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**ORNL**

**FOREIGN TRIP REPORT**

ORNL/FTR-3543

DATE: February 26, 1990

SUBJECT: Report of Foreign Travel of Daniel B. Waddle, Research Staff Member, Energy Division

TO: Alvin W. Trivelpiece

FROM: Daniel B. Waddle

PURPOSE: To lead an Electric Power Utility Efficiency Improvement Study to Guatemala, surveying three isolated (not connected to national grid) diesel power stations.

SITES VISITED:

2/5-2/11	Consultations	Guatemala City	Roberto Figueroa
2/11-2/15	Plant Visit	Santa Elena	Ino La Varredo
2/15-2/22	Consultations	Guatemala City	Roberto Figueroa

ABSTRACT: I travelled to Guatemala City, Guatemala to lead a team of specialists to study the operating, administrative, and management efficiency of isolated diesel power plants, operated by Instituto Nacional de Electrificacion (INDE). The study is part of a global initiative managed jointly by the Agency for International Development and the World Bank. The power plants were audited, including INDE's largest isolated diesel station, and two much smaller municipal and privately owned stations. I returned to Oak Ridge on February 22, 1990.

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## Background

The Agency for International Development (A.I.D.), in a joint project with the World Bank and other development agencies, is sponsoring a global study to determine the technical, administrative, and management measures that can be taken to improve performance of isolated diesel utilities in developing countries. To accomplish this goal, a series of studies in 24 developing countries is being conducted, including countries in Africa, Southeast Asia, and Latin America. The study is entitled the Electric Power Utility Efficiency Improvement Study (EPUES).

A.I.D., through an interagency agreement, has contracted Oak Ridge National Laboratory (ORNL) to play a leading role in designing and managing this activity. ORNL, through the services of Pete Smith of Oak Ridge Associated Universities (ORAU), in addition to providing an analytical role in the global study, is also leading several of the country missions.

In this collaborative relationship with ORAU, the traveller was requested to lead an EPUES mission to Guatemala. The mission was coordinated with USAID/Guatemala, and sponsored locally by the Instituto Nacional de Electrificación (INDE). The mission was conducted from February 5 through February 22, 1990.

## Activities

The traveller arrived in Guatemala City the evening of February 5, 1990. Two other team members, Robert Chronowski and Jack Fritz, accompanied the traveller to Guatemala, and were joined in Guatemala City by a local assistant, Edgar Flores. During the first week of the mission (February 5 through 10), the team interviewed senior management at INDE to gather information regarding INDE operations, organization, and management methods. Additionally, the team made a visit to the Escuintla thermal power plant site, approximately 75 kilometers south of Guatemala City; and to Guate-Sur, the dispatch center and headquarters of operations for the entire organization.

At the Escuintla site, the team interviewed the senior manager of the power station. He was interviewed to determine the nature and extent of training programs employed by INDE; to determine if labor problems played a prominent role in effectiveness of plant operations; and to determine the maintenance procedures employed for the capital equipment. The plant manager, as was all other INDE management staff, was very open and cooperative.

On Sunday, February 11, the team travelled to Santa Elena, Peten, to begin the first of three plant analyses. It had been decided to perform analyses on a private power plant, a municipal power plant, and an INDE-operated diesel station. All three stations were required to be diesel power plants, operated in isolation from the INDE interconnected grid. Two of the three sites were located in the Peten; the INDE Santa Elena plant, as well as a municipal utility, in Sayaxche, Peten, approximately 65 kilometers southwest of Santa Elena.

The team visited Sayaxche on February 12, 1990. Sayaxche is a relatively small community, with an approximate population of 5,000 inhabitants. The utility has been providing water and electric service for about 20 years, using small diesel generators, with low voltage distribution network, donated by INDE. About three years ago, the utility had experienced maintenance problems with three diesel generators; and with the opening of a regional hospital on the outskirts of Sayaxche, the municipality requested the hospital to provide the town with power. Sayaxche had only 2,500 customers, mostly with small residential loads (about 120 kW peak), and the hospital had installed a 500 kW generator. The town has been interconnected with the hospital since then, being provided power for ten hours per day (8:00 A.M. to noon and 6:00 P.M. to midnight), and bears only the heavy maintenance costs as they occur. The Ministry of Health provides normal maintenance for the machines, together with provision of diesel fuel. The municipality, on the other hand, collects all revenues, using these revenues to maintain lines, purchase diesel over and above that provided by the hospital if supplies run short, and to pay for major repairs for the power plant.

This rather odd arrangement, in spite of the obvious subsidy provided by the Ministry of Health, is still in danger of financial collapse; the residents of Sayaxche are only paying for approximately 40% of the cost of service. The team collected sufficient information to prepare an overview report, and returned to Santa Elena before dark the same evening of their arrival.

The next day the team met with the Santa Elena power plant management staff. The Santa Elena plant, due to the fact that voluminous records were kept, was to be studied in depth. The team spent the first morning in discussions with the INDE Peten Regional Director of Operations, and the Santa Elena Plant Manager. Discussions covered topics including plant management; equipment selection, maintenance, operating procedures, and spare parts systems; labor relations; training; personnel policies and profiles; fuel and lube oil specifications and ordering procedures; and other related topics. The team again found the managers to be very intelligent, dedicated, and competent.

In the afternoon, the team made a visual inspection of the plant, recording equipment specifications during the inspection. The power plant consists of four high speed (1800 rpm) diesel engines, all 500 kW capacity; two medium speed (1200 rpm) units, 500 and 750 kW machines; and three low speed (720 rpm) units, all 1000 kW in size. After the inspection, the team began to review the operating data, financial records, and other related documents. Late in the afternoon, it became apparent that the data had not been reduced in the form required for the study for any of the years needed.

The following day the team spent the entire day reducing data, and interviewing the power plant staff. In particular, the team held intensive interviews with the chief mechanic and his management assistant, as well as with the stores and financial record keeper. By the end of the day, the team began to form a congruous picture of the history of the operation of the Santa Elena power plant, over the period of record of the study.

The following day (Thursday, February 15, 1990), the team spent the morning clarifying specific questions, and checking data points of particular interest. In addition, two of the team members spent the morning reviewing commercial data at the Santa Elena INDE commercial office regarding sales, problems with theft and collections, and generally appraised the efficiency of the commercial unit. In addition, these two team members

visited a local saw mill to assess the capability of the private sector to supply power to the Peten, if Guatemala electric power sector policy were modified to allow private sales to INDE. The team returned to Guatemala City that afternoon.

The following two days the team processed data collected, and began to write the report required by the EPUES study. In addition, follow-up interviews were held with INDE managers regarding specific data needed.

Tuesday, February 20, 1990, the team visited a privately operated isolated diesel utility. This operation has been providing water and power services to Tiquisate for 27 years, beginning operations in 1963, when the former owner (United Fruit) sold its assets and ceased operations in Tiquisate. The power house has four slow speed diesel units (520 rpm), purchased in 1939 by United Fruit and still in good operating condition. Spare parts have been a problem, but the company has managed to keep the machines operating in spite of problems with spares. They provide services to approximately 700 customers, and charge roughly twice the INDE rate for power, but have little problems with collections.

In spite of the rate structure, the plant manager stated that the company may not be able to operate much longer. Rising fuel costs, inflationary pressure, and the presence of INDE facilities in very close proximity to the company's service lines (creating company's dissatisfaction with the customer base at the higher rates) all threaten the company's financial position. Moreover, the company has literally "mined" the resources provided by United Fruit. They have purchased a minimum of spare parts to keep the machines operational; and while they have few mechanical problems now, it is uncertain if foreign exchange could be found to purchase additional spares when they are needed.

This last plant visit provided the team with very useful information to contrast INDE operations with a privately run utility. Although one could hardly say that the privately run company provided a typical picture of private utility operations, it did illustrate the benefits of investing in capital equipment with an extended life expectancy, over that of purchasing equipment with the lowest initial cost, as INDE has been forced to do in the case of the isolated systems.

The following day the team travelled to Guate-Sur to debrief the Chief of Production (Gerente de Produccion), regarding the results of the three plant visits, and to provide an overview of preliminary findings. The team also provided USAID/Guatemala with a similar debriefing late in the afternoon.

The traveller left Guatemala on Thursday morning, February 22, 1990. He returned to Oak Ridge late in the afternoon, via Miami and Atlanta.

Itinerary

- February 5, 1990: Depart Oak Ridge for Guatemala City. Arrive that evening.
- February 6-10: Guatemala City, with a day trip to Escuintla.
- February 11-15: Santa Elena, Peten, with a day trip to Sayaxche on February 12.
- February 16-22: Guatemala City, Guatemala, with a day trip to Tiquisate on February 20, 1990.
- February 22, 1990: Return to Oak Ridge, via Miami and Atlanta.

List of Persons Contacted

**INDE:**

Rodolfo Rivas Sanchez, Jefe de Departamento de Comerciales

Alvaro Aldana Paiz, Jefe de Departamento Recursos Humanos

Gustavo Arroyo, Jefe de Departamento de Capacitacion

Carlos Izas, Jefe de Departamento de Planificacion de Financiero

Thomas Henry, Gerente de Produccion

Samuel Franco, Gerente Administrativo

Ricardo Palascos, Gerente de Financiero

Jorge Pena, Jefe de Planta de Escuintla

German Obiols, Jefe de Unidad de Planificacion del Systema Electrico

Ivo La Varreda, Jefe de Division Orriente de Operaciones

Francisco Ochaeta, Jefe de Operaciones de Planta Santa Elena

Jaime Gomez, Jefe de Construcion, Peten

**Non-INDE:**

Ing. Juan Alvarez, Municipality of Sayaxche

Rodolfo Santizo, Gerente de Operaciones, Empresa Electrica de Guatemala

Roberto Figueroa, Energy Officer, USAID/Guatemala

James Lay, NRECA CARES Project Manager

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