COMMON MATERIALS USED BY CARILEC UTILITIES

A.B.Chance - Cutouts
 Burndy Compression tools
 Klein Lineman's tools & accessories
 Milbank Meter sockets
 Howard transformers
 Preformed products

A.B. Chance - Insulators
 Burndy Sleeves and connectors
 Sangamo Meters
 A.B. Chance - Fuses Type "K"
 Ray Chem Terminators

F/10

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DISTRIBUTION PRIMARY ANALYSIS

CARILEC should consider using its corporate identity to purchase initially a portion of the Scott DPA package of software programs. By CARILEC acting as an entity, after the initial purchase of a software package, additional packages of the same software can be purchased by CARILEC for the individual island utilities. The cost would be borne by the member utility and would be approximately 1/3 of the individual cost. This points out the savings which might be realized by joint service projects.

CARILEC could furnish the initial software package to a host utility, which in turn would use the programs for its own use and agree to provide service to other member utilities.

SCOTT is a family of computer programs for the engineering of the distribution primary system. DISTRIBUTION PRIMARY ANALYSIS AND GRAPHICS (DPA/G) is commonly referred to as DPA Programs.

In addition to the basic DPA program, Scott has a digitizing package, Computer mapping including electrical and geographic features, a mapping interface to DPA, and just recently has developed a protection coordination package. Scott DPA Programs have a wide distribution and acceptance in the states. The users vary from small municipals to large investor utilities, the World Bank, and Consulting Engineers. Puerto Rico, Jamaica, and Bahamas are utilities in the Caribbean that use the Scott family of programs.

It would be our recommendation to start with the DPA package, then move to the digitizing and mapping package. If satisfactory progress is made then a complete family of programs is recommended in conjunction with needs of the CARILEC members.

F/11

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CARILEC ENGINEERS GROUP

A CARILEC Engineering Group could be formed within the member utilities. The membership of this group would consist of engineers from the electrical and generation departments of the utilities within CARILEC. The goal of the group would be to provide an opportunity to present papers, discuss common problems, and have other technical presentations.

In the first year an organizational meeting could be held to adopt guidelines for the Engineering Group. A Chairman, a Vice-Chairman who acts as Program Chairman, and a Secretary-Treasurer be elected with the normal responsibilities associated with the offices. The term of office could be for one year with the normal ascension to higher office, while the only election in contest would be the Secretary-Treasurer.

It would seem reasonable to have one meeting per year and move the meeting each year to a different island. This way a tour could be included in the scope of the meeting to familiarize those in attendance with the characteristics of the host utility. The length of the meeting might be two days with travel on the day preceding start of the formal meeting and ending in time of the second day for return travel. This would normally necessitate two overnights for an annual engineer's meeting.

CARILEC would act as an oversight committee, backing up the new officers as they become familiar with the new Engineer's Group. CARILEC would maintain a membership list and provide secretarial functions for the new group.

F/12

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MAPPING

There is a need for utility mapping in nearly all of the islands throughout the Caribbean. Few utilities have full-time employees that are trained draftmen, therefore an opportunity exists for the use of Computer Aided Drafting equipment.

Scott & Scott have a mapping package that allows one to create not only the electrical facilities, but also geographic layers such as physical outlines, roads, and shorelines. This package uses AutoCad in conjunction with the interface to the DPA programs. The value of using a package that is part of a family of programs is the ability to interface with one another. This is especially important faced with the distances and problems of resolving difficulties with associated software.

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20 May 1989

Anguilla Public Works Department
Electricity Department
The Valley, Anguilla
(809)497-2651

PRINCIPALS

Crefton Niles, Engineer/Manager
Ken Banks, Chief Engineer Dept of Works
Cedric Ambrister, Generation Engineer
Gavin Richardson, Electrical Superintendent
Fabian Fahie, Permanent Secretary, Ministry of Public Works
Michael Lowry, Engineer Mierlees/Blackstone

GENERATION

3 - Mierlees/Blackstone, 1.0 MW each.
1 - Allen, 1.0 MW.
Total of 4.0 MW installed capacity.
Frequency is 60 Hertz

TRANSMISSION

None.

DISTRIBUTION

11 kV - Primary. Built within the last 10 years and Post Insulator construction on a basic 40 ft. pole.

SECONDARY OR LV

120/240 3 Wire, 120/208 Y or 277/480 Y.

CUSTOMERS

It is estimated to be 3000 consumers.

kWh & kW DEMANDS

1987 MWh

Domestic/Small	3,376.6
Large (over 1000 kWh/mo)	3,135.5
Unmetered Customers	2,382.8
Street Lighting	179.1

Sales	9,074.0
Losses & Own Use	1,179.1
Generation	10.253.1
	=====

December 1988 Peak kW - 2900

REPORTS

Presently the meter is read, bills prepared and money collected by the Treasury. As yet they are not preparing any annual report.

COMPUTERS

The Department of Works has no computers as yet. Hopefully next year's budget will provide a computer. Crefton Niles has his own and is considering bringing it to the office.

SOFTWARE

None.

ENGINEERING CONSULTANTS

Kennedy & Donkin UK with CDB Funding are to make a study for Long-Range Forecast, Organizational Structure, Accounting Methods, Rates, & Maintenance Program.

D.R. Spence, Guyana, in the past has helped them with Specs & Plans for installation of Generation and cost studies associated with these investments.

MAPPING

Essentially none. Switch & Fuse - Board. Would like help to create these maps.

MATERIALS

1/0 ACSR using Armor Rod & Post Insulators. Burndy Connectors, A.B. Chance Fuses, Westinghouse Cutouts, 3/8 Hy Strength Guy Wire, Klein Tools, Howard Transformers, GE Meters and Milbank Meter sockets.

SUPPLIERS AND VENDORS

PECO in Miami, Florida, and Arbooz International in Miami, FL.
Generation Spares, UK

REPAIR OF TRANSFORMERS, CIRCUIT BREAKERS, ETC.

In the past there were minor repairs, presently nothing.

CONSTRUCTION DRAWINGS

Nothing available, we have been unable to find drawings of present construction.

TECHNICAL LIBRARY

Nothing available, however has received information from fellow manager regarding what is available.

PROTECTION ENGINEERING

As yet have had no coordination problems on the two feeders they operate from the power station. Depend on line fusing for sectionalizing and gang operated switches for isolation.

OTHER JOINT SERVICE CANDIDATES

Crefton Niles suggested that CARILEC act as a clearing house for OECS members to report their personnel needs, and keep a roster of competent contractors in the Caribbean.

Discussed the following Engineering Seminar Candidates:

Forecasting using LOTUS data such as Trendsetter Expert
Programming Concepts using dBASE
Use of Capacitors and installation on Delta Systems.

1 May 1989

ANTIGUA PUBLIC UTILITIES AUTHORITY
PO Box 416, St Mary's Street
St John's, Antigua, WI
(809) 462-4990

PRINCIPALS

Hon. Robin Yearwood, Minister of Public Utilities
Mike Woodward, General Manager
Milton Rogers (former Gen. Mgr., now Consultant)
Peter Benjamin, Acting Electric Manager
'Robbie' Robinson, Operations Superintendent
'Richy' Richards, Technical Supervisor
Seymore Blackman, Mechanical Engineer
Stan Jones, Mechanical Engineer
Michael Ford, Public Relations
Earl D. Gardner, Electrical Engineer Trainee

GENERATION

Friars Hill (13MW Diesel), Cassada Mirr (2 MW Diesel), Cassada Cummings (4 MW Diesel), Crabbs Tango (18.2 MW Steam), Crabbs Diesel (6 MW Diesel), WIOC (5 MW Diesel) - Total System 48 MW at 5 plant sites. Frequency is 60 Hertz.

TRANSMISSION

69 kV extended bus (5.72 mi dbl crt) + New Tower Line (20 mi)

DISTRIBUTION

6.6 kV & 11 kV - Converting 6.6 kV to 11 kV.

SECONDARY OR LV

120/240 volts, 240 volts, 240/415 3ph - a number of Secondary Voltages. Not clearly defined by area.

CUSTOMERS

Estimated to be in excess of 19,000.

kWh & kW Demands

See Budget Attachment - 1988 (16 MW/103,421.9 MWh).

REPORTS

In Lotus Report 4 & Report '89 also 12 month rolling on Power Plants. Enertech Loss Reduction (1986).

COMPUTERS

IBM System 2 - Series 50 (Engineering), IBM System 2 - Series 30 (Personnel), IBM System 2 - Series 80 (Billing) & NCR PC/HD Operations.

SOFTWARE

Microsoft Word Perfect
dBASE III+
pfs:FIRST PUBLISHER

LOTUS
CADPAW

ENGINEERING CONSULTANTS

Last used Stanley Consultants in early 70's.

MAPPING

Tracing of Fuses & Feeders, no coordination with Bureau of Survey, Ministry of Agriculture working on a Project at 1/25000 down to 1/5000 & final overall Map to be 1/10000 for Country. Transparency is in terrible condition.

MATERIALS

Minimal amounts - mostly U.S. origin. No procedure for returning used items to stock, just junked!

SUPPLIERS AND VENDORS

PECO International Inc.
7983 NW 33rd Street
Miami, FL 33122

Poles (CCA-REA Specs)
Williams Inspected
Mobile, Alabama

REPAIR OF TRANSFORMERS, CIRCUIT BREAKERS, ETC.

They are piled around to be checked, but there is no qualified personnel. No new circuit breakers are being used, however there are some old ones at Arpt Power House.

CONSTRUCTION DRAWINGS

Nonexistent - started to introduce REA 50-3 & 50-6 (URD) - No Staking sheets, however presently using a Linn REC copy for major extensions.

TECHNICAL LIBRARY RESOURCES

APUA will provide a room, however I doubt if anyone will properly check technical books, Reports, etc. in or out! We have provided them six copies of the National Electric Code Handbook from our Software Package funds. They have very few reference manuals of their own.

PROTECTION ENGINEERING

APUA has a copy of CADPAW (Westinghouse) presently no one to run it! Also Hicks installed a Sample copy of Scott's DPA programs on their Engineering Computer. Since they only have three local engineers in the T/D Section they are rather limited as to the number that could learn or be trained to operate both of the programs.

OTHER JOINT SERVICE CANDIDATES

Meeting of OECS Engineers annually to present & discuss papers relating to subjects common to the Islands.

16 May 1989

BARBADOS LIGHT & POWER COMPANY LIMITED
Bridgetown, Barbados
(809) 436-1800

PRINCIPALS

Frank McConney - Managing Director
A.A. Gittens - Engineering Manager
C.D. deCaires - Financial Controller
R.H. Edwards - Chief Generation Engineer
C.L. Franklin - Chief Distribution Engineer
C.W. Harrison - Secretary
N.W. Thomson - Chief Planning Engineer
W.A. Watkins - Manager Information Systems
S.T. Worme - Customer Service Manager

GENERATION

Two generation sites are Garrison and Spring Gardens.

Installed capacity - Steam	40.0 MW
- Gas Turbine	17.5 MW
- Diesel	74.8 MW

	132.3 MW

TRANSMISSION

24 kV

SECONDARY OR LV

120/240 3 wire, 120/208 Y - 50 cycle

CUSTOMERS

Number of Customers - Domestic	72,708
- Commercial	8,109
- Other	495

Total	81,312

Above data from 1988 Annual Report

kWh & kW DEMANDS

Sales in GWh's	- Domestic	127.1
	- Commercial	278.1
	- Other	5.9

Total		411.1

Peak Demand - 76.1 MW

REPORTS

Received a copy of the 1988 Annual Report & January 1989 Power People, an employee's Magazine.

COMPUTERS

Mainframe computer being changed from an English unit to Digital Equipment. A number of PC's throughout the engineering section including a Hewlett-Packard for AutoCad or Scott's drawing and digitizing package. A Wyse 286 for Scott DPA and noticed an IBM Series 80 in the Engineering Distribution Section.

SOFTWARE

Lotus	Symphony
dBASE III	Load Flow - Fortran
Scott DPA	

ENGINEERING CONSULTANTS

CDI Power Services & Stone & Webster.

MAPPING

Barbados Power & Light employed a number of draftsmen who are being trained to use AutoCad and are mapping their electric system for Scott DPA files.

MATERIALS

Toured two warehouse facilities - found ALC Conductors for HV and Copper for service drops. They use Burndy compression connectors. They use Penta treated poles (own drilling specs), Westinghouse arrestors, American electric street lights, and Howard transformers. They stock wraplock ties up to 795 mcm, and use preformed deadends and compression line baskets.

SUPPLIERS AND VENDORS

Poles from US. Conductor from Brazil. 11/24kV switchgear from UK. Pole line hardware, compression fittings, security lights, and many other items from U.S.

REPAIR OF TRANSFORMERS, CIRCUIT BREAKERS, METERS, ETC.

BL&P has a complete shop for transformer repair, but does not replace core and coil. It has a number of replacement tanks to replace corrosion problems, and a test shop for meters.

CONSTRUCTION DRAWINGS

BL&P has a complete book of standards & construction drawings.

TECHNICAL LIBRARY

BL&P needs to review the facilities!!!!

PROTECTION ENGINEERING

BL&P is using a Fortran Program on the English Mainframe. As the DEC is now being installed, they will be required to either go mainframe or PC for load-flow studies. They have reviewed Roger Thorpe's work as the person who does the load-flow studies, and they are getting satisfied with their results. Roger is competent in load-flow work and additionally they have a good-sized system to use as a base. They will be moving to a different load-flow program and hopefully this could be coordinated with CARILEC future plans.

OTHER JOINT SERVICE PROJECTS

There appears to be a need for a database program seminar as many want to use its capabilities.

6 June 1989

BRITISH VIRGIN ISLANDS
ELECTRICITY CORPORATION
PO Box 268, Roadtown
Tortola, British Virgin Islands
(809) 494-3911

PRINCIPALS

Mr. Ronnie Skelton, General Manager
Marva Thompson, Chief Accountant
Pearl Smith, Corporate Secretary
S. Rajmangal, Generation Engineer
Lowell Fahie, Planning Engineer
Lenford Allen, Superintendent Distribution

GENERATION

Installed capacity of 13.4 MW - Consists of 9 various engines.
Frequency in 60 Hertz.

TRANSMISSION

Installing a 34.5kV link between a new power plant called Pockwood
Pond & Roadtown - Underground - 2 circuits 5 plus miles long.

DISTRIBUTION

13.2 kV - 142mi, URD 41mi, 16.5mi Submarine cable.

SECONDARY OF LV

120/208v or 120/240. 135 mi of LV.

CUSTOMERS

6,061

kWh & kW DEMANDS

37,804,000 kWh Maximum demand 7330 kW - 1988 figures.

REPORTS

They prepare an annual report each year. (Didn't secure a copy)

COMPUTERS

IBM-36 with 2 PC's that have emulation boards. 36 programmed by GSI of Canada. The General Accounting package being used is a Prentice Hall on the 36. In addition a number of PC's were seen, at various departments 4-XT's and 2-AT's.

SOFTWARE

LOTUS	WORDSTAR
DBASE III+	ELECTROCOM - DPAS
LOAD FLOW - KENNEDY & DONKIN	

MAPPING

Very lacking in maps, essentially all they have is the one-line diagrams that are in the Kennedy & Donkin's engineering studies and reports.

MATERIALS

Chance hoists, Chance Fuse Links Type 'K', Chance Cutouts. RTE Load Break Elbows, RayChem Terminations & Splices. BICCON Compression (Burndy) England & Panduct, one & two hole compression ends. Preformed - Armor Rod, Deadends for Guy Wire and Conductor. Surge Arrestors - Bowthorpe of England. Klein Belts, Glove Bags, + Bashin. Fusetron Fuses & English Fuse Links. GE Mercury Vapor Lights - 175w. 5/8 & 3/4 inch bolts, mostly hex heads.

SUPPLIERS AND VENDORS

PECO & PHILRAY - Commonwealth Chemical all in Miami, 6-8 wks delivery. Lindex, Ltd., Taylor Trading, and Tradewind in England, 6 months delivery.

CONSTRUCTION DRAWINGS

No construction specs.

REPAIR OF TRANSFORMERS, CIRCUIT BREAKERS, ETC.

Minor repairs with no offshore shipment of transformers.

TECHNICAL LIBRARY RESOURCES

The library has a limited number of material, but is building an addition to house distribution section.

ANY OTHER JOINT SERVICE COMMENTS

Consideration of also starting a Generation Engineers or Managers group. Was informed that Barbados hosted a conference in 87, but nobody has taken the initiative to keep it moving.

MISCELLANEOUS COMMENTS

Ronnie Skelton: "When I attend a seminar, I hope to take home some useful "hands on" material and manuals. Just to attend a seminar to be entertained and take nothing back is a waste of my time."

7 May 1989

DOMINICA ELECTRICITY SERVICES, LTD.
18 Castle Street, PO Box 13
Roseau, Dominica, WI
(809)448-2681

PRINCIPALS

Hindpal S. Jabbal, General Manager
Rawlins Bruney, Engineering Manager
R. Peters, Financial Controller
T. B. Dorsett, Commercial Manager
Mr. Hamlet, Generation Manager
Wheam Dorsett, Distribution Manager
Allen Toussaint, Hydro Supt

GENERATION

Roseau. Presently approximately 4000 kW in 4 units and are installing a 1.9 MW Cat 750 rpm 6 cylinder in-line unit that is expected to be commissioned in the near future. At the north island diesel plant near the international airport, 3 Cat units with a total capacity of 1.8 MW. Hydro at Padu consists of 2 units rated at 940 kW each and at Trafalgar, 3-340 kW Gilkes Units. Proposing to install 2 additional Hydre stations of 2-740 kW units each. Frequency is 50 Hertz.

TRANSMISSION

None

DISTRIBUTION

11 kV Overhead and some URD just to feed Pad Mounted X'formers or Generator output lines.

SECONDARY OR LV

230/400 3ph and some 1 ph 230 volts.

CUSTOMERS

16,501 at year end 1988.

kWh & kW DEMANDS

See Annual Report and 88 Attachment - 1988 (6 MW/24,588 MWh)

REPORTS

Received a copy of 1987 Annual Reports & 1988 Key Figures.

COMPUTERS

Main frame computer is a IBM 34 with 8 terminals, (34 programming by CDI of Canada), IBM-AT 20 Mb HD. 4-Leading Edge 2-floppy drive units.

SOFTWARE

Multimate - WP	dBASE III+
Lotus	Harvard Project Mgr.
Word Perfect Ver 5	Emulator Bd in AT

ENGINEERING CONSULTANTS

Retained C.A. Speed Powers, Canada - World Bank Request for 2 man/months/yr thru 92-93 (66% Engineering - 33% Management).

MAPPING

Mapping is inadequate. Recommended using AutoCad and not train draftsmen on pen and ink. Mr. Jabbal indicates Computer Mapping a priority. Bruney also was concerned about their lack of maps!

MATERIALS

Warehouse - U.S. Poles - Penta Treated - 3/4" bolts, US Insulators PP, Klein Tools, Belts, Lineman's Bag, Straps, & Climbers. Chance cutouts, Preformed anchor makeups, Burndy connectors (from UK), and RayChem URD Terminators.

SUPPLIERS AND VENDORS

UK	PECO International, Inc
Poles from NY Distributor	7983 NW 33rd Street
Inspection by Williams	Miami, FL 33122

Mr. Jabbal recommended going after "Soft Financing for Material" and limiting the Tender to 6 items (Poles, Conductors, Cable, Insulators, Transformers, & Generators). He feels that these items represent 80% of the costs and only account for 2 to 3% of total items.

REPAIR OF TRANSFORMERS, CIRCUIT BREAKERS, ETC.

Minor repair of transformers. They have a McGraw-Edison Electronic Recloser, are installing a voltage regulator, and have a few capacitors on line.

CONSTRUCTION DRAWINGS

Not many, but with new USAID construction built by EBASCO on east side of Island, they seem to be trending toward REA type standards.

TECHNICAL LIBRARY RESOURCES

The Library owns a fair amount of data and more than seen on most utilities with lots of U.S. books and catalogs. Example of The Lineman's Handbook quite a few REA Bulletins including "Substation Design and Mechanical Design." A good amount of catalogs.

PROTECTION ENGINEERING

They lost a planning engineer to Cable & Wireless that was very astute in computer work and relay settings, etc. The Distribution Engineer has done a good job of automating his work on the computer and has spent some time on a training program at Durango, Colorado. They are not familiar with the Scott DPA programs, however they did have a loss study by the CARICOM project in 1984. They feel they have the ability to do some of the protection engineering or voltage drop analysis, but are not too heavily endowed with available engineers.

OTHER JOINT SERVICE CANDIDATES

They try to decentralize the projects as much as possible (Jabbal). From visiting with Hamlet, Power Plant Engineer, a Lotus spreadsheet to help prepare monthly operating reports and keep track of engineer run hours would be helpful. There is the possibility of CARILEC preparing a Statistics Sheet on the Carribean Electric Utilities like REA's 1-1.

22 June 1989

Grenada Electricity Services. Ltd
St. Georges, Grenada
West Indies
(809) 440-2097

PRINCIPLES

Gregory Bowen, General Manager
George Radix, Electrical Engineer
Bruce Bain, Generation Engineer
Kenneth James, Accountant
Godric Pursoo, Training Officer
Clive Hosten, Engineer Trainee

GENERATION

Queens Park Power Plant - 13 MW Diesel Engines, 50 Hertz.

TRANSMISSION

None

DISTRIBUTION

11 kV

SECONDARY OR LV

230/400 volts 3ph - 230 volts single ph.

CUSTOMERS

16,000

kWH & kW DEMANDS

1989 estimates - 49,000 MWh & 8.3 MW.

REPORTS

We did not receive a copy of any annual report.

COMPUTERS

Mainframe is an IBM-36 using programing by GSI of Canada, the same as six other OECS islands. 2 IBM PC's - AT.

SOFTWARE

Microsoft Word Processing LOTUS
dBASE III+

ENGINEERING CONSULTANTS

Have used Kennedy & Donkin when required by Financing Source.

MAPPING

Very minimal - interest in using CAD - suggested AutoCad. Presently beginning to survey a feeder to record span lengths, angles, assemblies, etc. for plotting on 1/2500 maps. Should be able to digitize from these base maps.

MATERIALS

Line design is in accordance with BSR 1320, therefore most of materials are purchased from the UK.

SUPPLIERS AND VENDORS

PECO International Inc Poles (Penta - US)
7983 NW 33rd Street Phi Ray (Miami)
Miami, FL 33122 Lindex - UK

REPAIR OF TRANSFORMERS, CIRCUITS BREAKERS, ETC.

Minor repair of transformers only, no off shore repair.

CONSTRUCTION DRAWINGS

Utilitze BSR 1320.

TECHNICAL LIBRARY RESOURCES

The library owns very few books, however there is a number of catalogs, both foreign and U.S.

PROTECTION ENGINEERING

With only one power plant - little need for Load Flow. Fault and Voltage Drop calculations using HP Calculator on primary feeders.

OTHER JOINTS SERVICE CANDIDATES

None suggested.

MISCELLANEOUS COMMENTS

Would like CARILEC to provide help in developing a Mapping program using CAD techniques. In the area of Mainframe computers such as six utilities are presently using, there is a need to coordinate a joint effort to modify present programs with GSI, employ a new source of utility programs for IBM 34 & 36's, or jointly hire a programmer to modify existing programs, provide source code is property of those using programs.

7 May 1989

MONTERRAT ELECTRICITY SERVICES, LTD
PO Box 16, Plymouth
Montserrat, West Indies
(809)491-2441/2

PRINCIPALS

Hilton Howson, Managing Director
Lennox Browne, Chief Engineer
Theresa Silcott, Secy Account
Jack Ryan, Engineer Trainee

GENERATION

Power Station - 1, 6 MW, 5 units, all Ruston Diesels
Exceptionally clean plant. 50 Hertz.

TRANSMISSION

None.

DISTRIBUTION

11 kV - Built to British standards.

SECONDARY OR LV

230/400 3ph primary secondary voltage, however 230 1ph used.

CUSTOMERS

1987 Annual Report indicated 4,425 Total.

kWh & kW DEMANDS

1987 Annual Report (2.9 MW/15,529.2 MWh).

REPORTS

We received a copy of 1987 Annual Report.

COMPUTERS

Secretary Office: IBM-AT; General Office: IBM-PC (2 floppys) and IBM Model 36, about 6 terminals, 36 programming by GSI (Canada), and Engineering computer in basement: AST-AT.

SOFTWARE

Easy Write - WP	dBASEIII+
Symphony - Ashton-Tate	Auto Cad

ENGINEERING CONSULTANTS

Use of Consultants from time to time, Line Specs (CDC) UK, Management Consultant - Antigua, Electrical - Quebec Hydro.

MAPPING

Basic Maps appear to be pencil on Transparency. They are doing some preliminary in AutoCad and would like very much to have additional training. They would like to have someone update system in AutoCad and they would maintain it.

MATERIALS

British Standards, All Aluminum Conductor ALC, Service Cable Cu-- 6 mm² & 10 mm², Item Code 9 digits.

SUPPLIERS AND VENDORS

They purchase mostly from UK, however some from PECO International Inc. in Miami, poles from U.S., Ground Mounted Pad Mount & Meters - UK.

REPAIR OF TRANSFORMERS, CIRCUITS BREAKERS, ETC.

Manual repair of transformers on island and no rewinds.

CONSTRUCTION DRAWINGS

Standards BS 1320 - 11 kV.

TECHNICAL LIBRARY

Very limited - ordering a few books.

PROTECTION ENGINEERING

The four Electrical Engineers at MONLEC are familiar with Scott DPA and are considering using this software package of DPA programs, Version 2.0. They have the expertise and equipment to install/use Scott DPA Version 2.5 or McGraw-Edison Protection Software.

OTHER JOINT SERVICE CANDIDATES

They are interested in Secondary Voltage Analysis and wanted to send Jack Ryan to APUA for training while Hicks was there for staking experience. Also, they are interested in using a staking sheet and actually pegging (staking) the pole locations.

Jack Ryan was able to come Antigua on June 5 & 6th and participated in a staking review. In addition he was given PRIDRP & SECDRP programs and a number of LOTUS templates for Mechanical Design.

19 June 1989

St. Lucia Electricity Services Limited
P.O. Box 230, Castries
St. Lucia, West Indies
(809) 452-2324

PRINCIPALS

Bernald Theobalds, General Manager
J. Joseph, Secretary
Timothy Chaderton, Personnel & Training Officer
Errol Hartley, Chief Engineer/Project Manager
Bennie Williams, Trans/Distr Engineer
J. Charlery, Generation Engineer

GENERATION

Two plant sites - Union Power Station 13.66 MW Diesel - with 4.46 MW at South Plant. They are building a new 12.8 MW plant adjacent to Hess Oil Terminal. Frequency is 50 Hertz.

TRANSMISSION

Initial construction of 66 kV - 150 mm² - 105 kilometers.

DISTRIBUTION

Feeder voltage is mostly 11 kV - a few step-downs to 6.6 kV.
Conductor is 150mm² & 50mm² ALC.

SECONDARY OR LV

240/416 Y - 240 single ph. Copper Service wires.

kWh & kW DEMANDS

North Portion:	79,843 MWh - 13.66 MW
Losses:	12.75%
South Portion:	24,482.18 MWh - 4.46 MW
Losses:	11.12%

REPORTS

Prepare an Annual Report each year.

COMPUTERS

Engineering - PC.XT, Generation-IBM Model 60, Main frame is IBM 36, however they are changing to a new 400.

SOFTWARE

Electrocom DPAS
dBASE III+

LOTUS
Word Perfect

MAPPING

They are working with 1/2500 maps to plot pole locations by a grid method. They propose to tie consumer to a pole number, then build a dBASE file to tie transformer to number of poles served.

MATERIALS

I didn't have an opportunity to visit the warehouse. Personnel were occupied in restoring service after a major outage due to a car hitting a pole. I observed Preformed Catalogs and was told they used Preformed Products. I am surprised that Anderson Versa-Crimp Connector Program is being used.

SUPPLIERS AND VENDORS

United Kingdom - Howard Transformers, U.S. - PECO International, Miami, and Anderson Compression - tools and connectors.

REPAIR OF TRANSFORMERS AND CIRCUIT BREAKERS, ETC.

There is a limited repair of transformers with no offshore repair.

CONSTRUCTION DRAWINGS

They are presently preparing a specification book for St. Lucia utility.

TECHNICAL LIBRARY

The library has a Lineman's Handbook, Westinghouse Blue & Green Manuals, a few other books, and a fair amount of catalogs from manufacturers in U.S. & UK.

ANY OTHER JOINT SERVICE CANDIDATES

Discussed the joint service candidates proposed previously and did not suggest any others.

MISCELLANEOUS COMMENTS

New power plant site will consolidate not only power plant control, but operations and materials. The system control is to be located at this new site adjacent to Hess Oil Terminal. Initially two 66 kV lines, wood pole, both single and H-frame, were proposed. Construction of the transmission lines is being carried out by an Italian contractor.

15 May 1989

ST. VINCENT ELECTRICITY SERVICES LIMITED
BW Hadaway's Building, Upper Bay Street
Kingston, St. Vincent
(809)456-1701

PRINCIPALS

J.F. Huggins, General Manager
R.T. Dinnick, T/D Engineer
Earl Regisford, Generation Engineer
B.A. Glasgow, Secy Accountant
Horace Lewis, Trainee Director

GENERATION

Cane Hall Power Station - Diesel (7 units - 9.0 MW Total)
Kingston Power Station - Diesel (1 unit - 600 kW Blackstone)
Richmond Hydro Station - (2 units - 1.0 MW Total)
South Rivers Hydro - (3 units - 250 kW, 750 kW Total)
Cumberland Hydro 3 Stations - (5 units - 3500 kW Total)
Frequency is 50 Hertz.

Installed capacity - Hydro	5,170
- Diesel	11,515

	16,185

TRANSMISSION

33 kV Cumberland Hydro to Cane Hall Power Station

CUSTOMERS

Domestic	13,590
Commercial	1,539
Industrial	42
Street Lighting	51

Total	15,222

Above data are from 1987 Annual Report

kWh & kW DEMANDS

Domestic	15,233,683 kWh
Commercial	12,594,362 kWh
Industrial	5,139,257 kWh
Street Lighting	611,615 kWh

Total	33,578,917 kWh

1987 Peak demand 7,570 kW

REPORTS

We received a copy of the 1987 Annual Report & March 1989 Operating Report.

COMPUTERS

The main Business Office is using IBM 34 with 8 terminals. There are several PC's in the Headquarters Office using Lotus for a number housekeeping projects. Programs for IBM 34 are furnished by GSI of Canada. At Cane Hall Facility, there are a T/D IBM AT (20 Meg), two Amstrads, and a Generation AT Clone.

SOFTWARE

Lotus	Wordstar/Spellstar
Symphony	dBASE III
XTREE	Harvard Graphics
CADPAW	LMENU
Form Tool	PS5000
GEM	

ENGINEERING CONSULTANTS

VINLEC is using Shawinigan Engineering Company Limited, Montreal, Canada for Hydro Project and Load-Flow Studies/Relay Coordination, and CDI Power of Canada for electrical design.

MAPPING

Drafting on a scale of 1/10000 on HV and 1/2500 on HV/LV. It seems to be drafting new or reconstruction areas. Again the mapping seems to be in need of a CAD system.

MATERIALS

They have an adequate supply of materials in the warehouse. For the Compression they are using both Penn-Union & Burndy - Lots of hot-line taps. They use Klein Tools, A.B. Chance Cutouts and Fuses, Westinghouse Arrestors, Wraploc Ties, Sangamo Meters - All Socket, Howard transformers. There are two sizes of poles, 45-3 HV & 35-5 LV.

SUPPLIERS AND VENDORS

They purchase from the U.S., PICO, UK, Brazil, Venezuela, Mexican Poles. All materials are supplied by Tender Offer.

REPAIR OF TRANSFORMERS, CIRCUIT BREAKERS, METERING, ETC.

In Canehill facility testing of oil, replace bushings, no core/coil changes. It is an excellent facility for metering testing.

CONSTRUCTION DRAWINGS

CDI Power has done an adaptation of the old BSR 1320 and VINLEC has revised these relatively few drawings for their construction standards.

TECHNICAL LIBRARY RESOURCES

VINLEC Library owns a reasonable amount of materials, plus lots of catalogs. Their conference room has additional books (no take-out rule applies).

PROTECTION ENGINEERING

Paul Soleyn, Assistant Planning Engineer (Metering & Protection)
Francis Pereira, Assistant Planning Engineer (Planning)
VINLEC has CADPAW installed and Paul feels he understands it in a working way. However, he will need additional training if they were to work for others. Feels that if he had another technician or computer operator they could do studies for other. They also purchased software by the name of CAPTIVE for help in relay settings along with fuse coordination. It is being installed by Steve D. Troop, Shawinigan Engineering Company Limited of Montreal, Canada.

OTHER JOINT SERVICE CANDIDATES

Mr. Samuel, the Generation Planning Engineer is doing work on Maintenance Scheduling of Diesel Plant and is using Microsoft Project Management (Project Planning) for aiding with this type of work. He has developed a Schedule Sheet in Lotus. Interested in a Programming Seminar using dBASEIII. He might also consider the Penguin Maintenance Programs.