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FOR: DOFLECA

ROUTINE -- UNCLASSIFIED -- DSSCS MESSAGE -- 15077 CHARACTERS
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DE RUEHSN #7960/01 2132145
ZNR UUUUU ZZH
EZ02:
R 312145Z JUL 92
FM AMEMBASSY SAN SALVADOR
TO SECSTATE WASHDC 8021
BT
UNCLAS SECTION 01 OF 02 SAN SALVADOR 007960
**** SECTION BREAK ****
SECTION 01 OF 02

E.O. 12356;N/A
TAGS: EPET, ENRG, ECON, ES
SUBJECT: STUDY OF CENTRAL AMERICAN ENERGY RESOURCES
EZ05:

REF: STATE 059161

1. SUMMARY. CENTRAL AMERICAN COUNTRIES ARE CURRENTLY FACING WHAT IS PROBABLY THE WORST ENERGY CRISIS IN THEIR HISTORY. WAR DAMAGED NICARAGUA AND EL SALVADOR ARE EMBARKING IN MAJOR RECONSTRUCTION AND RECONCILIATION. VISIBLE PROGRESS TOWARDS ECONOMIC STABILIZATION IS BEING ACHIEVED IN THE REGION, THOUGH SOCIAL UNBALANCES STILL PERSIST.

THE CENTRAL AMERICAN GOVERNMENTS HAD BEEN WARNED THAT AN ENERGY CRISIS WOULD SURFACE DURING THE 90'S. AS OF 1987, THE UNITED NATIONS ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN (ECLAC), THROUGH ITS MEXICO DIVISION, PROMOTED A SURVEY OF THE MOST URGENT NEEDS OF THE ELECTRIC SUB-SECTOR IN THE FIVE CENTRAL AMERICAN COUNTRIES. THE SURVEY WAS TO SERVE AS A DIAGNOSIS FOR THE U.N. SPECIAL PLAN FOR CENTRAL AMERICAN COOPERATION (PEC). THE FINDINGS OF THE THE SURVEY WERE PUBLISHED ON AUGUST 1988 IN A REPORT ENTITLED QUOTE PROJECT FOR THE INSTITUTIONAL DEVELOPMENT AND ELECTRIC INTEGRATION OF THE CENTRAL AMERICAN ISTHMUS QUOTE. THIS REPORT INCLUDED A VALUABLE DESCRIPTION OF THE CURRENT ENERGY SITUATION OF THE REGION, ITS PROSPECTS AND PROBLEMS, AND PROVIDED KEY INFORMATION ON THE MOST FEASIBLE ENERGY PROJECTS IN THE AREA. SINCE MOST OF THE QUESTIONS POSED IN REFTEL ARE ANSWERED IN THE REPORT, POST IS

POUCHING A COPY OF IT TO THE DEPARTMENT. END SUMMARY.

2. EL SALVADOR'S ENERGY PROSPECTS AND PROBLEMS: AN OVERVIEW. EL SALVADOR HAS NO KNOWN COAL DEPOSITS, AND APPARENTLY NO PETROLEUM EXPLORATION PROJECTS ARE PLANNED FOR THE FORESEEABLE FUTURE. AS IN OTHER CENTRAL AMERICAN COUNTRIES, ENERGY CONSUMED IN EL SALVADOR COMPRISES TWO WELL DEFINED GROUPS: (A) MODERN AND COMMERCIAL ENERGIES -HYDROCARBONS AND ELECTRICITY; AND (B) TRADITIONAL ENERGY, (I.E. FIRE WOOD AND CHARCOAL.) THE GOES ESTIMATES THAT BOTH GROUPS SHARE EQUALLY THE COUNTRY'S TOTAL CONSUMPTION, THAT IS, 50 PERCENT EACH GROUP. PER CAPITA CONSUMPTION OF ENERGY IN EL SALVADOR HOVERS ABOUT THE AVERAGE FOR CENTRAL AMERICA, BUT IS MUCH LOWER THAN IN COSTA RICA OR PANAMA, AND WELL BELOW THE AVERAGE FOR LATIN AMERICA. THE COUNTRY'S CURRENT PETROLEUM CONSUMPTION IS SLIGHTLY LESS THAN 17,00 BARRELS PER DAY, SUPPLIED BY MEXICO AND VENEZUELA UNDER THE SAN JOSE AGREEMENT.

3. ELECTRICITY IS PRODUCED AND SUPPLIED BY THE PARASTATAL EXECUTIVE LEMPA RIVER HYDROELECTRIC COMMISSION, CEL. CEL'S ENERGY OUTPUT IS NORMALLY GENERATED AS FOLLOWS: 60 PERCENT FROM HYDROELECTRIC POWER STATIONS; 25 PERCENT FROM THERMAL (BUNKER OR DIESEL) UNITS, AND 15 PERCENT FROM GEOTHERMAL UNITS. CEL'S REPORTED INSTALLED CAPACITY AS OF EARLY 1992, WAS 650 MW, VERSUS THE COUNTRY'S TOTAL DEMAND OF NEARLY 500 MW. CEL'S STUDIES SHOW A COMBINED POTENTIAL HYDROELECTRIC AND GEOTHERMAL CAPACITY OF SOME 1,500 MW. ONCE FULLY DEVELOPED, THE GOES ESTIMATES, THAT CAPACITY COULD SATISFY THE PROJECTED GROWTH IN DEMAND FOR THE NEXT 8 TO 10 YEARS, WITH AN ANNUAL GROWTH RATE OF 8 TO 10 PERCENT.

4. DURING THE FIRST SEMESTER OF 1992, EL SALVADOR'S ELECTRICITY PROBLEMS WERE COMPLICATED BY A DROUGHT THAT DELAYED THE NORMAL ONSET OF THE RAINY SEASON FOR SEVERAL WEEKS. SINCE FEBRUARY 1992 ELECTRICITY IN EL SALVADOR HAS BEEN SUBJECT TO INCREASING RATIONING (3 HOURS PER DAY IN FEBRUARY TO 8 HOURS PER DAY IN JUNE). THE LACK OF NORMAL ELECTRICITY FLOW IN THIS COUNTRY, TIED TO THE LACK OF NORMAL RAINY PATTERN, AFFECTS TREMENDOUSLY THE STILL-DEVELOPING INDUSTRIAL SECTOR AS WELL AS TRANSACTIONS OF A VERY ACTIVE LOCAL TRADE. GOES' ROUGH ESTIMATES PLACE THE DROP IN THE COUNTRY'S GROSS DOMESTIC PRODUCT (DUE TO THE LACK OF ELECTRICITY) IN SOME ONE MILLION DOLLARS PER HOUR OF BLACKOUT. CEL HAS WORKED HARD TO KEEP A MINIMUM OF ENERGY GENERATION BY OVERUSING THE

THERMAL UNITS, WHICH ARE NORMALLY UTILIZED DURING EMERGENCY SITUATIONS. AS OF EARLY JUNE, ONLY 10 PERCENT OF THE ELECTRICITY WAS BEING GENERATED AT HYDROELECTRIC STATIONS, VERSUS 46 PERCENT AT THERMAL UNITS AND 34 FROM GEOTHERMAL UNITS. THE COST PER KWH GENERATED AT THERMAL PLANTS IS SIX TIMES HIGHER THAN THE HYDROELECTRIC KWH AND DOUBLE THE GEOTHERMAL KWH.

5. PETROLEUM LEGISLATION AND GOES' ENERGY POLICY. UPSET BY THE ONGOING CRISIS, THE GOES HAS ESTABLISHED A SORT OF PERMANENT, HIGH LEVEL ENERGY CRISIS COMMITTEE RESPONSIBLE FOR THE DEVELOPMENT OF A LONG TERM STRATEGY FOR THE SECTOR AND FOR THE REVIEW OF CURRENT LEGISLATION THAT REGULATES THE IMPORTATION/PROCESSING/EXPLORATION OF PETROLEUM AND UNCLAS SECTION 02 OF 02 SAN SALVADOR 007960

E.O. 12356;N/A

TAGS: EPET, ENRG, ECON, ES

SUBJECT: STUDY OF CENTRAL AMERICAN ENERGY RESOURCES

OTHER NON-TRADITIONAL ENERGY SOURCES. HOWEVER, FOR AT LEAST THE NEXT TEN YEARS, EFFORTS WILL PROBABLY FOCUS ON EXPANSION OF THE CURRENT CAPACITY OF HYDRO-ELECTRIC AND GEOTHERMAL UNITS NOW IN USE, AS WELL AS ON THE CONSTRUCTION OF NEW PLANTS TO FULLY EXPLOIT THESE RESOURCES. PROSPECTS FOR THE EXPANSION AND CONSTRUCTION OF THERMAL (BUNKER) PLANTS ARE NOT AS STRONG. UNCERTAINTY OF PETROLEUM PRICES SEEMS TO PLAY A KEY ROLE HERE.

6. WITHIN THE FRAMEWORK OF THE CURRENT LEGISLATION, PETROLEUM EXPLORATION IN EL SALVADOR PRESENTS A RATHER LIMITED FUTURE. THE SALVADORAN HYDROCARBONS LAW NOW IN EFFECT WAS ENACTED IN THE EARLY 80'S AT THE PEAK OF THE GOES' ECONOMIC INTERVENTION DRIVE. BASED ON THIS LAW, THE STATE (CEL) ENJOYED FOR 10 YEARS, 1980 TO 1990, AN EXCLUSIVE MONOPOLY ON PETROLEUM IMPORTS. IN 1990, THE FREE MARKET REFORMS UNDERTAKEN BY THE GOES BROKE THIS MONOPOLY, AND CRUDE OIL IMPORTS ARE NOW A PRIVATE SECTOR PRIVILEGE. NONETHELESS, EL SALVADOR'S HYDROCARBONS LAW (OR THOSE PARTS STILL IN EFFECT) DOES NOT MAKE IT ATTRACTIVE FOR MOST FOREIGN COMPANIES TO UNDERTAKE ANY PETROLEUM EXPLORATION/PRODUCTION VENTURE IN THIS COUNTRY. ACCORDING TO ARTICLE 3 OF THE LAW, ALL ENERGY RESOURCES FOUND IN THE COUNTRY, WHETHER OIL, GAS OR GEOTHERMAL, BELONG TO THE STATE OF EL SALVADOR, AND THEIR EXPLOITATION MUST SERVE THE SOCIAL AND ECONOMIC POLICY OF THE STATE SO THAT THE PROCEEDS SUPPORT THE

COUNTRY'S OVERALL DEVELOPMENT.

7. ARTICLE 4 STATES THAT EXPLORATION AND EXPLOI- TATION OF PETROLEUM RESOURCES IS AN EXCLUSIVE RIGHT OF CEL. CEL CAN CARRY OUT EXPLORATION AND EXPLOI- TATION PROJECTS BY ITSELF OR THROUGH CONTRACTS AND ARRANGEMENTS WITH PRIVATE COMPANIES. CEL'S CONTRACTS WITH PRIVATE FIRMS TO CARRY OUT EXPLORATION AND EXPLOITATION PROJECTS DO NOT IMPLY ANY INVESTMENT FROM THE COMMISSION. EXPENDITURES AND RISKS ARE TO BE TAKEN TOTALLY BY THE FIRM. IF A FIRM FINALLY SUCCEEDS IN FINDING COMMERCIALY VIABLE PETROLEUM, THE OUTPUT MUST BE SHARED BY LAW AS FOLLOWS:

DAILY PRODUCTION (000 BARRELS)	ROYALTIES 1/ PERCENT	CEL SHARE 1/ PERCENT	TAX 2/ PERCENT
UP TO 50	12	7	45
50 TO 100	13	8	46
100 TO 150	14	9	47
150 TO 200	15	10	48
200 TO 250	16	11	49
OVER 250	17	12	50

- 1/ CALCULATED OVER TOTAL OUTPUT
- 2/ CALCULATED OVER WHAT IS LEFT TO THE FIRM

AS THE TABLE INDICATES, AFTER ALL IMPLIED COSTS AND RISKS, A FIRM THAT FINALLY SUCCEEDS IN PRODUCING, FOR EXAMPLE, 100,000 BARRELS PER DAY, WILL BE LEFT WITH ONLY 40,800 BARRELS TO SELL ON THE WORLD MARKETS. THE FIRM FIRST HAS TO DELIVER TO THE STATE OF EL SALVADOR 14,000 BARRELS IN ROYALTIES, 9,000 TO CEL, AND 36,200 TO THE MINISTRY OF FINANCE AS A SPECIFIC TAX.

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GEOTHERMAL DEVELOPMENT

Costa Rica:

A survey of Costa Rican geothermal potential, begun in 1987, was funded by the Italian government through the United Nations Development Program (UNDP). Electroconsult of Italy conducted this resource survey. Seven promising geothermal areas were identified.

Miravalles Geothermal Field:

Electroconsult was given the field development contract from the Interamerican Development Bank (IDB) and has drilled the 14 production and 6 injection wells in the field.

The Miravalles Field has severe problems with calcite scaling in production wells. The developers have increased well diameter to lessen the problem.

El Salvador:

French, Italian, and American consulting companies participated in the assessment of El Salvador's geothermal potential with United Nations and U.S. AID funding. Potential development areas were identified in Ahuachapan, Berlin, Chipilapa, Coatepeque, and San Vicente.

Ahuachapan Geothermal Field:

Electroconsult, with funding through Italian tied aid, has developed this field. The first 30 MW power plant went on line in 1975 and the second began generation in 1976. Both plants use turbine-generator units built by Mitsubishi Heavy Industries in Japan. In 1981, a third unit of 35 MW, built by Fuji (Japan) was completed. The field development of Electroconsult was poorly planned, and interference between wells has reduced the present electrical generation to 50 MW.

Berlin Geothermal Field:

Electroconsult (Italy) drilled several wells in this field during the 1970s, but civil war delayed any development. The first 10 MW power plant was completed in 1992, and an additional 60 MW development is underway. Latina, a Mexican drilling company, has the contract for field development.

Guatemala:

Four areas have been explored for geothermal development, and three others seem to have good prospects for electrical generation. The Interamerican Development Bank, working through the national utility (INDE) has funded the exploration drilling efforts. A recent government decision to acquire private investment to develop the geothermal fields has delayed the installation of power plants.

Zunil Geothermal Field:

A series of consultants, including Italian and Japanese, have worked in this field. A series of five early wells were too shallow to penetrate the main geothermal reservoir and were poor producers. Recent drilling has been under a contract to Morrison-Knudsen of Boise, Idaho. Five deep wells have been tested to produce over 25 MW, and a power plant was to be installed with IDB funding. Future development is delayed until the government can attract private investment.

Amatitlan Geothermal Field:

Six exploration wells have been drilled to test this area, and development for a 20 MW power plant is planned.

Nicaragua:

Political turmoil and a large national debt have held back geothermal development. The government is hoping to sell its geothermal assets to cancel much of its foreign debt.

Momotombo Geothermal Field:

Many countries, including the U.S., participated in drilling several geothermal wells prior to 1978, but Italian tied aid was used to capture the contract for Ansaldo (Italy) to install the first 35 MW power plant in 1980. The second phase was developed with financial aid from Italy, Canada, France, and the European Community (EC). The second 35 MW Ansaldo power plant began production in 1985.

Panama:

Several potential areas have been identified for geothermal exploration, but political unrest has delayed any development. The area of Cerro Pando has been drilled, and the Interamerican Development Bank has made a loan available for geothermal exploration.

CENTRAL AMERICAN GEOTHERMAL DEVELOPMENT

Country	Electric Power Consumption GW-hr/yr	Geothermal Potential Megawatts	Geothermal Generation Potential GW-hr/yr	Geothermal As Percent Of Power Consumption
Costa Rica	3,100	3,500	30,000	950%
El Salvador	2,000	2,000	17,000	850%
Guatemala	2,355	4,000	34,000	1,400%
Honduras	2,100	500	4,300	200%
Nicaragua	1,500	4,000	34,000	2,200%
Panama	16,000	1,000	8,500	50%

Current Installed Capacity

El Salvador 95 MW

Nicaragua 70 MW

Guatemala 2 MW

Costa Rica

Under Construction

30 MW

110 MW

MAJOR GEOTHERMAL COMPANIES

W.T. Box, President
Santa Rosa Geothermal Company
Calpine Corporation.
1160 North Dutton, Suite 200
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(707) 527-6700

Gary Shulman, President
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1460 West Water Street
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(607) 733-1027

Lucien Bronicki, President
Ormat, Incorporated
255 Glendale Avenue
Suite 25
Sparks, NV 89431
(702) 356-9029

- Far West
 Ron Burch
- Geothermal Development Associates
 Martin Booth
- Mission Power
 Roger Bamister
- Coithness
- Oxbow

Ben Holt
Chairman/CEO
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Thomas Hinrichs, ^{Vice} President
Magma Power Company
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(619) 622-7800

Darcel Hulse, President
Unocal Geothermal Division
P.O. Box 7600
Room M-32
Los Angeles, CA 90051
(213) 977-5239

~~Richard Jaros~~
David Sokol
President
California Energy Company
10831 Old Mill Road
Omaha, NE 68154
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Rich Jaros is CEO
(I think)

Tsvi Meidav, President
Trans-Pacific Geothermal Corporation
1901 Harrison Street
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Oakland, CA 94612
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Mike Wright

GEOHERMAL ASSOCIATIONS

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Geothermal Resources Association
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Magma Power Company
4365 Executive Drive, Suite 900
San Diego, CA 92121
(619) 622-7800

POTENTIAL COST SHARING OF PROJECTS
BY MAJOR GEOTHERMAL COMPANIES

A-Z/Grant

Will cost-share with the Geothermal Drilling Organization, the Geothermal Technology Organization, and the International Export Initiative.

- They have cost-shared in development of well-head components.
- Their business is drilling equipment, well-head equipment, valves. A significant portion of their business is foreign.

Barber Nichols

Will cost-share in Advanced Energy Conversion and the International Export Initiative.

- They are known to be interested in the possibility of operating binary power plants using an organic cycle in a super-critical mode.

Ben Holt Company

Will cost-share in Advanced Energy Conversion.

- They are known to be interested in the possibility of operating binary power plants using an organic cycle in a super-critical mode.

Caithness Corporation

Will cost-share in Reservoir Technology, Slim-Hole Drilling, and Industry-Coupled Drilling.

- They have been interested in having DOE fund studies of the geothermal system at Steamboat, NV.

California Energy Company

Will cost-share in Reservoir Technology, Industry-Coupled Drilling, Advanced Exploration Technology, the Pacific Northwest Initiative, and the International Export Initiative.

- They have agreed to make data available for their geothermal fields at Coso, CA and Roosevelt Hot Springs, UT for study by DOE-funded researchers.
- They are expected to be undertaking exploration in prospects at Medicine Lake, CA and Newberry, OR for which drilling will be required.
- They have geothermal concessions in the Philippines and Indonesia.

Calpine Corporation

They will cost-share in research at The Geysers field in California.

- They are strongly considering getting involved in foreign geothermal projects.

Douglas Energy Company

Will cost-share in Advanced Energy Conversion.

Exergy

Will cost-share in Advanced Energy Conversion.

Far West Capital, Inc.

Will cost-share in Reservoir Technology, Slim-Hole Drilling, Industry-Coupled Drilling, and the Pacific Northwest Initiative.

- They have been willing to release some of the data on their geothermal system at Steamboat, NV for study by DOE.

- They are participating in a slim-hole coring project on their ground at Steamboat.

Geothermal Development Associates

Will cost-share in International Export Initiative.

- They have a small development at Steamboat, NV, but are an expanding company in geothermal services which wants to become a developer. They are attempting to get involved in the Philippines and Indonesia.

Geothermal Power Company

Will cost-share in the International Export Initiative.

Magma Power Company

Will cost-share in Industry-Coupled Drilling, Slim-Hole Coring, and the International Export Initiative.

- They are currently exploring one geothermal system in the Basin and Range.

- They are involved in geothermal development in the Philippines.

Mission Power

Will cost-share in the International Export Initiative.

Northern California Power Agency

Will cost-share in Fluid Injection at The Geysers and Advanced Energy Conversion (heat rejection).

Ormat Inc.

Will cost-share in Industry Coupled Drilling, Slim-Hole Coring, Advanced Energy Conversion and the International Export Initiative.

Oxbow Power Services

Will cost-share in Reservoir Technology, Geothermal Drilling Organization, Geothermal Technology Organization, Slim-Hole Coring, Industry-Coupled Drilling, Advanced Exploration Technology, Pacific Northwest Initiative, and International Initiative.

- They have shown a willingness to make data available for study and publication by DOE researchers.

- They are strongly considering becoming involved in foreign geothermal projects.

Pacific Gas & Electric

Will cost-share in Advanced Energy Conversion.

-They are interested in more efficient cooling technologies that save water for injection at The Geysers.

Russian River Energy Company

Will cost-share in Coring at The Geysers, and Advanced Energy Conversion (heat rejection).

S-Cubed

Will cost-share in Reservoir Technology and the International Export Initiative.

Sierra Pacific Power Company

Will cost-share in Advanced Energy Conversion.

Trans-Pacific Geothermal Corporation

Will cost-share in Reservoir Technology, Geothermal Technology Organization, Slim-Hole Coring, Industry Coupled Drilling, Advanced Exploration, Pacific Northwest Initiative, and International Export Initiative.

-They have shown interest in sharing costs for drilling exploration holes, especially for the Vale, OR and Surprise Valley, CA prospect areas.

Unocal Geothermal Division

Will cost-share in Reservoir Technology, Geothermal Drilling Organization, Geothermal Technology Organization, Coring at The Geysers, Fluid Injection at The Geysers, Advanced Exploration Technology, and International Export Initiative.

-Their primary interests in the U.S. are in The Geysers field, CA.

-Their foreign interests are in the Philippines, Indonesia and Central America.

Utah Power/Pacificorp

Will cost share in ?

EE-122

Industry Comments on Publications Prepared for the Geothermal Division

Dr. John E. Mock, Dir. GD

I have heard some very strong criticism from industry concerning Geothermal Division publications prepared by support service contractors. The geothermal industry representatives were appalled at the errors in these reports produced for our Division. Of most immediate concern was the report on the update of geothermal technology successfully transferred to U.S. industry, actually a report to highlight accomplishments of U.S. industry. It was clear to all who read it, that the document was written by people who did not know the subject. The authors at BNF sent out an early draft, but they did not make the corrections suggested by reviewers. After several drafts and long delays with no improvement in the text, Jerry Hutterer was asked to rewrite the report. Unfortunately, he had only limited time to devote to the task, so it is still a weak report and should not be distributed.

The DOE support services contractors like BNF, Meridian, Peri, and NREL should not be paid to write useless reports with gross inaccuracies. The greater problem is that these people do not understand their ignorance of the geothermal technology, and they are stubborn when asked to correct their writing. The Geothermal Division should not expect to give industry garbage and then ask industry to totally rewrite it. Anything the Geothermal Division publishes should be carefully prepared and reviewed to give the most accurate image of the geothermal industry and geothermal research effort that is possible. To make the DOE geothermal reports accurate and credible, they should be contracted to NGA in the first place rather than after wasting enormous amounts of reviewers time and taxpayers money.

The several publications, flyers, brochures, reviews, and posters, should be discussed by the program managers as a "committee of the whole" to bring out the problems a one time. None of these publications has improved with age! The posters by BNF are still fundamentally flawed as they were at the beginning, and these flaws have not been removed over time.

Marshall Reed, Program Manager
Geothermal Reservoir Technology
Geothermal Division, EE-122

Geothermal Reservoir Technology Research Program

Headquarters Program Review

**November 9, 1993
1:30pm to 4:30pm
Room 4E-069**

**U.S. Department of Energy
Assistant Secretary for Energy Efficiency
and Renewable Energy
Geothermal Division
Washington, DC 20585**

PROJECTED
ECONOMIC AND OPERATING DATA FOR
U.S. GEOTHERMAL POWER PLANTS CONSTRUCTED IN
CENTRAL AMERICA

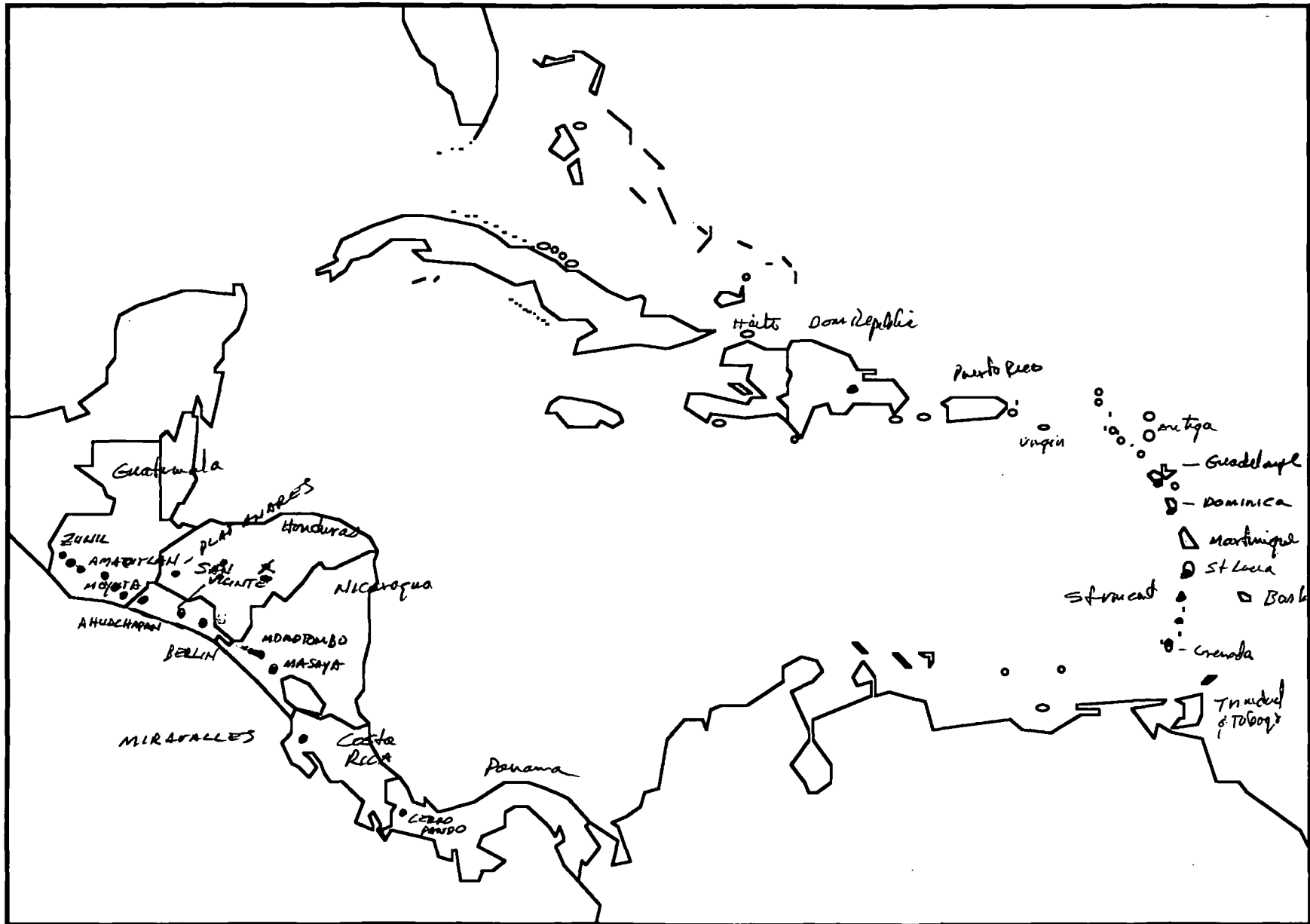
Technology**	Capitol Cost Per KW	O&M Cost % of Capitol Cost	Plant Life	Plant Availability	Capacity Factor	Levelized Energy Cost
Single Flash	\$ 1,800	6	25 Years	90-100%	80-90%	4.1¢/kwh
Double Flash	1,500	6	25 Years	90-100%	80-90%	3.4¢/kwh
Binary	1,900	7	25 Years	90-100%	80-90%	4.5¢/kwh

-17-

Megawatts**	Capitol Cost Per KW	O&M Cost % of Capitol Cost	Plant Life	Plant Availability	Capacity Factor	Levelized Energy Cost
10	\$ 2,350	8	25 Years	95%	80%	6.6¢/kwh
11	800**	5	25 Years	95%	90%	4¢/kwh
20	1,981	7	25 Years	95%	80%	5.3¢/kwh
30	1,894	6	25 Years	95%	80%	4.8¢/kwh
60	1,750	5	25 Years	95¢	80%	4.1¢/kwh

- * Guatemala, Honduras, El Salvador and Costa Rica
- ** Assumes Condensing Units
- *** Surplus Turbines and Generators

Central America and the Caribbean





The Deputy Secretary of Energy

Washington, DC 20585

Phillip Michael Wright, President
National Geothermal Association
P.O. Box 1350
Davis, CA 95617-1350

Dear Dr. Wright:

Please excuse my delay in responding to your letter of February 3, 1994, concerning your expression of National Geothermal Association interest in Costa Rica. I greatly appreciate the enthusiastic response of the geothermal industry to my request for an increased U.S. effort in Costa Rica.

I have asked Mr. Gary Ward, Office of International Energy Markets, to represent me in leading a geothermal trade mission to Costa Rica. With Mr. Ward as part of this mission, I expect that Costa Rican officials will be very cooperative and responsive to the proposals of U.S. industry. Mr. Ward will make the necessary contacts with the U.S. Embassy personnel, and will stress the need for their full support in matching the strong geothermal marketing efforts of other countries. I understand from Mr. Ward that this mission will include four industry experts covering the aspects of: environmental impact assessment and remediation, power project financing, resource exploration and delineation, and power project development and management. This mission is now planned for late June, and Mr. Ward will be in contact with you directly.

Mr. Gary Ward has suggested that Mr. Marshall Reed of the Department's Geothermal Division accompany the group to represent our research and development support to the U.S. geothermal industry. Mr. Reed will be your technical contact here in Washington and will provide assistance to Mr. Ward in this mission.

I hope that this mission of the Nation is successful and that you are able to do more U.S. geothermal development. This provides an alternative to the construction of hydroelectric power in environmentally sensitive rain forest. U.S. industry will be of significant benefit to other countries.

Bill Whit

6/13/94
Mike:
You can
read this version
easier.
Jed

PROPOSAL FOR ENHANCING THE U. S. GEOTHERMAL
INDUSTRY'S OPPORTUNITIES FOR DEVELOPMENT OF
GEOTHERMAL-ELECTRICAL POWER IN COSTA RICA

TO

U. S. DEPARTMENT OF ENERGY

BY

GEOTHERMAL DEVELOPMENT ASSOCIATES
Reno, Nevada

DAMES & MOORE
San Francisco, California

UNIVERSITY OF UTAH RESEARCH INSTITUTE
Salt Lake City, Utah

DECEMBER 13, 1993

INTRODUCTION

Environmental Motivation

Mr. William White, Deputy Secretary of Energy, learned in a meeting of Central American energy ministers, that the Republic of Costa Rica is planning a major hydroelectric project. This project will destroy a large percentage of the rain forest in Costa Rica. Geothermal energy offers a readily available alternative that will minimize rain forest destruction. Geothermal is the only renewable energy technology that offers proven base load electricity at a cost competitive with hydroelectric power.

Business Climate

The Republic of Costa Rica is a country of 2.6 million inhabitants that has the highest *per capita* energy consumption in Central America. The country is politically stable. A study of geothermal markets done for the California Energy Commission rates Costa Rica as fourth in the world in terms of geothermal business opportunity and as having relatively low business risk. Although the population is relatively small, we understand that Costa Rica is planning to increase electricity exports to neighboring countries.

Costa Rican Law Number 7200 authorizes the generation of electrical power by private firms. Therefore, there exists the legal basis for U. S. companies to develop electrical power plants using private power financing mechanisms. However, Law 7200 also limits to 20 MWe the size of the project that may be developed. This could require development in 20 MW increments or the use of Build-Operate-Transfer financing which would result in the project eventually being entirely owned by the national utility, Instituto Costarricense de Electricidad (ICE). Law 7200 requires 1. an account of eligibility to be granted by ICE, and 2. an environmental impact/assessment to be approved by MIRENEM (Costa Rica's EPA) prior to the granting of a concession to a private organization. An initial environmental bond of 4% of the project's value will be required when the contract is submitted.

Costa Rica will soon produce 55 MWe from the first development phase at the Miravalles Geothermal Field. The first 55 MWe power plant was supplied by Fuji of Japan with 4-1/2% financing by the Japanese. The well field was financed through the Interamerican Development Bank (IDB). An Italian firm provides reservoir engineering and management. U. S. firms provide drilling (Nabors) and cementing services (Halliburton) and supply well-head equipment (A/Z Grant). ~~Electroconsult of Italy did the power plant design.~~

Under the second phase (55 MWe development), U. S. companies were selected for the drilling and reservoir engineering and reservoir management portions of the project. An Italian firm has been selected to design the power plant, and an Italian or Japanese company will probably be selected to provide the power plant equipment.

ICE has maintained management control over the entire Miravalles project. Decisions are made at the highest levels of government, and this has resulted in project delays. Since the passage of Law No. 7200, ICE has been promoting the development of private power. This provides Costa Rica with the opportunity to increase their electrical generating capacity while not adding to their national debt.

The U. S. geothermal trade organization, the National Geothermal Association, has evaluated overseas geothermal development projects, and has concluded that 60-80% of the total expenditures are returned to the U. S. in the form of jobs or purchases of equipment. The project proposed here will be undertaken by a team of U. S. companies, and will use primarily U. S. expertise and equipment on the project.

Geothermal Resources

The Republic of Costa Rica contains abundant undeveloped geothermal resources. An assessment carried out by ICE, under support from the United Nations, estimates that there is 1000 MWe of geothermal potential. Independently, the U. S. National Geothermal Association has estimated the geothermal potential of Costa Rica at 3500 MWe. ICE rates the best prospects in the country at Miravalles and Rincon de la Vieja with estimated capacities of 160 to 190 MWe each. Second priority areas include Irazu-Turrialba, Tenorio, Platinar, Poas and Barva with estimated capacities of 100-115 MWe each.

As outlined above, ICE is concentrating on geothermal development of Miravalles. There is no indication that ICE or other entities are currently working on bringing other geothermal resources on line. We feel there is a window of opportunity for the U. S. geothermal industry to develop one or more of the other high-potential sites using private power concepts.

PROPOSAL

Statement of Work

The objectives of this proposal are to blaze a trail that can be followed by other companies in the U. S. geothermal industry in developing geothermal resources in Costa Rica. ~~We will select a suitable geothermal resource in Costa Rica, apply for and receive a~~ certification of eligibility from the National Electricity Service, prepare an environmental impact study and to carry out negotiations with ICE for a power purchase agreement. At that point, financing for well field and power plant development will be acquired from private sources. The successful completion of the project up through the power purchase agreement will set a precedence for private power development in Costa Rica that can be emulated by other U. S. companies.

It should be stressed that the team presented here has the technical and financial ability to complete the project, bring geothermal electricity on-line, and operate this business in a profitable mode.

The project will take place in four phases: resource feasibility, certification of eligibility, environmental assessment and power purchase negotiations.

Phase 1. Resource Feasibility

1.1 Resource Evaluation

A team of resource experts will visit geothermal prospects in Costa Rica to prioritize their development potential. This will include geologic reconnaissance of prospective areas and evaluation of any survey work on the sites.

1.2 Infrastructure Analysis

The development of a geothermal resource requires site access by heavy equipment and transmission right-of-way for the generated power. These and other infrastructure factors must be included in an analysis of the feasibility of resources development. This data will be collected by engineers during our initial visit to Costa Rica.

1.3 Legal and Institutional Considerations

Costa Rica is on record supporting the concept of private power development through Law #7200. However, it is important for us to understand the detailed procedures that must be followed to reach agreement on a power purchase contract. It is also critical to understand the rules governing investment, the repatriation of profits and Costa Rican tax laws. Our business team will discuss these aspects with representatives of ICE and other government officials during several visits to Costa Rica.

1.4 Report

The information from the Resource Feasibility phase will be combined in a report to DOE that will then be distributed to the U. S. geothermal and other renewable energy companies. Much of the fundamental work we will do will be directly transferable to Costa Rican geothermal projects of other U. S. companies.

The result of this part of the project will be identification of an area for which we can negotiate a power purchase agreement. This area will be identified to DOE at the time of the delivery of the Phase 1 report.

Phase 2. Certification of Eligibility

The team will make application to the National Electricity Service to be named eligible to undertake a specific project. Approval of eligibility is required by Law 7200.

Phase 3. Environmental Assessment

Law 7200 requires that MIRENEM must approve the environmental assessment, and their approval must be presented to the National Electricity Service by the project developer. The environmental assessment must include the following.

1. Possible impact by the activity on the natural and human environment.
2. The inevitable adverse effects if the activity is carried out.
3. The sustained effects on the flora, fauna, air and water.
4. Determination of the specific areas that will suffer deforestation.
5. Quantity of possible waste material generated.
6. Effects on population and human settlement.
7. Programs for reforestation, control of soil erosion, control of water and air contamination and plans for waste handling.
8. Contingency plans to prevent, detect and control adverse effects on the ecosystem.

This phase of the project will result in a report on the path and methodologies used to complete successfully the environmental assessment in such a fashion as to be acceptable to MIRENEM. This report will be made available to the public.

Phase 4. Power Purchase Agreement

Following the completion of Phases 2 and 3, a power purchase agreement can be negotiated with ICE. This power purchase agreement is required to obtain private financing for the development portion of the project.

Budget

The budgets presented below are estimated at the present time.

Phase 1. Resource Feasibility	\$300,000
Phase 2. Certification of Eligibility	\$ 50,000
Phase 3. Environmental Assessment	\$400,000
Phase 4. Power Purchase Agreement	\$ 50,000
	<hr/>
Total	\$800,000

Description of Development Team

The development team proposed here has had a good working relationship on past projects. There is capability on this team to conduct a project from initial geological surveys through power plant operation. A brief summary of the capabilities of the individual companies are contained in the paragraphs below.

All of the companies on this team are members of the National Geothermal Association (NGA). Through their NGA membership, all of these companies have received a Certificate of Review from the Department of Commerce that enhances their ability to work on overseas projects.

Geothermal Development Associates (GDA). Geothermal Development Associates has been a power project developer and consultant to the geothermal industry since its incorporation in 1978. GDA is experienced in project management, resource assessment, drilling management, project feasibility, project financing, engineering design, construction supervision, start-up and performance testing, power sales contract negotiations, utility interconnection studies, and permitting. The firm has been involved in all phases of power plant development in California, Nevada and Utah. Projects include binary cycle, single-flash, and dual-flash systems, and range in size from as little as 600 KW to 28 MW capacity. GDA presently holds important geothermal leasehold interests at four prime sites in Nevada and is actively pursuing multiple developments in Indonesia, Philippines and Latin America.

Dames and Moore. Dames & Moore is a worldwide professional firm providing consultation in the earth and environmental sciences, engineering, design and regulatory assistance fields. Since its founding in 1938, the firm has grown in size and technical capability with currently over 93,000 projects completed for nearly 24,000 clients throughout the world. The organization employs more than 3,500 professional and support staff based in 110 offices spanning the globe.

Dames & Moore has a large and diverse staff of scientists, planners, engineers and technicians with expertise in all environmental disciplines. Environmental services routinely provided by Dames & Moore include existing conditions surveys, inventories, impact evaluations and planning for appropriate mitigation measures. Dames & Moore was one of the first consulting firms to prepare an Environmental Impact Statement under requirements of the U. S. National Environmental Policy Act of 1969 (NEPA).

For many years, Dames & Moore has provided technical services to the geothermal industry, including geotechnical and environmental planning of both high- and low-temperature resources. The company has recently expanded its services to include environmental management of steam field and power plant operations.

University of Utah Research Institute (UURI). The University of Utah Research Institute, founded in 1972, is a non-profit research company owned by the University of Utah, but the management is separate from the University's. UURI has an experienced staff which concentrates on technology development and application in the exploration for geothermal resources. For the past 15 years, UURI has conducted geothermal research and exploration for the geothermal industry and the DOE Geothermal Program. UURI has developed methodologies for the cost-effective exploration and utilization of geothermal resources from the initial reconnaissance through production well drilling.



The Deputy Secretary of Energy

1000 Independence Avenue., S.W.

Washington, D.C. 20585

(202) 586-5500 • FAX (202) 586-0148

November 3, 1993

MEMORANDUM FOR **BOB SAN MARTIN**
FROM: **BILL WHITE** *BW*
SUBJECT: **GEOTHERMAL DEVELOPMENT IN COSTA RICA**

As you know, Costa Rica is an amazing country, with 5 percent of the world's known species. It plans to increase its hydroelectric generating capacity by 5 percent a year. Environmental groups active within the company fear that they will need to damn up all of their wild rivers to do this.

Geothermal energy is an alternative. There are a number of active volcanoes. There are two geothermal projects being put in. Attached is a memo from an economics officer within our Embassy concerning two projects, Miravalles I and II. Currently they are both planned to be 55 megawatt plants. I find it hard to believe that no American firm can effectively compete with the technology offered by Mitsubishi.

I would like to use this as a test case to evaluate whether we can mobilize a plan for cracking a foreign market. This can be a real win both for American commerce and for the environment. Please give me your thoughts on this and a potential action plan.

PROPOSAL FOR THE SUPPORT OF TRAVEL EXPENSES
NATIONAL GEOTHERMAL ASSOCIATION TASK FORCE
CENTRAL AMERICA TRIP, JUNE, 1994

The National Geothermal Association has formed a Task Force of geothermal experts to represent the U.S. geothermal industry in negotiating for geothermal development contracts and power sales agreements in Costa Rica, El Salvador, and Guatemala. The first trip of this Task Force is scheduled for June 19 through 29, 1994. The group, with DOE and Embassy staff support will meet the major government officials in each country. It is hoped that they can return from this trip with a Memorandum of Understanding or a Letter of Agreement to lay the foundation for future negotiations.

The following geothermal industry representatives will participate:

- Dr. Dennis L. Nielson, Senior Geologist, University of Utah Research Institute
For Geothermal Resource Exploration and Field Evaluation
- Mr. Domenic J. Falcone, President, Creston Financial Group
For Geothermal Field Development and Power Plant Financing
- Mr. G. Martin Booth III, President, Geothermal Development Associates
For Geothermal Power Project Development and Management
- Mr. Paul Brophy, Environmental Geologist, Dames & Moore, Inc.
For Geothermal Environmental Engineering

This is a request for Travel and Per Diem support for these individuals to participate in this geothermal Task Force to Central America. Cost estimates are based on basic coach class airline fares and the U.S. government Per Diem rates of March 1994. The hotel reservations will be made for the group by the U.S. Embassies, so no rate information is available at this time.

This schedule will be for West Coast travelers. Other travelers will book the same flights within Central America.

Sunday, 19 June, San Francisco, California, to San Jose, Costa Rica, American #981
Saturday, 25 June, Dallas - Ft. Worth, Texas, to San Francisco, California, American #71
Airline Fare: \$752

Government Per Diem rates:

San Jose, Costa Rica \$170/day @5 days \$850

Total Per Diem: $\$850 \times 4 = \3400

Total from San Francisco: $\$700 \text{ to } 900 \times 3 = \2700

Total from Salt Lake City: \$900

Total estimated cost: \$7000

**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: June 13, 1994

**TO: STACY
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108**

TELEFAX: 801-584-4453

5 PAGES FOLLOW.

**Marshall Reed
Geothermal Division
EE-122**

202-586-8076

Telefax: 202-586-5124

June 13, 1994

Mr. John E. H. Ryan, Director
International Fund for Renewable
Energy and Energy Efficiency
750 First Street, Suite 930, NE
Washington, DC 20002

Dear John:

In a meeting you attended, with Robert Lawrence representing the National Geothermal Association, Marshall Reed and Gladys Hooper representing the DOE geothermal program, and Judy Segal of ECRE, both you and Judy agreed to support the focus of NGA on breaking into the geothermal development market in Costa Rica. Judy Segal promised that ECRE would pay the travel expenses of an NGA task force to Costa Rica. This NGA effort was in response to a request from Bill White, Deputy Secretary of Energy, to offer a U.S. development alternative to Costa Rica plans to install 2,500 MW in four hydroelectric dams that would flood 20 percent of the rain forest. The member companies of NGA would not undertake this activity without the strong support of Bill White, Judy Segal, and you! The geothermal development market in Central America has been controlled by Electroconsult of Italy and by Mitsubishi of Japan. With tied aid and below market loans, these companies present a formidable presence to attack.

Recently, Marshall Reed contacted Judy Segal to inquire about the mechanism to have ECRE pay for the NGA task force to Costa Rica, since their trip is now scheduled for June 19, 1994. Judy said that she had no funds and that we should contact Dave Anderson to see if he had any money left. This was a major blow, since we had assumed we had Judy's support for this risky effort. Marshall reported that he had mentioned the problem to you, and that you and Judy were able to identify \$5,000 for support of the trip; this is half of our estimated travel costs for industry. Marshall had mentioned at that time they had plans to visit other countries as well. The trip is now back to just Costa Rica to allow the industry to concentrate on private geothermal development in that country.

In response to your request to Marshall that NGA send you a proposal for the travel costs, I have enclosed our estimated cost figures for the industry participation for the trip to Costa Rica. In addition to the four industry participants, Gary Ward and Marshall Reed of DOE and Marcelo Lippmann of Lawrence Berkeley Lab will also participate to strengthen the message that the U.S. geothermal industry has strong government support. The travel expenses of these three and the expenses of translators and local transportation will be covered by DOE.

We hope for your continued support of our Central American geothermal effort.

Sincerely

Phillip Michael Wright, President

NGA

PROPOSAL FOR THE SUPPORT OF TRAVEL EXPENSES
NATIONAL GEOTHERMAL ASSOCIATION TASK FORCE
CENTRAL AMERICA TRIP, JUNE, 1994

The National Geothermal Association has formed a Task Force of geothermal experts to represent the U.S. geothermal industry in negotiating for geothermal development contracts and power sales agreements in Costa Rica. The first trip of this Task Force is scheduled for June 19 through 25, 1994. The group, with DOE and Embassy staff support will meet the major government officials in each country. It is hoped that they can return from this trip with a Memorandum of Understanding or a Letter of Agreement to lay the foundation for future negotiations.

The following geothermal industry representatives will participate:

Dr. Dennis L. Nielson, Senior Geologist, University of Utah Research Institute

For Geothermal Resource Exploration and Field Evaluation

Mr. Domenic J. Falcone, President, Creston Financial Group

For Geothermal Field Development and Power Plant Financing

Mr. G. Martin Booth III, President, Geothermal Development Associates

For Geothermal Power Project Development and Management

Mr. Paul Brophy, Environmental Geologist, Dames & Moore, Inc.

For Geothermal Environmental Engineering

This is a request for Travel and Per Diem support for these individuals to participate in this

geothermal Task Force to Central America. Cost estimates are based on basic coach class airline fares and the U.S. government Per Diem rates of March 1994. The hotel reservations will be made for the group by the U.S. Embassies, so rate information is unavailable at this time.

This schedule will be for West Coast travelers. Other travelers will book their own flights.

Sunday, 19 June, San Francisco, California, to San Jose, Costa Rica, American #981

Saturday, 25 June, Costa Rica to Dallas - Ft. Worth, Texas, to San Francisco, California,

American #71

Airline Fare: \$852

Government Per Diem rates:

San Jose, Costa Rica	\$170/day	@6 days	\$1020 each
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Total Per Diem: $\$1020 \times 4 = \4080

Total air fare from San Francisco: $\$1100 \times 2 = \2200

Total air fare from Salt Lake City: \$1100

Total from Reno: \$1125

NGA overhead (est.): \$1000

Total estimated cost: \$9505

PMU version

PROPOSAL FOR THE SUPPORT OF TRAVEL EXPENSES
GEOTHERMAL ENERGY ASSOCIATION
CENTRAL AMERICA TRIP, JUNE, 1994

The Geothermal Energy Association has formed a Task Force of geothermal experts to represent the U.S. geothermal industry in beginning negotiations which will ultimately lead to development contracts and power sales agreements in Costa Rica and El Salvador. The first trip of this task force is scheduled for 19 - 29 June 1994. The group, with DOE and Embassy staff support, will meet the major government officials in each country. Emphasis during the trip will be on Costa Rica because that country is moving toward adoption of new laws that will bring the possibility of private power development.

The following geothermal industry representatives will participate:

Mr. G. Martin Booth III, President, Geothermal Development Associates. Mr. Booth's expertise is in geothermal power project development and management.

Mr. Domenic J. Falcone, President, Creston Financial Group. Mr. Falcone's company is involved in financing of geothermal energy projects.

Dr. Dennis L. Nielson, Associate Director, Earth Science Laboratory, University of Utah Research Institute. Dr. Nielson is experienced in geothermal exploration, field development and drilling.

Mr. Paul Brophy, Environmental Geologist, Dames & Moore, Inc. Mr. Brophy is well experienced in the environmental aspects of geothermal development.

FUNDING REQUESTED

This proposal addresses travel and per diem support for the individuals named above. Cost estimates are based on coach class airline fares and U.S. Government per diem rates as of March, 1994. Hotel reservations will be made for the group by the Embassies. The total amount requested is:

Travel Costs for 4 people	\$9200
Overhead	800
TOTAL	\$10,000

Marshall Reed version

PROPOSAL FOR THE SUPPORT OF TRAVEL EXPENSES
NATIONAL GEOTHERMAL ASSOCIATION TASK FORCE
CENTRAL AMERICA TRIP, JUNE, 1994

The National Geothermal Association has formed a Task Force of geothermal experts to represent the U.S. geothermal industry in negotiating for geothermal development contracts and power sales agreements in Costa Rica, El Salvador, and Guatemala. The first trip of this Task Force is scheduled for June 19 through 29, 1994. The group, with DOE and Embassy staff support will meet the major government officials in each country. It is hoped that they can return from this trip with a Memorandum of Understanding or a Letter of Agreement to lay the foundation for future negotiations.

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For Geothermal Environmental Engineering

This is a request for Travel and Per Diem support for these individuals to participate in this geothermal Task Force to Central America. Cost estimates are based on basic coach class airline fares and the U.S. government Per Diem rates of March 1994. The hotel reservations will be made for the group by the U.S. Embassies, so no rate information is available at this time.

This schedule will be for West Coast travelers. Other travelers will book the same flights within Central America.

Sunday, 19 June, San Francisco, California, to San Jose, Costa Rica, American #981
Wednesday, 22 June, San Jose, Costa Rica, to San Salvador, El Salvador, Aviateca #960
Friday, 24 June, San Salvador, El Salvador, to Guatemala City, Guatemala, Copa Air #318
Wednesday, 29 June, Guatemala City, Guatemala, to Dallas - Ft. Worth, Texas, American #990
Wednesday, 29 June, Dallas - Ft. Worth, Texas, to San Francisco, California, American #71
Airline Fare: \$752

Government Per Diem rates:

San Jose, Costa Rica	\$170/day	@3 days	\$510
San Salvador, El Salvador	\$131/day	@2 days	\$262
Guatemala City, Guatemala	\$156/day	@5 days	\$780
Total Per Diem:	\$1552		

Total from San Francisco: $\$2304 \times 3 = \6912

Total from Salt Lake City: \$2300

Total estimated cost: \$9212



UURI

University of Utah Research Institute
Earth Science Laboratory
391 Chipeta Way, Suite C
Salt Lake City, UT 84108-1295
USA

Phone: 801-584-4422

FAX: 801-584-4453

Facsimile (FAX) Cover Page

From: Mike Wright

Date: June8, 1994

To: De Rasser
GRC

Number of pages including this one: 3

Message or Comments:

5/31/74
Costa Rica

*** UNCLASSIFIED ***

FOR: DOFLECA

ROUTINE -- UNCLASSIFIED -- DSSCS MESSAGE -- 4871 CHARACTERS
VZCZCMSS9428

ACTION = DOE,DOE CMS(1),AN1(1),EP(5)

DOE,OIN IDD(-),EETID(-)

INFO = ** UNASSIGNED **

MLN = 14604 DAN = 402-115166

RR RHEBDOE

DE RUEHSJ #3736 1472025

ZNR UUUUU ZZH

EZ02:

R 272024Z MAY 94

FM AMEMBASSY SAN JOSE

TO SECSTATE WASHDC 1099

BT

UNCLAS SAN JOSE 03736

E.O. 12356: N/A

TAGS: ENGR, OTRA, CS

SUBJECT: COUNTRY CLEARANCES FOR U.S. DEPARTMENT OF ENERGY
(DOE) AND U.S. GEOTHERMAL INDUSTRY REPRESENTATIVES

EZ05:

REF: A) STATE 133327

B) STATE 140563

1. POST IS PLEASED TO GRANT COUNTRY CLEARANCES TO DOE REPRESENTATIVES GARY WARD, MARSHAL REED, AND MARCELO LIPPMANN, AND U.S. GEOTHERMAL INDUSTRY REPRESENTATIVES DENNIS NIELSEN, DOMENIC FALCONE, MARTIN BOOTH AND PAUL BROPHY TO TRAVEL TO COSTA RICA FROM JUNE 19 TO JUNE 22 TO DETERMINE WHAT STEPS ARE NEEDED IN DEVELOPING GEOTHERMAL ENERGY FOR PRIVATE ELECTRIC POWER GENERATION AND TO SEARCH FOR VIABLE GEOTHERMAL PROJECTS THAT COULD BE UNDERTAKEN.

2. DOE AND GEOTHERMAL INDUSTRY REPRESENTATIVES SHOULD BE AWARE THAT ALTHOUGH COSTA RICA HAS EXCELLENT POTENTIAL FOR DEVELOPING GEOTHERMAL POWER, OPPORTUNITIES FOR PRIVATE ELECTRIC POWER GENERATION ARE VERY LIMITED IN COSTA RICA. THE COSTA RICAN CONSTITUTION GIVES THE STATE-OWNED ELECTRIC AND TELECOMMUNICATIONS COMPANY -- INSTITUTO COSTARRICENSE DE ELECTRICIDAD (ICE) -- A MONOPOLY ON THE GENERATION AND SALE OF ELECTRICITY IN COSTA RICA. THE ONLY EXCEPTION IS THAT PRIVATE COMPANIES MAY OWN AND OPERATE ELECTRIC GENERATION PLANTS UP TO 20 MW AND SELL THE POWER TO ICE.

3. CONTROL OFFICER IS ECONOMIC COUNSELOR BEN FAIRFAX, TEL. (506) 220-3939, EXT. 2383, (506) 232-0784 (HOME). THE PROPOSED SCHEDULE AND HOTEL ACCOMMODATION INFORMATION WILL BE SENT VIA SEPTTEL.

4. COSTA RICA'S RAINY SEASON HAS BEGUN. THIS USUALLY

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*** UNCLASSIFIED ***

MEANS AFTERNOON AND EVENING SHOWERS, HEAVY AT TIMES.
TRAVELERS WILL NEED LIGHTWEIGHT CLOTHES AND AN UMBRELLA.

5. THREAT ASSESSMENT: THE THREAT OF TERRORIST ACTION
AGAINST U.S. PERSONNEL IS LOW IN COSTA RICA, BUT THEFTS
AND OTHER CRIMES ARE A LOCAL PROBLEM. U.S. VISITORS
SHOULD REMAIN VIGILANT AND EXERCISE CAUTION JUST AS THEY
WOULD IN ANY OTHER LARGE URBAN AREA.

BECELIA

BT
#3736

NNNN

*** UNCLASSIFIED ***

*** UNCLASSIFIED ***

FOR: DOFLECA

ROUTINE -- UNCLASSIFIED -- DSSCS MESSAGE -- 12890 CHARACTERS

VZCZCMSS4462

ACTION = DOE,DOE AN1(2),CMS(1),EP(5),PO9(1)

DOE,OIN IDD(-),EETID(-)

INFO = ** UNASSIGNED **

MLN = 19783 DAN = 403-100610

RR RHEBDOE

DE RUEHSJ #3793/01 1522150

ZNR UUUUU ZZH

EZ02:

R 012149Z JUN 94

FM AMEMBASSY SAN JOSE

TO SECSTATE WASHDC 1132

BT

UNCLAS SECTION 01 OF 02 SAN JOSE 03793

**** SECTION BREAK ****

SECTION 01 OF 02

SECSTATE PLEASE PASS TO DEPT. OF ENERGY (DOE):
GWARD/MREED/MLIPPMAN

E.O. 12356: N/A

TAGS: BBSR, ENRG, CS

SUBJECT: COSTA RICA'S FIRST GEOTHERMAL PLANT BUILT WITH

EZ05:

MAJOR ASSISTANCE FROM THREE U.S. COMPANIES

THIS CABLE WAS ORIGINALLY SENT 4/14. WE ARE RESENDING
IT GIVEN THE UPCOMING VISIT OF GARY WARD, MARSHALL REED
AND MARCELO LIPPMAN.

FCS/SAN JOSE LOOKS FORWARD TO MEETING THE VISITING TEAM
AND SHARING MORE INFORMATION ABOUT THIS PROJECT. WE
ARE ARRANGING FOR YOU TO VISIT THIS GEOTHERMAL PLANT.

1. SUMMARY: MARCH 25, 1994 WAS THE INAUGURATION OF
COSTA RICA'S FIRST GEOTHERMAL PLANT, MIRAVALLS I, IN
GUANACASTE, COSTA RICA A PROJECT THAT FCS SAN JOSE
STARTED REPORTING ON (IN THE FORM OF GOVERNMENT
TENDERS) IN 1989.

PHASE ONE OF THE TWO-PHASED MIRAVALLS OPERATION COST
OVER \$158 MILLION DOLLARS SUPPORTED BY FUNDS FROM THE
JAPANESE GOVERNMENT WITH COOPERATION FROM THE OVERSEAS
ECONOMIC COOPERATION FUND AND THE INTERAMERICAN
DEVELOPMENT BANK. IN ADDITION TO THE 55,000 KW
MARUBENI TURBINE ENGINES, U.S. COMPANIES -- NABORS, AIR
DRILLING AND HALLIBURTON WERE INVOLVED IN OVER USD\$ 20
MILLION WORTH OF DRILLING ACTIVITY WHICH -- MADE THE
TURBINES QUOTE A GO UNQUOTE. THE AMERICAN DRILLING
COMMUNITY SHOULD BE PROUD OF THESE THREE COMPANIES AND

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THE EXCELLENT WORK THEY HAVE PERFORMED IN NORTHWEST COSTA RICA. SOME 16 WELLS HAVE BEEN DRILLED BY NABORS, AIR DRILLING AND HALLIBURTON IN THIS FIRST PHASE (FOUR MORE ARE PENDING). WELL DEPTH RANGES FROM 1,800 METERS TO 3,000 METERS. ALL THREE COMPANIES PLAN TO BID ON MIRAVALLS II (10-12 MORE WELLS) AND SHOULD HAVE AN EXCELLENT CHANCE TO CONTINUE THEIR PRESENCE IN COSTA RICA. BOTH NABORS AND AIR DRILLING REMARK THAT THEIR EXPERIENCE IN COSTA RICA HAS BEEN EXTREMELY POSITIVE. END SUMMARY.

2. SCO GALINDO SPENT A FULL DAY AND A-HALF VISITING THE INSTALLATIONS OF THE THREE AMERICAN COMPANIES, NABORS, AIR DRILLING AND HALLIBURTON, INVOLVED IN THIS MAJOR GEOTHERMAL PROJECT IN NORTHWEST, VOLCANO-ACTIVE, COSTA RICA (UNFORTUNATELY THE SCO DID NOT MEET WITH ANYONE FROM HALLIBURTON).

3. DUE TO SCHEDULING CONFLICTS SCO GALINDO WAS THE ONLY STAFF MEMBER ABLE TO ATTEND THE INAUGURAL CEREMONIES WHICH CONCLUDED ALMOST TWO YEARS OF OPERATION. OVER 3,000 ICE (ICE-INSTITUTO COSTARRICENSE DE ELECTRICIDAD IS COSTA RICA'S STATE MONOPOLY ELECTRIC COMPANY) EMPLOYEES, PRESIDENT CALDERON AND PRESIDENT-ELECT JOSE MARIA FIGUERES AND A HOST OF OTHER DIGNITARIES TO INCLUDE THE JAPANESE AMBASSADOR AND HIS 15-MEMBER DELEGATION WERE PRESENT AT THE OPENING CEREMONIES. THE JAPANESE AMBASSADOR ALSO ADDRESSED THE CROWD.

4. BILLED AS QUOTE THE CLEAN ENERGY SOURCE UNQUOTE, THE IMPETUOUS FOR THE MIRAVALLS PROJECT BEGAN IN THE 70'S DURING THE OIL CRISIS WHEN COSTA RICA REALIZED IT NEEDED TO DIVERSIFY ITS ENERGY SOURCES. TODAY, COSTA RICA BOASTS OF NUMEROUS EXISTING, NEW AND FUTURE ENERGY PROJECTS TO INCLUDE HYDRO, PETRO, GEOTHERMAL AND SOON, WIND-POWER ENERGY SOURCES. IT HAS, INDEED, DIVERSIFIED.

5. THE APPROACH TO THE AREA, LOCATED IN THE SHADOWS OF A RECENTLY ACTIVE VOLCANO, IS A MIXTURE OF THE REAL AND SURREAL. THE QUASI-MOON LIKE TOPOGRAPHY OF THE AREA IS GENTLY DISRUPTED WITH AN ESTIMATED 3 MILES OF ABOVE GROUND SHINNING SILVER TUBING THE WIDTH OF THE WIDEST SEQUOIA TREE OF NORTHERN CALIFORNIA. IT IS WITHIN THIS TUBING THAT VAPOR FROM THE WELLS DRILLED BY THE AMERICAN COMPANIES IS CARRIED TO THE TURBINES HOUSED IN A BUILDING THE SIZE OF AN ARMOURIES.

6. THE THREE AMERICAN COMPANIES, COLLECTIVELY, WERE RESPONSIBLE FOR EXPLORING GEOTHERMAL ENERGY (VAPOR) THROUGH 16 PRE-DESIGNATED WELLS. NABORS' U.S. MANAGER

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AND LOCAL REPRESENTATIVE WERE RIGHTFULLY PROUD TO BOAST THAT THE EQUIPMENT USED FOR TWO COMPLETE DRILLING TOWERS (ONLY TWO ARE IN FULL USE) CAME IN BARGES THAT REQUIRED 120 (YES 120) TRIPS BY LARGE 18 WHEELERS WHO TOOK THE PRECIOUS CARGO (WITHOUT ANY ACCIDENTS WHATSOEVER) FROM THE PIER IN LA CALDERA TO THE MIRAVALLS SITE. THE UNLOADING OF BOTH SOPHISTICATED UNCLAS SECTION 02 OF 02 SAN JOSE 03793

SECSTATE PLEASE PASS TO DEPT. OF ENERGY (DOE):
GWARD/MREED/MLIPPMAN

E.O. 12356: N/A

TAGS: BBSR, ENRG, CS

SUBJECT: COSTA RICA'S FIRST GEOTHERMAL PLANT BUILT WITH MAJOR ASSISTANCE FROM THREE U.S. COMPANIES

COMPUTERS, RIGS, CRANES, FORKLIFTS, AND DIRTY, USED BUT HIGHLY EFFICIENT U.S. DRILLING MATERIAL (9,000 TONS TOTAL WEIGHT) WAS DONE IN RECORD TIME FOR U.S. MUCH LESS COSTA RICAN STANDARDS.

7. THE SCO WAS IMPRESSED WITH THE LEVEL OF FIRST CLASS COMMITMENT (ACROSS THE BOARD) MADE BY NABORS INC. NABORS EMPLOYS, FEEDS AND HOUSES SOME 70 COSTA RICANS. APPROXIMATELY 30 U.S. NABORS' EMPLOYEES, TAKING 30 DAY SHIFTS IN COSTA RICA, WORK ALONG SIDE THE 70 COSTA RICANS. U.S. NABORS' EMPLOYEES HAVE WORKED ON GEOTHERMAL AND OIL DRILLING PROJECTS THROUGHOUT THE MIDDLE EAST, ASIA AND SOUTH AMERICA (BRAZIL, ARGENTINA, ETC.) NONE, HAVE HAD AN EXPERIENCE AS POSITIVE AS THE ONE THEY ARE HAVING IN COSTA RICA WITH THEIR COSTA RICAN EMPLOYERS. WITHIN THE LAST TWO YEARS THERE HAS BEEN ONLY ONE SEVERE ACCIDENT, COMPLETELY UNRELATED TO WORK, SUFFERED BY A COSTA RICAN NABORS' EMPLOYEE.

8. THE SCO WAS PRESENT WHEN PREPARED LUNCHES WERE DELIVERED TO THE TOWER WORKERS (BOTH COSTA RICANS AND AMERICANS WORK 12 HOUR SHIFTS). THESE LUNCHES CAME FROM NABORS' RENTED HOUSES WHERE LARGE CAPACITY FREEZERS HOUSE FOOD FOR AN ARMY. FORD VANS (ALL IMPORTED) DELIVER, ON SCHEDULE, WORKERS AND FOOD. IT'S RUN LIKE THE BEST ARMY OUTFIT.

9. ON AVERAGE, THE NABORS' OPERATION AND NABORS' EMPLOYEES (U.S. AND COSTA RICAN) GENERATE APPROXIMATELY USD\$8-10,000 WORTH OF REVENUE IN THE GUANACASTE REGION EVERY MONTH (HOUSING, FOOD, EMPLOYEES RELATED TO HOUSING, TRANSPORTATION, ETC.). THE GUANACASTE REGION IS ONE OF COSTA RICA'S POOREST REGIONS.

10. THE SCOPE AND BREATH OF THE 4 STORY DRILLING

*** UNCLASSIFIED ***

**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: June 9, 1994

**TO: Dr. Phillip M. Wright
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108-1295**

TELEFAX: 801-584-4453

6 PAGES FOLLOW.

Embassy staffing problems have eliminated El Salvador from our trip! Guatemala is out because the Energy Minister and Geothermal Director will be in Puerto Rico that time. The Embassy in Costa Rica has reserved rooms for us in Hotel Corobici, San Jose. Background cables are attached.

**Marshall Reed
Geothermal Division
EE-122**

**202-586-8076
Telefax: 202-586-5124**

May 27, 1994

Mr. John E. H. Ryan, Director
International Fund for Renewable
Energy and Energy Efficiency
750 First Street, Suite 930, NE
Washington, DC 20002

Dear John:

In a meeting you attended, with Robert Lawrence representing the National Geothermal Association, Marshall Reed and Gladys Hooper representing the DOE geothermal program, and Judy Siegal of ECRE, both you and Judy agreed to support the focus of NGA on breaking into the geothermal development market in Costa Rica. Judy Siegal promised that ECRE would pay the travel expenses of an NGA task force to Costa Rica. This NGA effort was in response to a request from Bill White, Deputy Secretary of Energy, to offer a U.S. development alternative to Costa Rican plans to install 2,500 MW in four hydroelectric dams that would flood 20 percent of the rain forest. The member companies of NGA would not undertake this activity without the strong support of Bill White, Judy Segal, and you! The geothermal development market in Central America has been controlled by Electroconsult of Italy and by Mitsubishi of Japan. With tied aid and below market loans, these companies present a formidable presence to attack.

Recently, Marshall Reed contacted Judy Siegal to inquire about the mechanism to have ECRE pay for the NGA task force to Central America since their trip is now scheduled for June 19, 1994. Judy said that she had no funds and that we should contact Dave Anderson to see if he had any money left. This was a major blow, since we had assumed we had Judy's support for this risky effort. Marshall reported that he had mentioned the problem to you, and that you and Judy were able to identify \$5,000 for support of the trip; this is half of our estimated travel costs for industry.

In response to your request to Marshall that NGA send you a proposal for the travel costs, I have enclosed our estimated cost figures for the industry participation for the trip to Central America. In addition to the four industry participants, Gary Ward and Marshall Reed of DOE and Marcelo Lippmann of Lawrence Berkeley Lab will also participate to strengthen the message that the U.S. geothermal industry has strong government support. The travel expenses of these three and the expenses of translators and local transportation will be covered by DOE.

We hope for your continued support of our Central American geothermal effort.

Sincerely

Phillip Michael Wright, President
NGA

**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

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**Marshall Reed
Geothermal Division
EE-122**

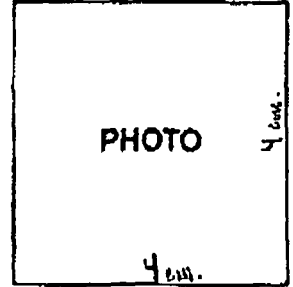
202-586-8076

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Consulado General de El Salvador
1010 16th Street, N.W., 3rd Floor
Washington, D.C. 20036

APPLICATION FOR VISA TO ENTER EL SALVADOR
Form 100



LEFT THUMB PRINT

RIGHT THUMB PRINT

No. _____

I hereby apply for a visa to enter El Salvador as a _____ (tourist, diplomat, business, transit).

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PLACE AND DATE OF BIRTH: _____

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LENGTH OF STAY IN EL SALVADOR: _____

PERSONS ACCOMPANYING AND RELATIONSHIP:

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_____	_____	_____
_____	_____	_____
_____	_____	_____
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 BT
 UNCLAS STATE 140563

E. O. 12356: N/A
 TAGS: ENRG
 SUBJECT: CENTRAL AMERICAN VISIT BY U. S.
 DEPARTMENT OF ENERGY (DOE) AND U. S. GEOTHERMAL
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1. THIS IS AN ACTION CABLE.
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PAGE 02 OF 03 CSN = 3480
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26/0406Z

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**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: May 27, 1994

**TO: Dr. Dennis L. Nielson
University of Utah Research Institute
391 Chipeta Way, Suite C
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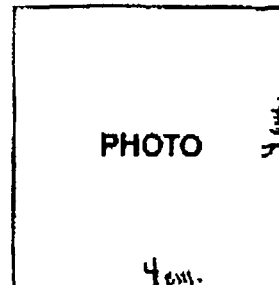
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WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: May 23, 1994

**TO: Dr. Phillip M. Wright
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108-1295**

TELEFAX: 801-584-4453

5 PAGES FOLLOW.

This is some background information on the politics of energy in Costa Rica. Mike Wright is planning to telephone Christiana Figueres, sister of the president, to get her views on BOT type development as a way around the restrictions on private generation.

**Marshall Reed
Geothermal Division
EE-122**

202-586-8076

Telefax: 202-586-5124

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DON ROSENTHAL
GARY WARD
BOB TASK
JESSICA HIRST**

FROM: AIMÉE CHRISTENSEN

RE: UPDATE ON COSTA RICA JOINT INITIATIVE

DATE: MAY 20, 1994

I have enclosed two documents, one a meeting report on the May 16 meeting, and second, a memo from me to David Rhodes in the Vice President's Office regarding the Costa Rica initiative.

The Vice President will be traveling to Honduras and plans to meet with the six Central American Presidents. We are hoping that he might highlight our partnership as an example for future cooperation in the area of sustainable energy use and the mitigation of climate change.

On the evening of May 16, I attended a dinner with the Costa Rican delegation and both Southern Electric and the Edison Electric Institute were present. Both asked a number of questions regarding Joint Implementation and showed interest in pursuing investment opportunities in Costa Rica under the auspices of our initiative.

If you have any questions, feel free to give me a call (6-4576). I will need input for a memorandum of cooperation which Christiana Figueres agreed is key to ensure that action will follow our words. Thank you for your help.

MEETING REPORT

RE: Monday, May 16 Meeting with Costa Rican delegation to discuss cooperation in the area of climate change and sustainable energy use.

DATE: MAY 18, 1994

The Costa Rican delegation members were: Alvaro Umana, former Minister of Natural Resources, Energy and Mines; Teofilo de la Torre, President of the Electricity Institution of Costa Rica (ICE); and Christiana Figueres of the Hawthorne Group in Rosslyn, VA.

The purpose of the meeting was for policy staff to follow up on your discussions with Costa Rican President Figueres regarding cooperation in the area of climate change and sustainable development. The meeting was very productive and we are currently drafting a memorandum of cooperation which will focus our joint work on climate change issues and identify concrete proposals for implementation. We hope to showcase our partnership at the Americas Summit, December 9-10, 1994.

The focus of the meeting was a discussion of Joint Implementation, and how DOE could facilitate joining investors with Costa Rican needs in this area. Alvaro Umana, who is heading President Figueres' task force to develop a Climate Change Plan, focused on carbon off-sets through energy efficiency, forest protection and replanting.

While we are excited about their commitment to forest protection, for our joint project to be more attractive to the USIJI process, we are also interested in demand-side management and energy sector diversification, especially in relation to our upcoming geothermal mission. President Figueres has voiced his interest in both efficiency and non-hydro renewable energy.

As you know, the Costa Rican state-owned electric company, ICE, relies on hydropower, mostly large-scale, for 80% of its electricity, and has planned a series of four dams through 2005. There are many questions about the environmental impacts of these, including greenhouse gas emissions and the destruction of carbon-sequestering forests. In addition, the debt incurred to build the four dams will equal 55% of Costa Rica's external debt.

Alvaro Umana and the Figueres Administration, including Rene Castro, the new Minister for Natural Resources, Energy and Mines, are interested in promoting alternatives to large-scale hydro and in increased protection and recovery of their forested lands.

While ICE President Teofilo de la Torre is interested in maintaining their focus on hydroelectric projects, the political climate is changing around him. We all agreed on an active cooperation leading to the Americas Summit in December.

We look forward to building a set of proposals for this joint project and feel that it will be a model for country partnerships in the area of Climate Change mitigation and sustainable development.



Department of Energy
Washington, DC 20585

MEMORANDUM TO DAVID RHODES, OVP

FROM: AIMÉE CHRISTENSEN

RE: COSTA RICA INITIATIVE ON CLIMATE CHANGE AND
SUSTAINABLE ENERGY USE

DATE: MAY 20, 1994

Jack Riggs suggested that the Vice President may wish to mention this initiative during his meeting next Tuesday in Honduras.

On April 20, 1994, Costa Rican President-elect José Maria Figueres met with Deputy Secretary Bill White to discuss possible cooperation in the area of climate change and sustainable energy use. At the conclusion of the meeting, White directed his staff to follow up on working together in this area.

On May 16, 1994, staff met with Alvaro Umana, former Minister of Natural Resources, Energy and Mines; Teofilo de la Torre, President of the Electricity Institution of Costa Rica (ICE); and Christiana Figueres of the Hawthorne Group of Rosslyn, VA. The meeting was very productive and we are currently drafting a memorandum of cooperation which will focus our joint work on climate change issues and identify concrete proposals for implementation. We aim to showcase our partnership at the Hemispheric Summit, December 9-10, 1994.

Both sides have agreed that ideally, the project will be designed in accordance with the soon-to-be-released guidelines for the U.S. Initiative on Joint Implementation (USIJI). The USIJI allows for U.S. utilities enrolled in our Climate Challenge program to invest in projects abroad which reduce carbon-dioxide concentrations, either through changes in energy use, or increasing the number of carbon-sequestering forests. The reduction of carbon-dioxide abroad may be counted toward the utilities' voluntary reductions under the Climate Challenge program.

Alvaro Umana, who is heading President Figueres' task force to develop a Climate Change Plan, focused on carbon off-sets through energy efficiency, forest protection and replanting of degraded lands. We are excited about their commitment to forest protection, and are also encouraging both demand-side management and energy sector diversification, especially to non-hydro renewable sources. President Figueres has voiced his interest in both efficiency and non-hydro renewable energy.

The Costa Rican state-owned electric company, ICE, relies on hydropower, mostly large-scale, for 80% of its electricity, and has planned a series of four dams through 2005. There

are many questions about the environmental impacts of these, including greenhouse gas emissions and destruction of carbon-sequestering forests. In addition, the debt incurred to build the four dams will equal 55% of Costa Rica's external public-sector debt.

This is an exciting opportunity to encourage alternatives to the traditional focus on increased production, by locating private-sector investment for efficiency and smaller-scale, more environmentally friendly forms of renewable energy. Alvaro Umana and the Figueres Administration, including Rene Castro, the new Minister for Natural Resources, Energy and Mines, are interested in promoting alternatives to large-scale hydro as well as in increased protection and recovery of their forested lands.

We have all agreed on an active cooperation leading to the Americas Summit in December. We look forward to building a set of proposals for this joint project to create a model for country partnerships in the area of climate change mitigation and sustainable development.

**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: May 23, 1994

**TO: Dr. Phillip M. Wright
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108**

TELEFAX: 801-584-4453

4 PAGES FOLLOW.

Here is yet another Latin American Meeting. It doesn't seem worth attending, but Panel C in the session on Sunday afternoon (page 3) is interesting.

**Marshall Reed
Geothermal Division
EE-122**

202-586-8076

Telefax: 202-586-5124



The Institute of the Americas
presents

ELECTRIC POWER AND NATURAL GAS PROJECTS IN THE AMERICAS:

Privatization and Greenfield Opportunities



June 12 - 14, 1994

La Jolla, California

**Institute of the Americas International Conference Center
and the La Jolla Marriott Hotel**

Co-sponsors:

**U.S. DEPARTMENT OF COMMERCE,
INTERNATIONAL TRADE ADMINISTRATION**

U.S. ENVIRONMENTAL TECHNOLOGY EXPORT COUNCIL (ETEC)

THIRD ANNUAL LATIN AMERICAN ENERGY CONFERENCE

ELECTRIC POWER AND NATURAL GAS PROJECTS IN THE AMERICAS

From the President



I am writing to invite you to attend our upcoming meeting on "Electric Power and Natural Gas Projects in the Americas: Privatization and Greenfield Opportunities," to convene June 12-14 in La Jolla, California. The meeting is the Institute's Third Annual Energy Conference and largest meeting on electric

power and natural gas in the Americas. Over 350 energy industry executives are expected to attend from all over the Americas: utility executives, energy ministry policy makers, investors and investment bankers, engineering executives, lawyers and regulators, suppliers of equipment and expertise, industry analysts, representatives of major projects.

The Institute of the Americas Annual Energy Conference has been broadly recognized by energy leaders as "the regional energy conference to attend," where significant, tangible investment and trade agreements are launched. In addition to the normal conference agenda, we will be able to arrange a limited number of private meetings, where speakers will have the chance to meet one-on-one with U.S. and Latin American companies regarding specific projects and investment opportunities.

This year's speakers will include leading energy investors, key policy makers, and technology suppliers from across the hemisphere. A number of ministerial officials from Latin America will be among the participants - four energy ministers participated in last year's meeting. Emerging trade and investment opportunities will be discussed, as well as major privatizations, regulatory changes, sources of capital and new ventures, including planned international pipelines and power connections.

A special focus this year will be developments in the Andean countries, including power privatizations in Peru, power project development in Colombia, and the much discussed gas pipeline between Bolivia and Brazil. There have been many exciting developments since last June's meeting, and a few set-backs. We are working hard to identify the best opportunities for your business over the next year in the Andes and across the region.

The Third Annual Latin American Energy Conference is an important element of a three-year initiative to promote energy and environmental cooperation in the Americas, initiated by the U.S. Department of Commerce, the Institute of the Americas, and the U.S. Environmental Technology Export Council.

Thank you for considering this invitation. We hope that you will be able to join us.

Sincerely,

Ambassador Paul H. Boeker
President

The meeting will feature presentations by the following invited government and industry leaders:

Carlos Bastos

Secretary of Energy of Argentina

Francisco Acosta

Minister of Energy and Mines, Ecuador

Charles Frank

Executive Vice President, G.E. Capital

Raul Garcia

Gas Industry Regulator, Argentina

Mauricio Gonzales

President, YPFB, Bolivia

Francisco Gutierrez

President, OLADE

Emilio Lozoya Thalmann

Secretary of Energy, Mines and Parastatal Industries, Mexico

Rebecca Mark

President, Chairman and CEO, Enron Development Corp.

Julio Sosa Rodriguez

Minister of Finance, Venezuela

Abdon Vivas Teran

Minister President, Fondo de Inversiones de Venezuela

William H. White

Deputy Secretary of Energy, United States

What industry leaders say
about this conference.

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Mission Energy

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Southern Electric International *

Vinson & Elkins

* Energy Program Steering Committee member

AGENDA

SUNDAY, JUNE 12, 1994

2:30-5:00 p.m. Welcoming remarks. Opening address: **U.S. - Latin American Energy Cooperation**; **William H. White**, Deputy Secretary of Energy, United States

Opening plenary panel: **1994-1995 Outlook for Energy Cooperation in the Americas**

Francisco Gutiérrez, President, OLADE;
Rebecca Mark, President, Chairman and CEO, Enron Development Corp.
Brian D. O'Neill, Senior Vice President, Chase Manhattan Bank

7:00-8:00 p.m. Cocktails

8:00-9:30 p.m. Opening dinner - Keynote: **Privatization and Industry Reorganization Update**; **Julio Soza Rodríguez**, Minister of Finance, Venezuela

MONDAY, JUNE 13, 1994

8:30 a.m. Keynote: **Evaluating the Argentine approach: Lessons for Latin America**; **Carlos Bastos**, Secretary of Energy, Argentina; **Raul Garcia**, Gas Industry Regulator, Argentina

10:00 a.m. Plenary panel: **Prospects for Project Development and Investment**

W. Clay Smith, Assistant to the President and CEO, Southern Electric International;
Jim Steele, Enron Development Corp.;
John Vella, Mission Energy;
Bruce Levy, President, Energy Initiatives Inc.;
Jorge Borja, President, Grupo ICA - Fluor

12:30-2:00 p.m. Luncheon - Keynote: **Asia-Latin American Competition for Energy Project Finance**; **Charles Frank**, Executive Vice President, GE Capital

Afternoon concurrent panels

2:00 p.m.

PANEL A: Peru Power Update

Representatives of ElectroPeru, ElectroLima, regional power companies

PANEL B: Pipelines and International Power Transmission Grid Update: Bolivia-Brazil and Chile-Argentina Developments

Rudolph Araneda, Executive Vice President, Distribuidora de Gas de Chile, **Orlando Galvão**, CFO, Petrobras; Representative, Bolivian government

PANEL C: Central America and Caribbean Electric power utility director, Honduras;

René Nuñez, Empresa Electrica, Guatemala;

Guillermo "Billy" Sol, El Salvador;

Lee Goodwin, Reid & Priest, Jamaica;

Miguel Sanben, Technical Assistant to the President, Dominican Republic

5:00 p.m. Afternoon summary panel: **What Developers Are Looking For in New and Privatized Projects**

7:00-8:00 p.m. Cocktails

8:00-9:30 p.m. Dinner - Keynote: **Ecuador's Energy Privatization Law**; **Francisco Acosta**, Minister of Energy and Mines, Ecuador

TUESDAY, JUNE 14, 1994

8:30 a.m. Keynote: **Venezuelan Power Privatization: Strategy and Timing**; **Abdon Vivas Teran**, President, Fondo de Inversiones de Venezuela
Keynote: **PDVSA's Strategic Planning, Including Ventures with Foreign Investors**; **Ronald Parin**, Advisor to the President, Petróleos de Venezuela

9:15 a.m. Plenary panel: **Financing Projects Under Different Regulatory Environments**

Richard Farmer, Partner, Reid & Priest, Moderator;

Charles J. Wortman, Managing Director, Latin America Corporate Finance Division, The Chase Manhattan Bank N.A., **Brandon Blaylock**, Managing Director, GE Capital - Mexico;
Sara Ordoñez, President, FEN, Colombia, Argentine energy regulator; Latin American fund manager; Rating agency representative

12:30-2:00 p.m. Luncheon - Keynote: **The Bolivian Energy Privatization Program**; **Mauricio Gonzales**, President, YPFB, Bolivia

Afternoon panels

2:00 p.m. **PANEL A: Power Projects in Colombia** **Rafael Herz**, Departamento Nacional de Planeación, Colombia, **Rudolf Godeón**, Grupo Sanford-Mayer, Colombia, **Jorge Castellanos**, Crédito Público, Colombia, **Carrillo Villaveces Atuesta**, Principal Partner and Board Member, Interlink, Colombia, **Michael Madia**, Director, Portfolio Management, ABB Energy Ventures
PANEL B: Brazil Power: Rio Light and Excelisa Update. Uncompleted Projects Update and Overall Strategy. Speakers: TBA

5:30 p.m. Concluding plenary session: **Sector Outlook**

7:00-8:00 p.m. Cocktails

8:00-9:30 p.m. Concluding dinner - Keynote: **Public - Private Energy Cooperation in Mexico: Progress and Prospects**; **Emilio Lozoya Thalmann**, Secretary of Energy, Mines and Parastatal Industries, Mexico

(Invited speakers. Agenda subject to change.)

ABOUT THE INSTITUTE OF THE AMERICAS

As a non-profit independent organization, the Institute is devoted to finding effective responses to some of the major challenges facing the countries of the Western Hemisphere: consolidating democracy and market-oriented economic reforms; extending free trade; countering drug abuse and traffic; and halting environmental deterioration. The Institute currently has five major projects on the topics of privatization, the environment, energy, capital markets and free trade.

The Institute's **Energy Conferences** have established a reputation for delivering quality information and high-level participants from across the Americas. But besides this success story, here are some of our other important and equally successful projects:

Project on Privatization: Building on the success of Chile's early efforts to return corporations to private management, the Institute has assisted Argentina in successfully privatizing their public utilities through international briefings for potential bidders.

In March 1993, we collaborated with the Inter-American Development Bank to sponsor the International Conference on the Reform of Social Security and Pension Funds in Latin America, held here in La Jolla, California. Last July, the Institute organized the successful U.S.-Mexico Conference on Financing Border Infrastructure in San Antonio, Texas. Present were over 300 corporate leaders and seven cabinet secretaries representing the U.S. and Mexico.

The Overseas Private Investment Corporation and the Institute of the Americas organized a meeting of senior Andean officials and international business executives in 1993. The meeting was the first ever held to familiarize international businesses with investment and export opportunities, particularly those arising from privatization, in the Andean nations of Colombia, Ecuador, Peru and Bolivia.

July 18-20, the Institute will host a conference on "The Mexican Health System: Opportunities for Public-Private Cooperation" in La Jolla. This conference will examine private investment in hospitals, managed care organizations and other approaches to improve the delivery of health care services in Mexico. It is co-sponsored by the U.S. Trade and Development Agency.

Project on Capital Markets: The Institute is collaborating with the World Bank and other sponsors to convene the 1994 Capital Markets Conference, titled "Maturing of Latin American Capital Markets," and scheduled for May 15-17 in La Jolla. The meeting will focus on the outlook for institutional investment in the region; Latin American debt performance and outlook; new product development to increase Latin America's access to capital; strategies for lowering the cost of capital; and several sessions on the important area of asset-backed securities.

Project on Free Trade: Was launched in March 1991 with a private consultation of public and private trade experts. It represents an effort to examine the impact of regional trading blocks on the global trading system and is being organized with the collaboration of The Japan Institute of International Affairs.

Project on Environment: The Institute is organizing a high-profile, two-day meeting April 25-26, 1994, focusing on the specifics of Argentina's major water projects, to be attended by a significant number of U.S. engineering firms, technology producers, investors, and federal and international officials. Similar to our previous conference on the clean-up of the Rio Tietê, in São Paulo and our briefing on water projects in Venezuela, this will be an opportunity for Argentina to disseminate detailed project information and also demonstrate its commitment to environmental quality. Participants include the secretary of natural resources and human environment of Argentina, and officials from the provinces of Buenos Aires, Mendoza, Cordoba and Tucuman.

In 1992, the Institute became the secretariat for the U.S.-Mexico Environmental Business Committee. The goals of this group are: to help small businesses handle environmental problems; encourage environmental technology transfer; form business-to-business linkages; promote examples of environmental success stories; and support private-public cooperation in the building of environmental infrastructure. The Institute is providing a one-stop, binational secretariat for the Committee.

Annual Policy Conference: On March 2, 1994 we commenced our annual policy conference on democratic and economic reform, "The 1994 Hemispheric Policy Forum: Reform and Integration: The Challenge for a New Generation". This conference featured policymakers from the Clinton Administration, Canadian, and Latin American governments, who addressed the pressing issues of economic and political reform as well as cooperation and integration in the hemisphere.

Presidential Events: Conference-related or stand alone events such as presidential dinners. President Carlos Saúl Menem of Argentina will visit the Institute on October 1, 1994.

In addition to sponsoring these programs, the Institute recently published its second book on privatization, entitled, *Latin America's Turnaround: Privatization, Foreign Investment and Growth*. The Institute also publishes the award-winning periodical on key issues in the Americas called **HEMISFILE**. HEMISFILE is provided to all members of the Institute, and is also available by subscription.

Please contact Kristie Lawrence, Associate Director of Development, for membership information, and Jeff Carmel, Editor, for information on HEMISFILE.

**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: May 13, 1994

**TO: Dr. Phillip M. Wright
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108**

TELEFAX: 801-584-4453

2 PAGES FOLLOW.

Letter sent to Judy at ECRE.

**Marshall Reed
Geothermal Division
EE-122**

202-586-8076

Telefax: 202-586-5124



Department of Energy

Washington, DC 20585

May 12, 1994.

Mrs. Judy Siegel, President
 United States Export Council
 for Renewable Energy
 122 C Street, 4th Floor, NW
 Washington, DC 20001

Dear Judy:

Our geothermal energy mission to Central America is taking shape and our plans are now being finalized. I thought this would be a good time to give you an update. In view of the inauguration date of 1 June for the new president of El Salvador, we plan our mission for the last two weeks of June. Since the group has evolved, it is useful to give you more information on each individual.

Geothermal Resource Exploration and Field Evaluation:

Dr. Dennis L. Nielson, Senior Geologist
 University of Utah Research Institute
 391 Chipeta Way, Suite C
 Salt Lake City, UT 84108-1295
 TELEPHONE: 801-584-4438
 TELEFAX: 801-584-4453

Geothermal Field Development and Power Plant Financing:

Mr. Domenic J. Falcone, President
 Creston Financial Group
 1800 Harrison Street, 18th Floor
 Oakland, CA 94612
 TELEPHONE: 510-987-8500
 TELEFAX: 510-893-1321

Geothermal Power Project Development and Management:

Mr. G. Martin Booth III, President
 Geothermal Development Associates
 251 Ralston Street
 Reno, NV 89503
 TELEPHONE: 702-322-0938
 TELEFAX: 702-322-1320

Geothermal Environmental Engineering:

Mr. Paul Brophy, Environmental Geologist
 Dames & Moore
 221 Main Street, Suite 600
 San Francisco, CA 94105-1917
 TELEPHONE: 415-896-5858
 TELEFAX: 415-882-9261

Geothermal Reservoir Research and Training:

Dr. Marcelo J. Lippmann, Senior Researcher
Earth Science Division, Building 50E
Lawrence Berkeley Laboratory
Berkeley, CA 94720

TELEPHONE: 510-486-5035

TELEFAX: 510-486-5686

Department of Energy Representative:

Mr. Gary Ward, International Affairs Specialist
U.S. Department of Energy
Office of International Energy Markets
Office of Policy, Planning, and Program Evaluation
1000 Independence Avenue, SW
Washington, DC 20585

TELEPHONE: 202-586-6123

TELEFAX: 202-586-6148

Geothermal Research Program:

Mr. Marshall J. Reed, Program Manager
U.S. Department of Energy
Geothermal Division, EE-122
1000 Independence Avenue, SW
Washington, DC 20585

TELEPHONE: 202-586-8076

TELEFAX: 202-586-5124

With the support of Bill White, the Deputy Secretary of Energy, I believe we will get the attention and help we need from the U.S. Embassies to counteract the strong geothermal marketing efforts of several other countries. We should have a successful mission and be able to return to the U.S. with preliminary agreements or letters of intent from the Central American countries.

Please let me know what procedure you have for covering the travel expenses of the industry participants in this mission. We had discussed this support from US/ECRE at one of our meetings, but I did not get any details earlier.

Thanks for you continuing support and interest.

Sincerely,



Marshall Reed, Program Manager
Geothermal International Program
Geothermal Division, EE-122

**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585
FACSIMILE TRANSMISSION**

DATE: May 12, 1994
TO: Dr. Phillip M. Wright
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108

TELEFAX: 801-584-4453

1 PAGE FOLLOWS.

I just received this by telefax from Dom. I interpret it to mean that we will pay \$5,000 to \$7,000 for his help.

Marshall Reed
Geothermal Division
EE-122
202-586-8076

Telefax: 202-586-5124

CRESTON FINANCIAL GROUP

1800 Harrison Street
18th Floor
Oakland, CA 94612

(510) 987-8300
Fax (510) 893-1321

MEMORANDUM

TO: Marshall Reed
FROM: Domenic Falcone
RE: Geothermal Mission to Costa Rica
DATE: May 10, 1994

I thought it would be a good idea to confirm our conversation of yesterday concerning the above referenced mission to Costa Rica. My availability during June is flexible, however, I would prefer being in Costa Rica during the week of June 13th or 20th. The specific days can be at your choice.

I would like to limit my participation to Costa Rica only since I believe if you are to accomplish the result you are seeking, dedication to one country in order to achieve closure is the best opportunity I have to assist you. As I mentioned, I would be pleased to be available for follow-up after the mission goes on to other countries should that be necessary in order to get a Memorandum of Understanding signed. At this time, I am thinking about staying in Costa Rica for 5 to 7 days.

As far as expenses and other financial arrangements are concerned, we settled on the following:

- I would be reimbursed for travel, meals, and lodging for the time I would be available to the mission.
- I am prepared to fund my expenses and invoice you after I return. I am also open to other arrangements.
- I will be paid a discounted rate for my time spent working with the mission. My normal hourly billing rate is \$230, however I agree to a \$1,000 per day rate for the work applicable to the mission. I will prorate for my time based on an 8 hour day.

I am very pleased to be included in this mission and I look forward to receiving more details on the itinerary at your earliest convenience.

If you are not in agreement with the above, please do not hesitate to contact me and we can amend my statements, as appropriate.

Mike:

Please call Dom Falcone on 5/12/94

1. To conserve Dom's time, it would be possible for him to participate only in the Costa Rica portion of the trip to Central America. When meeting schedules are better defined, it may only require two days of his time in country. Stops in other countries are at the request of Gary Ward and have less well defined objectives.

2. We are viewing this as a business development trip. It is anticipated that if a project develops from this trip, the participants would have the first option of forming a project team. Responsibilities would be Creston-finance, UURI-resource exploration and confirmation, GRA-development, and Dames & Moore-environmental.

3. With a limited time of participation, is he going to require salary? None of the other participants are receiving salary.

4. Marshall Reed is coordinating schedules.

**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: May 11, 1994

**TO: Dr. Phillip M. Wright
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108-1295**

TELEFAX: 801-584-4453

2 PAGES FOLLOW.

Thank you for your response to my request for dates. Please review this draft MEMO for Gary Ward to set the time and membership of our geothermal mission to Costa Rica and other countries. This is to clarify the role of each member of the group, and I wish to represent your title and expertise properly.

**Marshall Reed
Geothermal Division
EE-122**

**202-586-8076
Telefax: 202-586-5124**

MEMORANDUM

TO: Gary Ward
FROM: Marshall Reed
DATE: 11 May, 1994
SUBJECT: Mission to Central America

Since our geothermal energy mission to Central America is taking shape and our plans are being finalized, I contacted the Industry group to make sure of their availability. There are conflicts with some members of our group during the first half of June, and they will not all be available until 19 June. In view of this and the late inauguration date for the new president of El Salvador, 1 June, I suggest we plan our mission for the last two weeks of June.

Since the group has evolved, it is useful to give you more information on each individual. I have listed their expertise and affiliations for inclusion in your cables to the U.S. Embassies.

Exploration for Geothermal Resources and Field Evaluation:

Dr. Dennis L. Nielson, Senior Geologist
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108-1295
TELEPHONE: 801-584-4438
TELEFAX: 801-584-4453

Financing Geothermal Field Development and Power Plants:

Mr. Domenic J. Falcone, President
Creston Financial Group
1800 Harrison Street, 18th Floor
Oakland, CA 94612
TELEPHONE: 510-987-8500
TELEFAX: 510-893-1321

Development of Geothermal Fields and Power Plant Construction:

Mr. G. Martin Booth, President
Geothermal Development Associates
251 Ralston Street
Reno, NV 89503
TELEPHONE: 702-322-0938
TELEFAX: 702-322-1320

Geothermal Environmental Engineering:

Mr. Paul Brophy, Senior Environmental Geologist
Dames & Moore
221 Main Street, Suite 600
San Francisco, CA 94105-1917
TELEPHONE: 415-896-5858
TELEFAX: 415-882-9261

Geothermal Reservoir Research and Training:

Dr. Marcelo J. Lippmann, Senior Researcher
Earth Science Division, Building 50E
Lawrence Berkeley Laboratory
Berkeley, CA 94720

TELEPHONE: 510-486-5035

TELEFAX: 510-486-5686

Geothermal Research Program:

Mr. Marshall J. Reed, Program Manager
U.S. Department of Energy
Geothermal Division, EE-122
1000 Independence Avenue, SW
Washington, DC 20585

TELEPHONE: 202-586-8076

TELEFAX: 202-586-5124

With your help and participation, I believe we will have a successful mission. I hope we will be able to return to the U.S. with preliminary agreements or letters of intent for geothermal projects with the Central American countries.

**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: May 8, 1994

**TO: Dr. Phillip M. Wright
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108-1295**

TELEFAX: 801-584-4453

3 PAGES FOLLOW.

Here is the draft TELEX from Gary Ward to the U.S. Embassies concerning our geothermal mission to Costa Rica and other countries. He is planning the trip for mid-June! (Please let me know the dates in June that you will be available!)

Sent to:

Dennis

Dom

Martin

Marcelo

Paul

**Marshall Reed
Geothermal Division
EE-122**

202-586-8076

Telefax: 202-586-5124

OUTGOING TELETYPE

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DOE/EA/6 WARD
572/941586-6123

DOE/EE/M REED
DOE/EE/J MOCK

PRIORITY COSTA RICA, EL SALVADOR, NICARAGUA,
GUATEMALA

N/A

ENERG

SUBJECT DEPARTMENT OF ENERGY (DOE) LED
GEOTHERMAL MISSION TO SAN JOSE, SAN SALVADOR, MANAGUA,
AND GUATEMALA CITY

WARD
REED
MOCK

1. THIS IS AN INFORMATION CABLE.

SUMMARY

2. A GROUP OF COMPANIES FROM THE U.S. GEOTHERMAL INDUSTRY WILL BE UNDERTAKING A ONE AND ONE HALF WEEK MISSION TO THE CENTRAL AMERICAN COUNTRIES OF COSTA RICA, EL SALVADOR, NICARAGUA, AND GUATEMALA MID JUNE 1994. THE TEAM WILL BE ACCOMPANIED BY REPRESENTATIVES OF THE DEPARTMENT OF ENERGY. THE PURPOSE OF THIS GROUP WILL BE TO DETERMINE WHAT STEPS ARE NEEDED IN DEVELOPING GEOTHERMAL ENERGY FOR PRIVATE ELECTRICAL POWER GENERATION AND TO SEARCH FOR VIABLE GEOTHERMAL PROJECTS THAT COULD BE UNDERTAKEN.

PARTICIPANTS

3. INITIAL ORGANIZATIONS TO BE REPRESENTED ON THE MISSION WILL BE THE GEOTHERMAL DEVELOPMENT ASSOCIATES

UNCLASSIFIED

OUTGOING TELEGRAM

OPTIONAL FORM NO. 10 (REV. 10-1-79)
Dept. of State

Information Sheet

UNCLASSIFIED

PAGE 2

(GDA), RENO, NV, A DEVELOPER OF GEOTHERMAL POWER PROJECTS; UNIVERSITY OF UTAH RESEARCH INSTITUTE (UURI), SALT LAKE CITY, UT, AN EARTH-SCIENCE CONSULTANT EXPERIENCED IN GEOTHERMAL EXPLORATION AND DRILLING; DAMES AND MOORE, SAN FRANCISCO, CA, A COMPANY EXPERIENCED IN THE FINANCING OF GEOTHERMAL POWER PROJECTS; LAWRENCE BERKELEY LABORATORY (LBL), BERKELEY, CA, A DEPARTMENT OF ENERGY (DOE) NATIONAL LABORATORY WITH EXPERTISE IN GEOTHERMAL DEVELOPMENT; AND REPRESENTATIVES FROM THE DOE PROGRAM OFFICES.

OBJECTIVES OF THE MISSION

4. THE PRIMARY OBJECTIVES OF THE MISSION WOULD BE TO DETERMINE WHAT STEPS ARE NECESSARY TO DEVELOP PRIVATE POWER IN EACH COUNTRY; AND, DETERMINE THE STATE OF READINESS OF EACH COUNTRY TO ALLOW AND SUPPORT PRIVATE POWER DEVELOPMENT WITHIN ITS BORDERS.

ANTICIPATED ACCOMPLISHMENTS

5. THE ULTIMATE GOAL OF THE COMPANIES ON THIS MISSION WOULD BE TO NEGOTIATE A POWER SALES AGREEMENT AND OBTAIN A GEOTHERMAL CONCESSION FOR DEVELOPMENT. HOWEVER, THIS GOAL MIGHT NOT BE REALIZED ON THIS MISSION DUE TO THE COMPLEX NATURE OF THESE TASKS. THE REALISTICALLY ANTICIPATED RESULTS OF THE MISSION ARE TO: MEET WITH KEY GOVERNMENT REPRESENTATIVES AUTHORIZED TO NEGOTIATE PRIVATE POWER AGREEMENTS AND TO ESTABLISH A WORKING RELATIONSHIP; ASSESS THE POTENTIAL OF EACH COUNTRY TO BE VISITED; USE THE INFORMATION OBTAINED TO REACH THE PRIMARY OBJECTIVES OF SPECIFYING WHAT STEPS ARE NECESSARY AND THE STATE OF READINESS FOR PRIVATE POWER DEVELOPMENT PROJECTS IN EACH COUNTRY; AND, TO SIGN A MEMORANDUM OF UNDERSTANDING OR SIMILAR DOCUMENT INDICATING THE WILLINGNESS AND THE ENTHUSIASM OF THE HOST GOVERNMENT TO PROCEED WITH A PRIVATE POWER GEOTHERMAL PROJECT.

FOCUS OF THE MISSION

6. WE ANTICIPATE THAT THE MISSION WILL FOCUS BOTH ON PROJECTS FOR RURAL ELECTRIFICATION USING GEOTHERMAL RESOURCES AND ON PROJECTS FOR GEOTHERMAL GRID-CONNECTED POWER DEVELOPMENT. RURAL ELECTRIFICATION IS A HIGH PRIORITY IN MOST DEVELOPING COUNTRIES, BUT THE RELATIVE PRIORITIES FOR THESE TWO OPTIONS MUST BE DISCUSSED WITH EACH GOVERNMENT.

UNCLASSIFIED

OUTGOING TELEGRAM

OPTIONAL FORM 105-A (OCR) (Rev. 8-80)

Continuation Sheet

Dept. of State

UNCLASSIFIED

PAGE 3

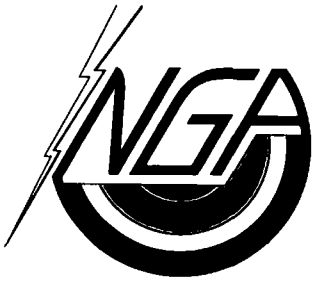
LONG TERM OBJECTIVES

7. MANY OF THE LATIN AMERICAN AND CARIBBEAN COUNTRIES HAVE ABUNDANT HIGH-TEMPERATURE GEOTHERMAL RESOURCES SUITABLE FOR ELECTRICAL POWER GENERATION. THESE COUNTRIES ALSO HAVE LARGE AREAS WITH NO ELECTRICAL SERVICES, AND THEIR GRIDS ARE GENERALLY PLAGUED BY BLACKOUTS DUE TO A GROWING DEMAND FOR ELECTRICITY AND DUE TO THEIR HEAVY RELIANCE ON HYDROELECTRIC POWER WHICH IS VULNERABLE TO PERIODIC DROUGHT. THE POTENTIAL FOR EXPORT OF U.S. GEOTHERMAL GOODS AND SERVICES TO THESE COUNTRIES IS LARGE -- PERHAPS \$2 TO \$6 BILLION OR MORE OVER THE NEXT DECADE. THE GEOTHERMAL ENERGY ASSOCIATION AND THE U.S. GEOTHERMAL INDUSTRY HAVE THE OBJECTIVE OF WORKING IN LATIN AND CARIBBEAN COUNTRIES OVER A SUSTAINED PERIOD TO HELP THESE COUNTRIES DEVELOP THEIR INFRASTRUCTURE AND BECOME MORE SELF SUSTAINING. THE LONG TERM OBJECTIVES OF THE COMPANIES ON THIS MISSION IS TO BLAZE A PATH FOR OTHERS IN THE U.S. GEOTHERMAL INDUSTRY TO FOLLOW BY DEVELOPING SEVERAL ADDITIONAL PRIVATE POWER PROJECTS IN ONE OR MORE OF THE COUNTRIES ON THE ITINERARY.

8. U.S. DEPARTMENT OF ENERGY REPRESENTATIVE (DOE) GARY WARD, INTERNATIONAL AFFAIRS SPECIALIST, OFFICE OF INTERNATIONAL ENERGY MARKETS, OFFICE OF POLICY, PLANNING, AND PROGRAM EVALUATION, HAS BEEN DESIGNATED AS THE CONTROL OFFICER FOR THIS MISSION. WARD CAN BE REACHED BY PHONE ON (202) 586-6123 OR BY FAX (202) 586-6148. THE DOE REPRESENTATIVE WILL CONTACT EACH EMBASSY DIRECTLY TO INITIATE THE PROCESS AND WILL SEND ADDITIONAL INFORMATION ON THE MISSION'S GOALS AND OBJECTIVES. WARD WILL ALSO FORWARD TO EMBASSIES A LIST OF QUESTIONS THAT THE U.S. GEOTHERMAL INDUSTRY WOULD LIKE TO BE ANSWERED ON EACH COUNTRY'S ENERGY SECTORS.

9. CABLE TO FOLLOW ON SPECIFIC AGENDA FOR THE TEAM AND ITS PARTICIPANTS. DOE THANKS EMBASSIES IN ADVANCE FOR ASSISTANCE ON DEVELOPING A SUCCESSFUL MISSION. YY

UNCLASSIFIED



NATIONAL GEOTHERMAL ASSOCIATION

P.O. Box 1350
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(916) 758-2360 Fax: (916) 758-2839
Telex: 882410

Mr. William White
Deputy Director
U.S. Department of Energy
1000 Independence Ave., S.W.
Washington, DC 20585

February 3, 1994

Dear Bill,

The geothermal industry is very much interested in developing easier and more successful methods of doing business in Latin America. As a result of your interest in the potential for geothermal power development to displace a large, environmentally damaging hydro project in Costa Rica, several of our member companies have gotten together to submit a proposal to DOE for geothermal work in that country. The proposed project would blaze a trail for other U.S. companies to follow in (1) negotiating a geothermal concession, (2) complying with environmental and other regulations, (3) negotiating a power-purchase agreement with the Costa Rican utility ICE, and (4) exploration, drilling and construction of a geothermal power plant in Costa Rica. As you know, the Costa Ricans in the past have given U.S. companies only relatively small pieces of geothermal projects, with the major portions usually being contracted to Italian geothermal companies. The Italian government has been very aggressive in pursuing geothermal projects for its industry in countries throughout the world.

Development of geothermal power generation has been extremely slow in Costa Rica, especially given the enormity of the resource. We believe that the process could be speeded up considerably using U.S. expertise and the new business environment for developing private power in that country. However, the first geothermal project to actually navigate the complete path will be the most difficult and, if successful, will form a model that other U.S. companies can follow.

The proposed project has been discussed with Tom Hall in DOE's CORECT program who suggested that we present the proposal to the U.S. ECRE office. We have been given strong encouragement by Judy Siegel at ECRE and John Ryan who runs their IFREE program. They have indicated that a cost-shared project may be funded if we have support from your office. These organizations made funding available to organize a trip to Costa Rica and other Central American countries to examine project feasibility first hand. Such a trip is

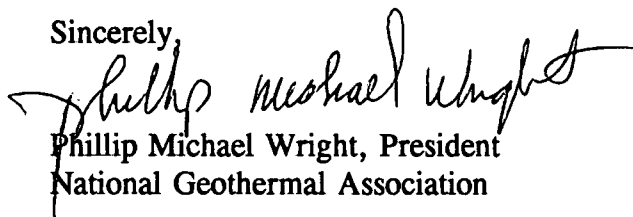
tentatively planned for early June, 1994, after installation on the new government in Costa Rica following February elections. Our project has also been discussed with Gary Ward, who I understand accompanied you on your trip to Costa Rica, and who is enthusiastic and supportive.

It would help us greatly if you would be willing to do two things:

1. Indicate your support for our project to Gary Ward and ask him to pass on this support to the CORECT and ECRE people; and,
2. Designate Ward as your representative to accompany us on our forthcoming trip to Costa Rica and other Central American countries, and to maintain cognizance of this project.

The geothermal industry is certain that several goals of the Clinton Administration can be furthered through your support. Installation of geothermal power generation can be accomplished in Latin America in the short term, helping to alleviate environmental problems, maintaining 1990 levels of CO₂ emissions and creating jobs for Americans through export of our goods and services. We thank you for your help.

Sincerely,

A handwritten signature in cursive script that reads "Phillip Michael Wright". The signature is written in dark ink and is positioned above the printed name and title.

Phillip Michael Wright, President
National Geothermal Association

MODE = TRANSMISSION

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END=MAY-12 13:18

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-U OF U RESEARCH -

FAX



UURI
Earth Science Laboratory
391 Chipeta Way, Suite C
Salt Lake City, UT 84108-1295
Phone: 801-584-4422
FAX: 801-584-4453

Date: 5-12-94

Total # of pages (including this page): 3

To: Marshall Reed

Company: _____

Fax #: _____

From: M. Wright

Subject: _____

Comments:

MEMORANDUM

DATE: May 24, 1994

FROM: Marshall Reed

TO: Mike Wright
Dennis Nielson
Martin Booth
Dom Falcone

SUBJECT: Information for Private Geothermal Development in Costa Rica.

On October 18, 1990, Costa Rica passed Law 7200 authorizing private electricity generation. A copy of the English translation of this law is available from Dave Anderson, GRC. The major restrictions of the law are that private generation cannot exceed 15 percent of the national generation and that private power units must be less than 20 MW. A solicitation from ICE to purchase privately generated electricity was oversubscribed, and ICE selected for contracts only some of the projects proposed.

Enclosed is a confidential ICE report describing the solicitation and the projects selected. Please do not disclose that you have a copy of this report. Some of the laws and decrees cited on page 14 and the contract criteria on page 15 may be of use in developing a geothermal project and in packaging a BOT contract. Most of the private generating capacity is from 20 MW hydroelectric plants on the upper reaches of the major rivers.

INSTITUTO COSTARRICENSE DE ELECTRICIDAD

DIRECCION PLANIFICACION ELECTRICA

DEPARTAMENTO PROYECTOS DE GENERACION

GENERACION PRIVADA EN COSTA RICA

OCTUBRE 1993

RECONOCIMIENTO

Este documento fue elaborado por Ing. Mario López S. Jefe del Departamento Proyectos de Generación.

Especial reconocimiento a la Sra. Elsie Rodríguez Asistente de Ingeniería de la Oficina de Minicentrales por el excelente trabajo en la elaboración de los cuadros y figuras.

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INTRODUCCION

EL OBJETIVO GENERAL DE ESTE DOCUMENTO ES EL DE INFORMAR SOBRE LA SITUACION ACTUAL DEL **PROGRAMA DE GENERACION AUTONOMA O PARALELA** AMPARADA A LA LEY 7200 Y SU REGLAMENTO DECRETO No 20346-MIRENEM.

PARA LA ELABORACION DE LA INFORMACION QUE SE MUESTRA EN EL INFORME SE UTILIZARON LOS DATOS QUE HAN SUMINISTRADO LOS GENERADORES PRIVADOS HASTA EL 31 DE AGOSTO DE 1993.

EL DOCUMENTO SE PRESENTA DIVIDIDO EN TRES PARTES: LA PRIMERA DENOMINADA **ANTECEDENTES** PARA UBICARSE DENTRO DEL CONTEXTO DEL PLAN NACIONAL DE ENERGIA, LA SEGUNDA PARTE LLAMADA **PROCEDIMIENTOS** EN DONDE SE EXPLICA EN FORMA MUY RESUMIDA, SENCILLA Y ORDENADA EN ETAPAS, EL PROCESO QUE DEBE SEGUIR UN PROYECTO DE GENERACION PRIVADA PARA COMPRA Y VENTA DE ENERGIA. SE RESUMEN LOS PRINCIPALES ARTICULOS DE LA LEY 7200 Y SU REGLAMENTO DECRETO No 20346-MIRENEM, Y FINALMENTE LA PARTE TERCERA **ESTADO ACTUAL (AGOSTO 1993)** EN DONDE SE COMENTAN Y SE MUESTRAN MEDIANTE CUADROS Y FIGURAS, EL NUMERO DE PROYECTOS QUE PARTICIPAN EN EL PROGRAMA, ETAPA EN QUE SE ENCUENTRA, MAGNITUD DE POTENCIA, LOCALIZACION SEGUN LA CUENCA, COSTOS DE CONSTRUCCION, COSTO DE INSTALACION, LA GENERACION Y FACTURACION DE LAS PLANTAS QUE SE ENCUENTRAN EN OPERACION.

EL AUTOR DE ESTE TRABAJO ESTARA MUY COMPLACIDO Y AGRADECIDO DE RECIBIR SUGERENCIAS Y RECOMENDACIONES QUE SIRVAN PARA MEJORAR ESTE DOCUMENTO EN SUS FUTURAS EDICIONES YA QUE SE PLANEA ACTUALIZARLO CADA CIERTO TIEMPO SEGUN CAMBIE LA INFORMACION QUE SE PRESENTE.

. ANTECEDENTES

POLITICA ENERGETICA NACIONAL ¹

PRINCIPIOS GENERALES

MANTENER EL PAPEL PREPONDERANTE DEL ESTADO EN LAS ACTIVIDADES RELACIONADAS CON LA EXPLOTACION DE LOS RECURSOS ENERGETICOS

ASEGURAR QUE EL DESARROLLO ENERGETICO CONTRIBUYA A MANTENER EL EQUILIBRIO SOCIAL ECONOMICO Y POLITICO

OBJETIVO FUNDAMENTAL DEL SECTOR ENERGIA

ASEGURAR EL ABASTECIMIENTO DE LA ENERGIA NECESARIA PARA EL DESARROLLO INTEGRAL DE LA SOCIEDAD COSTARRICENSE

LA EXPLOTACION DE LOS RECURSOS NATURALES ESTA A CARGO FUNDAMENTALMENTE DE LA ADMINISTRACION PUBLICA, SIN EMBARGO, ES IMPORTANTE CONSIDERAR QUE PARTICULARES PUEDAN LLEVAR A CABO ACTIVIDADES RELACIONADAS CON LA EXPLORACION, PRODUCCION Y ADMINISTRACION DE ESTOS RECURSOS EN CASOS CALIFICADOS Y AL AMPARO DE LOS INSTRUMENTOS JURIDICOS CORRESPONDIENTES. LAS CONDICIONES DE RIESGO Y EL ALTO NIVEL DE INVERSIONES QUE IMPLICAN ALGUNAS DE ESTAS ACTIVIDADES HACEN NECESARIO QUE EL ESTADO DELEGUE EN LA EMPRESA PRIVADA LA REALIZACION DE LAS MISMAS

¹- Tomados del primer y segundo PLAN NACIONAL DE ENERGIA 1986 - 2005 Y 1990 - 2010, editados por MIRENEM.

ESTRATEGIA PRODUCCION CAMPO ELECTRICIDAD

DENTRO DEL PLANEAMIENTO DE LAS NUEVAS OBRAS DE GENERACION, EL ICE PODRA INCLUIR LA MODALIDAD DE PROYECTOS DE GENERACION COMPARTIDOS A PARTIR DE FUENTES NUEVAS Y RENOVABLES DE ENERGIA, COMO MEDIO DE COMPLEMENTAR LAS CAPACIDADES DE GENERACION DEL PAIS. SE CONSIDERARAN LAS INICIATIVAS PRIVADAS CON FINANCIAMIENTO PROPIO Y QUE NO REQUIERAN AVAL DEL ESTADO CUANDO SEAN TECNICA Y ECONOMICAMENTE FACTIBLES Y DE CONVENIENCIA NACIONAL.

POR CONSIGUIENTE PARA ENFRENTAR LOS RETOS DEL FUTURO LAS ACCIONES ESTRATEGICAS DEBEN INCLUIR LA CONCRECION DE INICIATIVAS TAN IMPORTANTES COMO LA GENERACION PRIVADA DE ELECTRICIDAD.

. PROCEDIMIENTOS

**PROCEDIMIENTOS DEL PROGRAMA DE
GENERACION AUTONOMA O PARALELA**

EN LA FIGURA ADJUNTA SE MUESTRA EN FORMA DE FLUJOGRAMA LAS ETAPAS EN QUE SE DIVIDE LA GESTION DE GENERACION PRIVADA PARA PARTICIPAR EN LA PRODUCCION DE ELECTRICIDAD, SEGUN SE ESTABLECE EN LA LEY 7200 Y SU REGLAMENTO #20346-MIRENEM.

PARTICIPAN ADEMAS DEL GENERADOR PRIVADO, EL INSTITUTO COSTARRICENSE DE ELECTRICIDAD, EL MINISTERIO DE RECURSOS NATURALES ENERGIA Y MINAS Y EL SERVICIO NACIONAL DE ELECTRICIDAD.

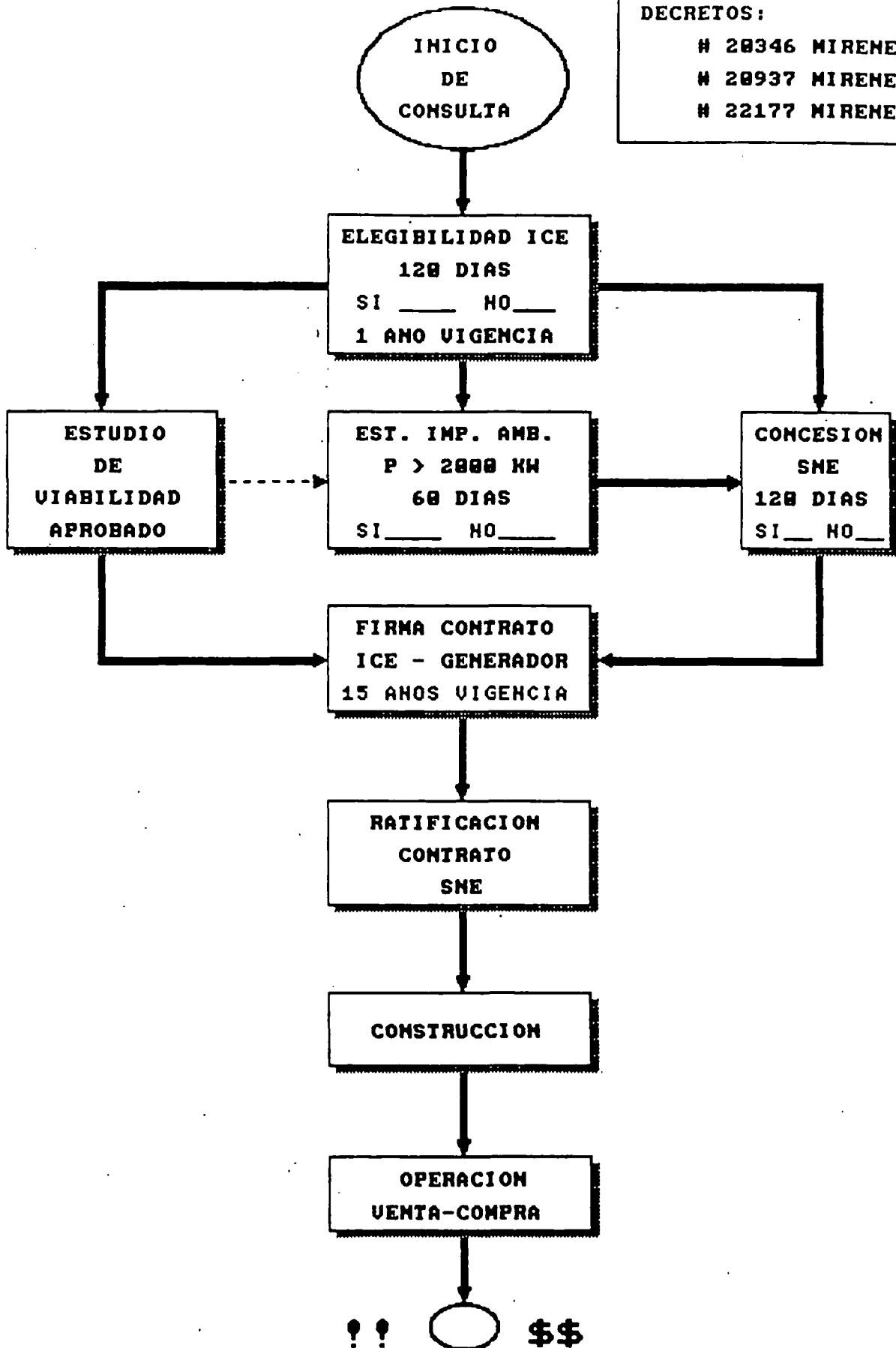
SE MUESTRA LA SECUENCIA Y DEPENDENCIAS ENTRE LAS ETAPAS.

CON BASE EN ESTA FIGURA SE DESCRIBIRAN LOS PRINCIPALES ASPECTOS DE CADA ETAPA PARA QUE SIRVA DE GUIA E INFORMACION AL LECTOR DE ESTE DOCUMENTO. POR SUPUESTO PARA CONOCER DETALLES REFERIRSE A LA LEY 7200 Y SU REGLAMENTO.

GENERACION ELECTRICA AUTONOMA O PARALELA

PROCESO

LEY 7288
LEY 7293
DECRETOS:
28346 MIRENEM
28937 MIRENEM
22177 MIRENEM



LEY QUE AUTORIZA LA GENERACION ELECTRICA**AUTONOMA O PARALELA**

LEY N° 7200
(GACETA 18 OCTUBRE 1990)

1. SE DEFINE LA GENERACION AUTONOMA O PARALELA COMO LA PRODUCIDA POR CENTRALES ELECTRICAS DE LIMITADA CAPACIDAD PERTENECIENTES A EMPRESAS PRIVADAS O COOPERATIVAS DE ELECTRIFICACION RURAL QUE PUEDAN SER INTEGRADAS AL SISTEMA ELECTRICO NACIONAL. POTENCIAL HIDRAULICO Y FUENTES NO CONVENCIONALES DE ENERGIA.

2. CENTRALES HIDROELECTRICAS POT. 20000 KW.

3. EL ICE COMPRARA ELECTRICIDAD A LAS COOPERATIVAS DE ELECTRIFICACION RURAL A LAS EMPRESAS PRIVADAS EN LAS CUALES AL MENOS 65% DEL CAPITAL SOCIAL PERTENEZCA A COSTARRICENSES.

CONCESION Y ELEGIBILIDAD

4. EL SNE OTORGARA CONCESIONES HASTA POR UN PLAZO NO MAYOR DE 15 AÑOS. PODRA PRORROGARLAS.

5. EL SNE EXIGIRA UNA DECLARATORIA DE ELEGIBILIDAD OTORGADA POR EL ICE, PARA OTORGAR UNA CONCESION.

6. EL ICE PODRA DECLARAR UNA ELEGIBILIDAD SIEMPRE Y CUANDO LA POTENCIA, POR CONCEPTO DE GENERACION PARALELA, NO LLEGUE A CONSTITUIR MAS DEL 15% DE LA POTENCIA DEL CONJUNTO DE CENTRALES ELECTRICAS QUE CONFORMAN EL SISTEMA ELECTRICO NACIONAL.

ESTUDIO DE IMPACTO AMBIENTAL

7. PARA PROYECTOS MAYORES A 2000 KW SE DEBERA PRESENTAR AL SNE CERTIFICACION SOBRE APROBACION DE UN ESTUDIO DE IMPACTO AMBIENTAL POR EL MIRENEM.

8. AL FIRMAR EL CONTRATO DE SUMINISTRO POR EL ICE, SE DEBERA ACOMPAÑAR UNA GARANTIA INCONDICIONAL DE CUMPLIMIENTO A FAVOR DE MIRENEM, EQUIVALENTE AL 4 % DEL VALOR DEL PROYECTO DURANTE LA CONSTRUCCION DE LA OBRA QUE SE MANTENDRA VIGENTE POR UN AÑO A PARTIR DE LA ENTRADA EN OPERACION. LA GARANTIA SE REDUCIRA A UN MONTO EQUIVALENTE A UN 1 % DEL VALOR DEL PROYECTO DURANTE LA CONCESION.

9. EL ICE SUSCRIBIRA LOS CONTRATOS PARA LA COMPRA DE ENERGIA Y DEBERAN SER RATIFICADOS POR EL SNE SEGUN LA LEY 258 DE NACIONALIZACION DE AGUAS, FUERZAS HIDRAULICAS Y ELECTRICAS. (18 AGOSTO 1941).

TARIFAS

10. EL ICE PRESENTARA SOLICITUDES DE CAMBIO DE TARIFAS QUE DEBERAN SER LAS MAS FAVORABLES PARA EL PUBLICO CONSUMIDOR DENTRO DEL PRINCIPIO DE COSTO EVITADO DE INVERSION Y OPERACION DEL SISTEMA NACIONAL INTERCONECTADO CON UN CRITERIO ECONOMICO NACIONAL.

11. LAS TARIFAS PARA COMPRA DE ENERGIA REQUIEREN LA EXPRESA Y PREVIA FIJACION DEL SNE.

EXONERACIONES

12. LAS EMPRESAS PRODUCTORAS DE ENERGIA ELECTRICA AUTONOMAS O PARALELAS GOZARAN DE LAS MISMAS EXONERACIONES QUE EL ICE: IMPORTACION DE MAQUINARIA Y EQUIPO PARA CONDUCCION DE AGUA, ASI COMO TURBINAR, GENERAR, CONTROLAR, REGULAR, TRANSFORMAR Y TRANSMITIR ENERGIA ELECTRICA.

DECLARATORIA DE ELEGIBILIDAD**REQUISITOS**

- .CAPACIDAD MENOR A 20000 KW.
- .EXPLOTACION DE ENERGIA HIDRAULICA O RENOVABLE
- .65% DEL CAPITAL SOCIAL PERTENEZCA A COSTARRICENSES.
- .NO HABER SIDO PREVIAMENTE PARTE DEL SISTEMA ELECTRICO NACIONAL.
- .CAPACIDAD AUTONOMA ACUMULATIVA (CONTRATOS SUSCRITOS) INFERIOR AL 15 % DE LA CAPACIDAD TOTAL DEL SISTEMA ELECTRICO NACIONAL.
- .NO INTERFERENCIA CON UN PROYECTO ANTERIOR, EN TRAMITE U OTORGADA, O AFECTE NEGATIVAMENTE ALGUN PROYECTO CONTEMPLADO POR EL ICE EN SUS PLANES DE DESARROLLO.

SOLICITUD (120 DIAS)

1.

I-EMPRESA PRIVADA

- .CERTIFICACION DEL CAPITAL SOCIAL AUTORIZADO Y COPIA DE LA ESCRITURA CONSTITUTIVA DE LA SOCIEDAD. DOCUMENTO DE COMENTARIO DEBE SER EXPEDITA POR NOTARIO O CONTADOR PUBLICO AUTORIZADO.
- .CERTIFICACION DE PERSONERIA DEL FIRMANTE DE LA SOLICITUD.
- .DOMICILIO LEGAL DEL SOLICITANTE
- .DEMOSTRACION DETALLADA DE LA CAPACIDAD FINANCIERA DE LA EMPRESA.

II-COOPERATIVA ELECTRIFICACION RURAL

- .CERTIFICACION DE PERSONERIA DEL FIRMANTE DE LA SOLICITUD.
- .DOMICILIO LEGAL DEL SOLICITANTE
- .DEMOSTRACION DETALLADA DE LA CAPACIDAD FINANCIERA DE LA COOPERATIVA

2. INFORMACION CON LAS FIRMAS DE LOS PROFESIONALES DEL RAMO EN CADA UNA DE LAS ESPECIALIDADES:

I-PROYECTOS MENORES 2000 KW

- .NOMBRE DEL RIO A APROVECHAR.
- .CROQUIS DEL PROYECTO EN MAPAS DEL IGN 1:50000
- .ENERGIA PROMEDIO ANUAL ESTIMADA DE LA PLANTA Y OFRECIDA AL ICE.
- .POTENCIA NOMINAL DE LA PLANTA Y OFRECIDA AL ICE.
- .CAUDAL DE DISEÑO.
- .CAUDALES PROMEDIO MENSUALES.
- .MEMORIA DE CALCULO DE POTENCIA Y ENERGIAS
- .INDICACION 1:50000 LINEA PROPUESTA
- .INTERCONEXION AL SNI Y SUBESTACION ASOCIADA
- .COSTO PROYECTO Y PLAN FINANCIAMIENTO 100 %.

II-PROYECTOS IGUALES O MAYORES 2000 KW

- .NOMBRE RIOS A APROVECHAR.
- .CROQUIS DEL PROYECTO 1:50000.
- .ESQUEMAS INDIVIDUALES DE LAS PRINCIPALES OBRAS CON DIMENSIONES.
- .ELEVACION DE LA PRESA Y DE LA DESCARGA
- .CAUDAL DE DISEÑO.
- .CAUDALES PROMEDIO MENSUALES.
- .ENERGIAS PROMEDIO ANUAL DE LA PLANTA Y OFRECIDA AL ICE.
- .POTENCIA DE LA PLANTA Y OFRECIDA AL ICE.
- .MEMORIA DE CALCULO DE POTENCIA Y ENERGIA.
- .CROQUIS DE CAMINOS DE ACCESO AL PROYECTO.
- .LINEA PROPUESTA DE INTERCONEXION AL SNI Y SUBESTACION ASOCIADA.
- .ESTIMACION DE COSTO DEL PROYECTO Y PLAN FINANCIAMIENTO 100 %.

III-PROYECTOS FUENTES NO CONVENCIONALES

- .FUENTE PRIMARIA DE ENERGIA Y TECNOLOGIA A UTILIZAR.
- .CROQUIS DEL PROYECTO 1:50000.
- .ESQUEMA GENERAL DEL PROYECTO CON PRINCIPALES OBRAS INDICANDO DIMENSIONES.
- .ENERGIA PROMEDIO ANUAL DE LA PLANTA Y OFRECIDA AL ICE.
- .POTENCIA DE PLANTA Y OFRECIDA AL ICE.
- .MEMORIA DE CALCULO DE POTENCIA Y ENERGIA.
- .CROQUIS DE CAMINOS ACCESO AL PROYECTO.
- .INDICACION LINEA PROPUESTA DE INTERCONEXION AL SNI Y LA SUBESTACION ASOCIADA.
- .ESTIMACION DEL COSTO Y DESCRIPCION PLAN FINANCIAMIENTO 100%.

ESTUDIO DE VIABILIDAD**REQUISITOS**

LA INFORMACION CONTENIDA EN EL INFORME DE VIABILIDAD DEBERA SER RESPALDADA CON LA FIRMA DE LOS PROFESIONALES DEL RAMO EN CADA UNA DE LAS ESPECIALIDADES.

CENTRALES HIDRAULICAS < DE 2000 KW

- .RESUMEN DEL PROYECTO.
- .NOMBRE DEL RIO A UTILIZAR.
- .ESTIMACION DE ENERGIAS PROMEDIO MENSUALES DE LA PLANTA Y A SUMINISTRAR AL ICE.
- .POTENCIA DE LA PLANTA Y OFRECIDA AL ICE.
- .CAUDAL DE DISEÑO.
- .ESTIMACION DE CAUDALES PROMEDIO MENSUALES DE ENERO A DICIEMBRE PARA AÑOS HIDRAULICIDAD PROMEDIO.
- .ESQUEMA DEL PROYECTO PLANTA Y PERFIL EN 1:50000 IGN.
- .PLANOS INDIVIDUALES DE LAS OBRAS DIMENSIONADAS UTILIZANDO TOPOGRAFIA DE DETALLE.
- .SUMINISTRO DE INFORMACION HIDROLOGICA PARA DISEÑO.
- .DISEÑO PRELIMINAR DE LA LINEA DE INTERCONEXION Y SUBESTACION ASOCIADA CON UBICACION DESDE CASA MAQUINAS HASTA ENLACE CON SNI DE ACUERDO A NORMAS INDICADAS POR ICE.
- .ESTIMACION DE COSTOS TOTAL, RENTABILIDAD ECONOMICA Y FINANCIERA Y PLAN DE FINANCIAMIENTO.
- .PROGRAMA DE EJECUCION DE OBRAS.

CENTRALES HIDRAULICAS >= 2000 KW

.RESUMEN DEL PROYECTO.
.NOMBRE RIO APROVECHAR.
.PLANO GENERAL DEL PROYECTO PLANTA PERFIL EN 1:50000 Y TOPOGRAFIA DE DETALLE.
.ESTUDIOS GEOLOGICOS Y GEOTECNICOS DE LOS SITIOS OBRA PRESA CONDUCCION Y CASA MAQUINAS.
.ESTUDIO HIDROLOGICO DE RESPALDO.ESTIMACION AVENIDAS DISEÑO.
.ESTIMACION DE CAUDALES ENERO DICIEMBRE AÑOS HIDRAULICIDAD PROMEDIO.
.ESTIMACION ENERGIAS PROMEDIO ANUAL Y MENSUAL ENERO DICIEMBRE PRODUCIDAS POR LA PLANTA Y A SUMINISTRAR AL ICE.
POTENCIA NOMINAL DE LA PLANTA Y OFRECIDA AL ICE.EFICIENCIAS EQUIPO TURBOGENERADOR.
.VOLUMEN UTIL EMBALSE.
.DISEÑO PRELIMINAR DE LA LINEA DE TRANSMISION Y SUBESTACION ASOCIADA CON UBICACION DESDE CASA DE MAQUINAS AL PUNTO DE ENLACE CON EL SNI ACUERDO NORMAS INDICADAS POR EL ICE.
.DESGLOSE COSTOS DEL PROYECTO.ESTUDIO DE RENTABILIDAD ECONOMICA/FINANCIERA Y PLAN DE FINANCIAMIENTO.
.PROGRAMAS DE EJECUCION DE OBRAS.

CENTRALES FUENTES NO CONVENCIONALES

.RESUMEN DEL PROYECTO Y DESCRIPCION DEL FUNCIONAMIENTO DE LA PLANTA.

.FUENTE PRIMARIA DE ENERGIA A UTILIZAR Y DEMOSTRACION DE LA EXISTENCIA DEL RECURSO DURANTE TODA LA VIDA ECONOMICA DEL PROYECTO.

.PLANO GENERAL DEL PROYECTO 1:50000 Y TOPOGRAFIA DE DETALLE.

.ESTIMACION DE ENERGIAS PROMEDIO ANUAL Y MENSUAL ENERO DICIEMBRE PRODUCIDAS POR LA PLANTA Y A SUMINISTRAR AL ICE.

.POTENCIA NOMINAL DE LA PLANTA Y OFRECIDA AL ICE. EFICIENCIAS DEL EQUIPO TURBOGENERADOR.

.DISEÑO PRELIMINAR DE LA LINEA DE TRANSMISION Y SUBESTACION ASOCIADA CON UBICACION DESDE CASA DE MAQUINAS HASTA ENLACE CON SNI DE ACUERDO A NORMAS INDICADAS POR ICE.

.DESGLOSE DE COSTOS DEL PROYECTO ESTUDIO DE RENTABILIDAD ECONOMICA/FINANCIERA Y PLAN DE FINANCIAMIENTO.

.PROGRAMA DE EJECUCION DE OBRAS.

LOS ASPECTOS CONTRACTUALES

REQUISITOS

- . TENER VIGENCIA ELEGIBILIDAD(ICE)
- . TENER VIGENCIA CONCESION(SNE)
- . APROBACION ESTUDIO VIABILIDAD(ICE)
- . DEMOSTRAR QUE EL PROYECTO TIENE OPCION FINANCIAMIENTO.CARTAS INTENCIONES
- . DEMOSTRAR ASESORIA TECNICA PARA EJECUCION DEL PROYECTO
- . TENER ACTUALIZADAS CERTIFICACIONES DE CAPITAL SOCIAL, PERSONERIA JURIDICA ETC.
- . PARA PLANTAS >2000 KW PRESENTAR LA GARANTIA INCONDICIONAL DE CUMPLIMIENTO A FAVOR DE MIRENEM DE LOS PROGRAMAS DE CONTROL Y DE RECUPERACION AMBIENTAL

CONTENIDO

- . RESPONSABLES Y OTROS DATOS GENERALES DE PLANTA
- . TARIFAS DE COMPRA DE ENERGIA Y POTENCIA
- . PENALIZACION POR INCUMPLIMIENTO DE POTENCIA
- . FORMAS DE PAGO
- . COMPROMISOS DE FECHAS FINANCIAMIENTO Y CONSTRUCCION
- . ASPECTOS TECNICOS DE INTERCONEXION AL SNI
- . SISTEMAS DE COMUNICACION Y OPERACION DE LA PLANTA ASI COMO DE MEDICION
- . INCUMPLIMIENTO Y OBLIGACIONES VARIAS
- . EXONERACIONES.SUSCRIBIR UN CONTRATO CON MIRENEM Y MINISTERIO DE HACIENDA (ART. 2, LEY 7293 " LEY REGULADORA DE TODAS LAS EXONERACIONES VIGENTES, SU DEROGATORIA Y SUS EXCEPCIONES" 3 ABRIL 1992, PREVIO A SOLICITAR AL ICE RECOMENDACION IMPUESTOS DE IMPORTACION
- . VALOR CONTRATO (GENERACION UN AÑO).

VIGENCIA

- . LUEGO DE SER RATIFICADOS POR EL SNE LOS CONTRATOS TENDRAN UNA DURACION MAXIMA DE 15 AÑOS, PUDIENDO RENOVARSE DE COMUN ACUERDO

**GENERACION ELECTRICA
AUTONOMA O PARALELA**

MARCO LEGAL

.LEY N° 258 (18/8/41)SNE
LEY DE NACIONALIZACION DE AGUAS, FUERZA
HIDRAULICA Y ELECTRICA

.DECRETO EJECUTIVO N° 18947-MIRENEM (18/4/1989
(DEROGADO)
REQUISITOS Y CONDICIONES GENERALES PARA VENTA
DE ENERGIA AL ICE POR PRODUCTORES PRIVADOS

.LEY N° 7200 (18/10/90)
LEY QUE AUTORIZA LA GENERACION ELECTRICA
AUTONOMA O PARALELA

.DECRETO N° 20346-MIRENEM (23/4/91)
REGLAMENTO A LA LEY QUE AUTORIZA LA GENERACION
AUTONOMA O PARALELA

.DECRETO N° 20937-MIRENEM (20/1/92)
GUIA PARA LA ELABORACION DE LOS ESTUDIOS DE
IMPACTO AMBIENTAL EN PROYECTOS DE GENERACION
AUTONOMA O PARALELA DE ENERGIA ELECTRICA

.LEY N° 7293 (3/4/92)
LEY REGULADORA DE TODAS LAS EXONERACIONES
VIGENTES, SU DEROGATORIA Y SUS EXCEPCIONES

.DECRETO N° 22177-MIRENEM (26/5/93)
DECRETO QUE MODIFICA EL INCISO f) DEL ARTICULO
DEL DECRETO EJECUTIVO 20346-MIRENEM.

**TARIFAS PARA COMPRA DE ENERGIA
A PRODUCTORES PRIVADOS**

LEY 7200

EL ICE PRESENTARA SOLICITUDES DE CAMBIO DE TARIFAS EN CADA OCASION, QUE DEBERAN SER LAS MAS FAVORABLES PARA EL PUBLICO CONSUMIDOR, DENTRO DEL PRINCIPIO DE COSTO EVITADO DE INVERSION Y OPERACION DEL SISTEMA NACIONAL INTERCONECTADO, CON UN CRITERIO ECONOMICO NACIONAL

SE PRESENTAN TRES TIPOS DE TARIFAS OPCIONALES

1. TARIFA 1

- .REMUNERACION POR POTENCIA
- .REMUNERACION POR ENERGIA SUMINISTRADA
- .PENALIZACION POR FALLAS EN EL SUMINISTRO CONTRATADO

2. TARIFA 2

- .REMUNERACION POR ENERGIA SUMINISTRADA, INCLUYE UNA PORCION DEL CARGO POR POTENCIA

3. TARIFA 3

- .REMUNERACION POR ENERGIA SUMINISTRADA APLICADA EPOCA DE VERANO (ENERO A MAYO) INGENIOS AZUCAREROS

CRITERIO ECONOMICO BASADO EN LA TEORIA MARGINALISTA. SE PRESENTA UNA FORMULA DE AJUSTE AUTOMATICO PARA CONSIDERAR LOS EFECTOS DE LA INFLACION Y DE LA DEVALUACION DURANTE EL PERIODO

LAS TARIFAS AUTORIZADAS PARA 1993 SE MUESTRAN A CONTINUACION:

TARIFA 1

A) PRECIOS DE ENERGIA

Período anual	Período horario	colones/kWh
Enero-Agosto	Punta	8.71
	Fuera de punta	7.16
Setiembre-diciembre	Punta	7.31
	Fuera de punta	3.89

B) PRECIOS DE LA POTENCIA EQUIVALENTE

Período anual	Período horario	colones/kWh
Enero-Agosto	Punta	10450
	Fuera de punta	2325
Setiembre-diciembre	Punta	544
	Fuera de punta	0

C) PENALIZACION

Período anual	Período horario	colones/kWh
Enero-Agosto	Punta	30.09
	Fuera de punta	1.15
Setiembre-diciembre	Punta	3.07
	Fuera de punta	0

TARIFA 2

PRECIO INTEGRADO DE ENERGIA Y POTENCIA

Período anual	Período horario	colones/kWh
Enero - Agosto	Punta	11.72
	Fuera de punta	7.27
Setiembre - diciembre	Punta	7.62
	Fuera de punta	3.89

TARIFA 3
EPOCA SECA

Período anual	Período horario	colones/kWh
Enero - mayo	punta	9.30
	fuera de punta	8.19

.ESTADO ACTUAL

PROGRAMA DE GENERACION PRIVADA**SITUACION A AGOSTO 1993**

. SE HAN PRESENTADO 41 PROYECTOS QUE SUMAN UN TOTAL DE 279247 kw.

. EN ETAPA DE OPERACION HAY 6 PROYECTOS QUE SUMAN 8800 kw.

. EN ETAPA CONTRATO FIRMADOS HAY DOS PROYECTOS QUE TOTALIZAN 15100 kw

. EN ETAPA DE NEGOCIACION DEL CONTRATO HAY DOS PROYECTOS QUE TOTALIZAN 15000 kw.

. EN ETAPA DE VIABILIDAD APROBADAS HAY DOS PROYECTOS QUE TOTALIZAN 16900 kw.

. EN ETAPA DE EVALUACION DE LA VIABILIDAD HAY 10 PROYECTOS QUE TOTALIZAN 59770 kw.

. EN ETAPA DE ELEGIBILIDAD VIGENTE EXISTEN 12 PROYECTOS QUE TOTALIZAN 106200 kw.

. EN ETAPA DE SOLICITUD DE ELEGIBILIDAD EN ESTUDIO EXISTEN 7 PROYECTOS QUE TOTALIZAN 57420 kw.

. SE PRESENTA UN CUADRO RESUMEN CON LOS NOMBRES DE LOS PROYECTOS, DE LAS EMPRESAS INTERESADAS, DEL TAMANO DE LA POTENCIA Y CONDICION A LA FECHA DE CORTE DE AGOSTO.

. SE PRESENTA UNA FIGURA QUE MUESTRA LA DISTRIBUCION DE LOS PROYECTOS CON LAS POTENCIAS Y PORCENTAJES ASI COMO EL NUMERO SEGUN LA CONDICION EN QUE SE ENCUENTRAN.

PROGRAMA DE COMPRA DE ENERGIA A PRODUCTORES PRIVADOS
 LISTA DE PROYECTOS
 AGOSTO DE 1993

NUMERO SODEL	NOMBRE DE LA EMPRESA INTERESADA	ACTIVIDAD PRIMARIA	NOMBRE DEL PROYECTO	FUENTE PRIMARIA	TAMANO KW	FECHA RECIBIDA	FECHA RESPUESTA	CONDICION ACTUAL	FECHA VENCIMIENTO
800608	PLANTA ELECTRICA TAPEZCO	GENERAC.	PLANTA ELECTRICA TAPEZCO	HIDRO	80	01-Jun-89	30-Jun-89	OPERACION	(1)
800613	COOPEJIBAYE R.L.	BENEFIC.	PLANTA COOPEJIBAYE	HIDRO	125	29-Sep-89	08-Nov-89	OPERACION	(1)
800201	HACIENDA SAN RAFAEL S.A.	BENEFIC.	PLTA. HIDROELEC. SM RAFAEL	HIDRO	300	09-Feb-89	09-Mar-89	OPERACION	(1)
900826	PLANTA ELECTRICA SARCHI	BENEFIC.	PLANTA SANTA RUFINA	HIDRO	420	21-Sep-90	18-Oct-90	OPERACION	(1)
900827	EL ANGELO S.A.	INDUSTRIA	EL ANGELO	HIDRO	3850	28-Sep-89	01-Oct-90	OPERACION	
801015	EL VIEJO S.A.	INGENIO	EL VIEJO	SAGAZO	4000	09-Oct-89	09-Nov-89	OPERACION	(2)
910537	HIDROZASCAS S. A.	GENERAC.	AGUAS ZARCAS	HIDRO	13100	04-Jun-91	15-Oct-91	CONTRATO	
910608	HIDROELECTRICA CANO GRANDE S. A.	GENERAC.	CANO GRANDE	HIDRO	1985	04-Sep-91	11-Oct-91	CONTRATO	
800710	HIDROELECTRICA PLATANAR	GENERAC.	PROY. HIDROELEC. PLATANAR	HIDRO	15000	11-Nov-91	07-Jan-92	NEGOCIACION	17-Jun-94
920147	RODRIGUEZ Y MORA S.A.	LECHERIA	LOS NEGritos	HIDRO	50	28-Jan-92	21-May-92	NEGOCIACION	21-Nov-93 (1)
900421	CONELECTRICAS R. L.	GENERAC.	SAN LORENZO	HIDRO	15000	08-Apr-90	02-Oct-91	VIAS APROBADA	12-May-94
920363	HIDROELECTRICA TAUS SA	GENERAC.	TAUS I a IV	HIDRO	1880	12-Mar-92	09-Jul-92	VIAS APROBADA	09-Jun-94
910841	RAFAEL CORRALES VILLALOBOS	CONSULTOR	DONA JULIA	HIDRO	12000	05-Sep-91	07-Jan-92	VIAS EN EST.	17-Jun-94
920148	GANADERA MONTEZUMA S. A.	GANADO	GANADERA MONTEZUMA	HIDRO	1000	29-Jan-92	29-May-92	VIAS EN EST.	29-May-94
800912	EL PISQUIN S.A.	GANADERIA	LA PAZ	HIDRO	17500	07-Sep-89	22-May-90	VIAS EN EST.	01-Oct-93
911144	CIA HIDROELEC TURIRE	GENERAC.	TURIS	HIDRO	1500	07-Nov-91	04-Mar-92	VIAS EN EST.	04-Mar-94
920148	SUERKATA SRL	REFORER.	AMPLIACION SUERKATA	HIDRO	3400	12-Feb-92	02-Jun-92	VIAS EN EST.	02-Jun-94
920362	BERNARDO ARCE GUTIERREZ	ADMINISTRAC	DON PEDRO	HIDRO	5000	04-Mar-92	30-Jun-92	VIAS EN EST.	30-Jun-94
920458	POCORA ELECTRICA SA	GENERAC.	DOS NOVILLOS	HIDRO	368	20-Apr-92	18-Aug-92	VIAS EN EST.	18-Aug-94
801219	HIDROATLANTICA S.A.	GENERAC.	PROY. HIDROELEC. LOMAS	HIDRO	8000	12-Oct-89	22-May-90	VIAS EN EST.	01-Oct-93
901233	CORPORACION SUPERIOR	INDUSTRIA	RIO LAJAS	HIDRO	10000	03-Dec-90	12-Nov-91	VIAS EN EST.	23-Apr-94
920582	AZUCARERA EL VIEJO S. A.	INGENIO	TENORIO I	HIDRO	1000	12-May-92	08-Sep-92	VIAS EN EST.	08-Sep-94
910234	ANGEL CUSTODIO ALFARO	ASERRIO	REBECA UNO	HIDRO	50	25-Feb-91	27-May-92	ELEGIBLE	27-Nov-93 (1)
920250	ARCH GENERACION S. A.	GENERAC.	ARCH GENERACION	HIDRO	19800	12-Feb-92	09-Jun-92	ELEGIBLE	09-Jun-94
910840	JORGE JIMENEZ Y CIA SA	GENERAL	LA PAZ ARRIBA	HIDRO	1370	05-Sep-91	10-Jan-92	ELEGIBLE	18-Jun-94
920364	JOSE A BENAVIDES SANCHO	ADMINISTRAC	VOLCAN J	HIDRO	17000	18-Mar-92	14-Jul-92	ELEGIBLE	14-Jul-94
901131	EMPRESA ELEC. LIMON SA	GENERAC.	RIO BANANO	HIDRO	17000	03-Apr-92	28-Jul-92	ELEGIBLE	28-Jul-94
920361	INMOBILIARIA ESCO SA	COMERCIO	RIO RUBIO	HIDRO	400	02-Mar-92	18-Aug-92	ELEGIBLE	18-Aug-94
920458	HIDROELEC. BUENA VISTA SA	GENERAC.	BUENA VISTA	HIDRO	15000	20-Apr-92	18-Aug-92	ELEGIBLE	18-Aug-94
920580	CARLOS CORRALES VILLALOBOS	CONSULTOR	DON RAFAEL	HIDRO	15000	11-May-92	08-Sep-92	ELEGIBLE	08-Sep-94
910336	ALVARO ESQUIVEL SUC. LTDA	CAFETALE	LA ANITA	HIDRO	149	13-Feb-92	29-Sep-92	ELEGIBLE	29-Sep-93
920584	DESARROLLOS ENERGETICOS (MV) S. A.	GENERAC.	SAN GABRIEL	HIDRO	422	23-Jun-92	21-Oct-92	ELEGIBLE	21-Oct-94 (1)
920786	HIDROELECTRICA EL GATO S. A.	GENERAC.	EL GATO	HIDRO	13000	07-Jul-92	27-Oct-92	ELEGIBLE	27-Oct-93
920581	RAFAEL P. CORRALES	GENERAC.	GUACIMO	HIDRO	7000	11-May-92	23-Feb-93	ELEGIBLE	23-Feb-94
920588	JORGE FIGUEROA QUIROS	GENERAC.	SAN VALENTIN	HIDRO	14300	29-May-93		ELEG. EN EST.	
920587	LOSKO S.A.	COMERCIO	POAS I Y II	HIDRO	1400	29-May-93		ELEG. EN EST.	
920588	ALTOJAS S.A.	GENERAC.	ALTOJAS	HIDRO	1470	29-May-93		ELEG. EN EST.	
920589	CONELECTRICA R.L.	GENERAC.	LA VIEJA	HIDRO	15200	28-May-93		ELEG. EN EST.	
920870	PLANTAS EOLICAS S.A.	GENERAC.	PROY. EOLICO PRIVADO	EOLICO	19800	18-Aug-93		ELEG. EN EST.	(3)
920871	INGL. QUEBRADA AZUL LTDA	GENERAC.	QUEBRADA AZUL	SAGAZO	250	18-Aug-93		ELEG. EN EST.	(2)
920872	INV. LA MANQUERA S.A.	GENERAC.	LA ESPERANZA	HIDRO	5000	27-Aug-93		ELEG. EN EST.	

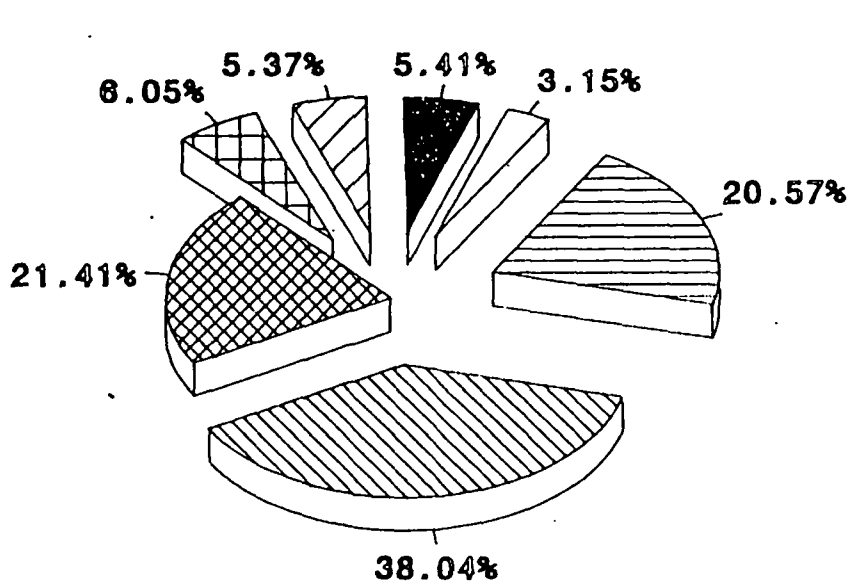
NOTAS:

- (1) CORRESPONDE A PLANTAS RENABILITADAS
- (2) CORRESPONDE A PRODUCCION DE LA ENERGIA POR MEDIO DE SAGAZO
- (3) CORRESPONDE A PRODUCCION DE LA ENERGIA POR MEDIO DE VIENTO

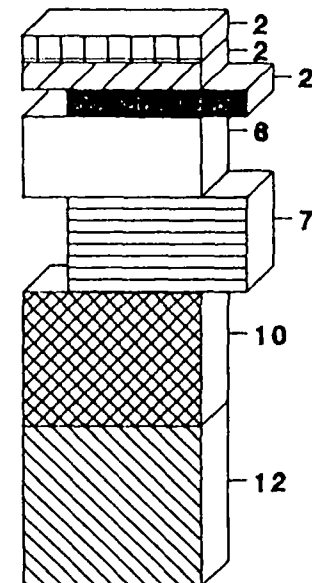
TABLA QP
 SET-93

GENERACION PRIVADA

SITUACION ACTUAL DEL PROGRAMA - AGOSTO 1993



(PORCENTAJES)



(NUMERO DE PROYECTOS, TOTAL 41 UNID)

- | | | | |
|--|--|--|--|
| <input type="checkbox"/> OPERACION, 8.8 MW | <input checked="" type="checkbox"/> CONTRATO, 15.10 MW | <input checked="" type="checkbox"/> NEGOCIACION, 15 MW | <input type="checkbox"/> VIAB/APROB, 16.8 MW |
| <input checked="" type="checkbox"/> VIAB/EST, 59.77 MW | <input checked="" type="checkbox"/> ELEGIBILIDAD, 108.2 MW | <input type="checkbox"/> ELEG. EN EST. 57.42 MW | |

TOTAL 279.20 MW

SET-1993
MINI2A

LOCALIZACION DE LOS PROYECTOS POR CUENCA

. DE LOS 41 PROYECTOS PRESENTADOS A AGOSTO DE 1993, EL TAMAÑO OSCILA ENTRE 50 Y 19800 KW. EN UN RANGO MENOR A 500 KW HAY 11 PROYECTOS, ENTRE 15000-20000 HAY 10 PROYECTOS, EL RESTO DE LOS 20 PROYECTOS TIENEN POTENCIAS QUE OSCILAN ENTRE 1000 Y 15000 KW.

. LOS PROYECTOS SE LOCALIZAN EN LAS CUENCAS HIDROGRAFICAS DE LOS RIOS: BANANO, REVENTAZON, CHIRRIPO, SARAPIQUI, SAN CARLOS, RIO FRIO, TEMPISQUE, BEBEDERO, GRANDE DE TARCOLES, PARRITA, Y GRANDE DE TERRABA.

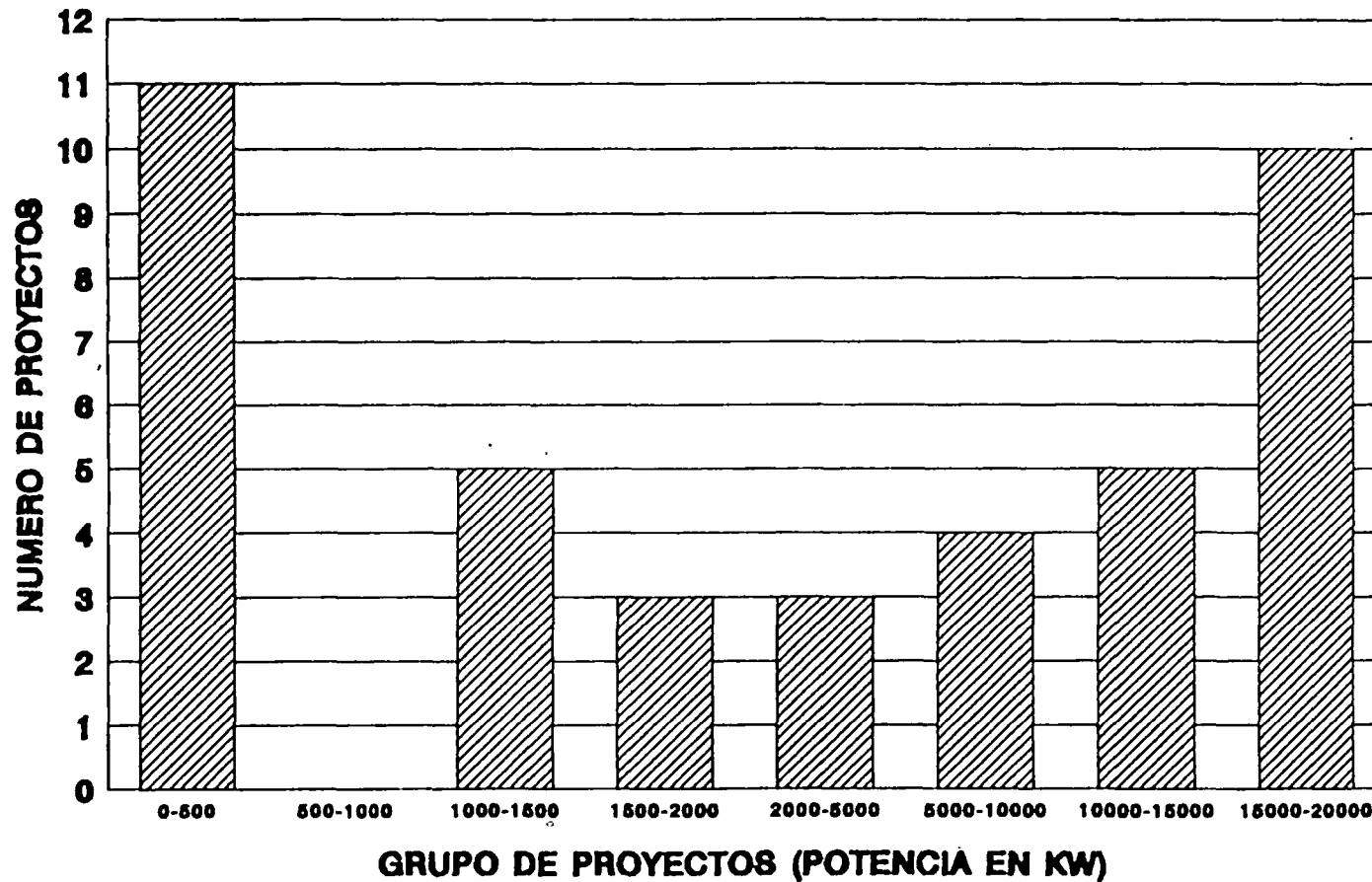
. LAS CUENCAS CON MAYOR NUMERO DE PROYECTOS SON SARAPIQUI (10), SAN CARLOS (10) Y REVENTAZON (9).

. EL MAYOR POTENCIAL HIDROELECTRICO LO PRESENTA EL RIO SARAPIQUI CON UN TOTAL 96390 KW ES DECIR UN 34.52 % DE LA PRODUCCION TOTAL, LUEGO SAN CARLOS CON 65725 KW ES DECIR UN 23.54% DEL TOTAL, EL RIO REVENTAZON CON 35490 KW PARA UN 12.71%..

. EN LAS FIGURAS ADJUNTAS SE MUESTRAN LOS PROYECTOS POR CUENCA Y LA LOCALIZACION DENTRO DEL TERRITORIO NACIONAL.

GENERACION PRIVADA

NUMERO DE PROYECTOS SEGUN LA POTENCIA INSTALADA (KW)



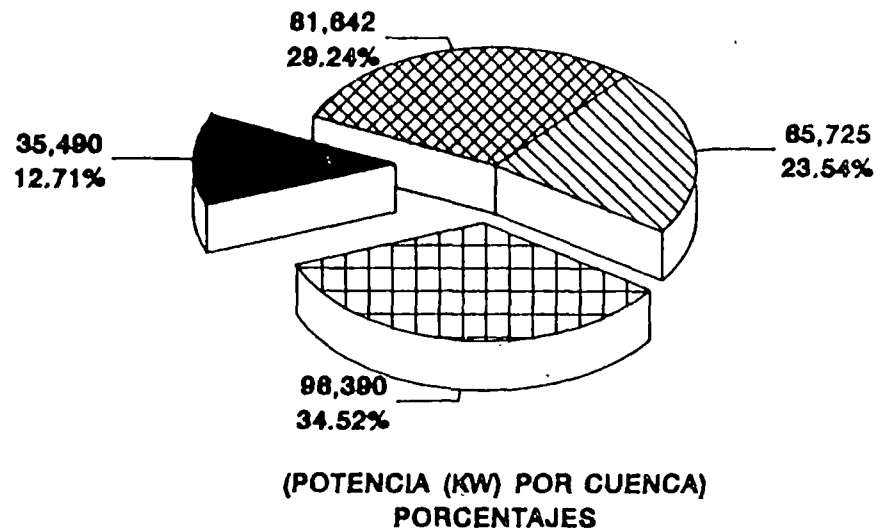
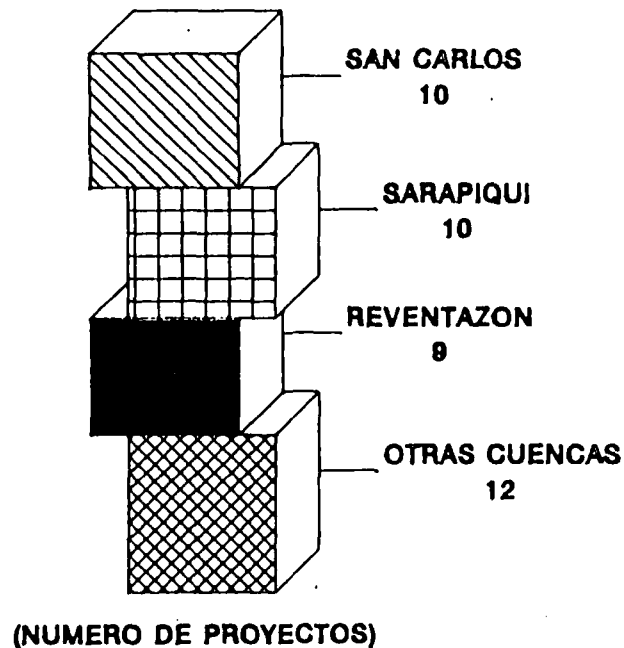
TOTAL DE PROYECTOS: 41 UNID

SET-1993
MINI4

PROYECTOS GENERACION PRIVADA

POTENCIA Y CANTIDAD DE PROYECTOS POR CUENCA

A AGOSTO DE 1993



▣ OTRAS CUENCAS ■ REVENTAZON □ SARAPIQUI ▨ SAN CARLOS

POTENCIA TOTAL: 278,247 KW

8ET-1993
MINI7

PROYECTOS DE GENERACION

POTENCIA Y NUMERO DE PROYECTOS POR CUENCA

A AGOSTO DE 1993

CUENCA (RIO)	Nº DE CUENCA	CANT. PROYECTOS	POTENCIA (KW)
BANANO	3	1	17,000
REVENTAZON	9	9	35,490
CHIRRIPO	11	2	21,300
SARAPIQUI	12	10	96,390
SAN CARLOS	14	10	65,725
RIO FRIO	16	1	19,800
TEMPISQUE	19	1	4,000
BEBEDERO	20	2	2,000
GR. DE TARCOLES	24	3	2,120
PARRITA	26	1	422
GR. DE TERRABA	31	1	15,000

**PROYECTOS DE GENERACION PRIVADA
PROYECTOS Y POTENCIA (KW) POR CUENCA**

CUENCA	No CUENCA	NOMBRE DE PROYECTO	POTENCIA	POTENCIA TOTAL
RIO BANANO	3	RIO BANANO	17 000	17 000
REVENTAZON-PARISMINA	9	TUIS	1 500	35 490
		RIO LAJAS	10 000	
		TAUS	1 950	
		DOS NOVILLOS	366	
		RIO RUBIO	400	
		LA ANITA	149	
		LOMAS	8 000	
		EL GATO	13 000	
		PLANTA PEJIBAYE	125	
RIO CHIRRIPO	11	GUACIMO	7 000	21 300
		SAN VALENTIN	14 300	
RIO SARAPIQUI	12	PLANTA EL ANGEL	3 850	96 390
		SUERKATA	3 400	
		LA PAZ	17 500	
		DOÑA JULIA	12 000	
		LA PAZ ARRIBA	1 370	
		DON PEDRO	5 000	
		VOLCAN 3X	17 000	
		DON RAFAEL	15 000	
		ARCH GENERACION	19 800	
		ALTROJAS	1 470	
RIO SAN CARLOS	14	AGUAS ZARCAS	13 100	65 725
		REBECA	50	
		LOS NEGRITOS	50	
		CAÑO GRANDE	1 995	
		SAN LORENZO	15 000	
		PLATANAR	15 000	
		PLANTA TAPEZCO	80	
		LA VIEJA	15 200	
		LA ESPERANZA	5 000	
		QUEBRADA AZUL	250	(1)
RIO FRIO	16	PROY. EOLICO PRIVADO	19800	19800 (2)
RIO TEMPISQUE	19	PLANTA EL VIEJO	4 000	4 000 (1)
RIO BEBEDERO	20	GANADERA MONTEZUMA	1 000	2 000
		TENORIO	1 000	
RIO GRANDE DE TARCOLES	24	PLANTA SAN RAFAEL	300	2 120
		PLANTA SANTA RUFINA	420	
		POASI Y II	1 400	
RIO PARRITA (PIRRIS)	26	SAN GABRIEL	422	422
RIO GRANDE DE TERRABA	31	BUENA VISTA	15 000	15 000

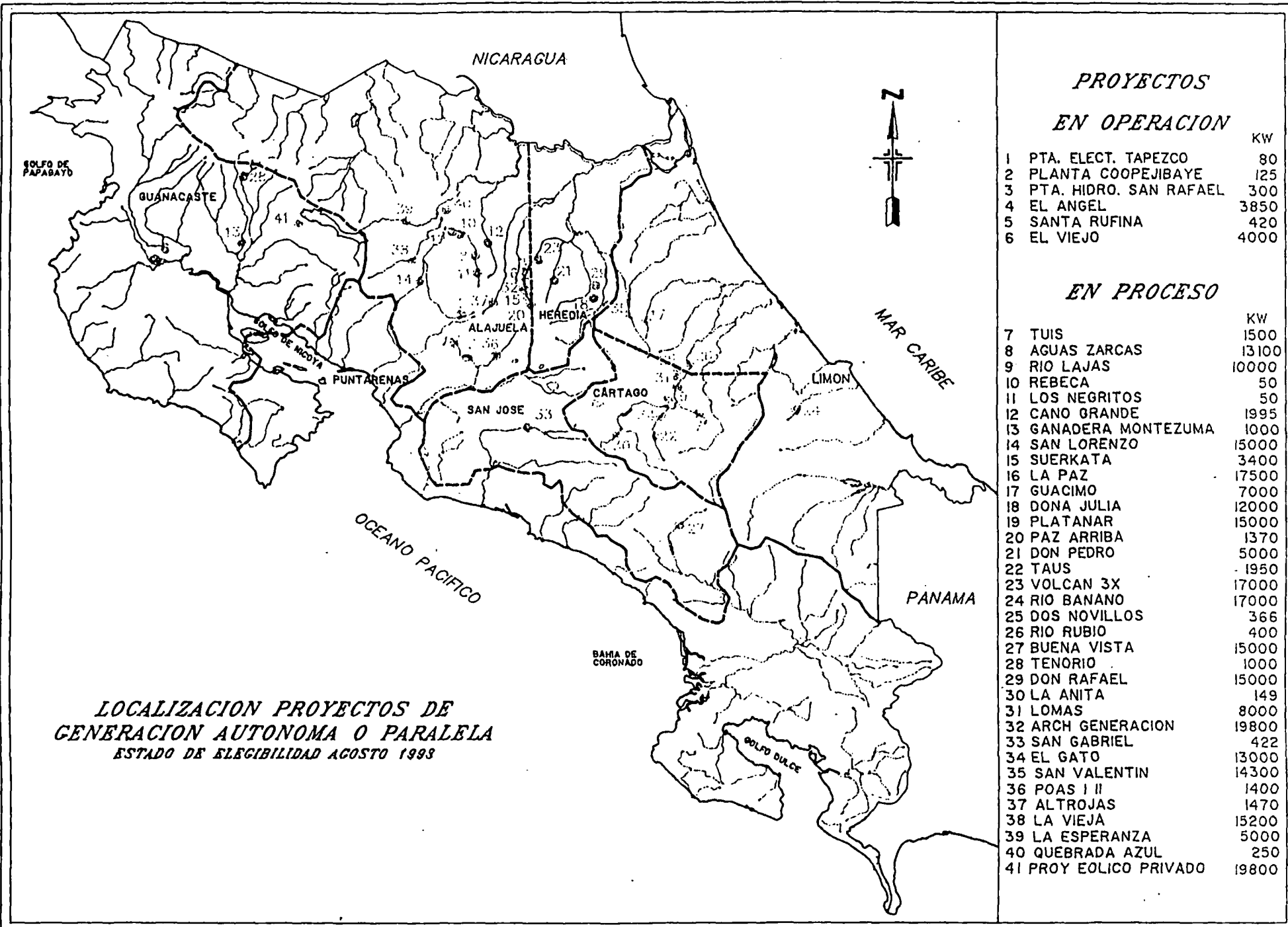
NOTAS:

- Producción de energía con bagazo (1)
- Producción de energía con viento (2)

POTENCIA TOTAL

279 247

CUENCAS
SET-1993



**LOCALIZACION PROYECTOS DE
GENERACION AUTONOMA O PARALELA
ESTADO DE ELEGIBILIDAD AGOSTO 1993**

**PROYECTOS
EN OPERACION**

	KW
1 PTA. ELECT. TAPEZCO	80
2 PLANTA COOPEJIBAYE	125
3 PTA. HIDRO. SAN RAFAEL	300
4 EL ANGEL	3850
5 SANTA RUFINA	420
6 EL VIEJO	4000

EN PROCESO

	KW
7 TUIS	1500
8 AGUAS ZARCAS	13100
9 RIO LAJAS	10000
10 REBECA	50
11 LOS NEGRITOS	50
12 CANO GRANDE	1995
13 GANADERA MONTEZUMA	1000
14 SAN LORENZO	15000
15 SUERKATA	3400
16 LA PAZ	17500
17 GUACIMO	7000
18 DONA JULIA	12000
19 PLATANAR	15000
20 PAZ ARRIBA	1370
21 DON PEDRO	5000
22 TAUS	1950
23 VOLCAN 3X	17000
24 RIO BANANO	17000
25 DOS NOVILLOS	366
26 RIO RUBIO	400
27 BUENA VISTA	15000
28 TENORIO	1000
29 DON RAFAEL	15000
30 LA ANITA	149
31 LOMAS	8000
32 ARCH GENERACION	19800
33 SAN GABRIEL	422
34 EL GATO	13000
35 SAN VALENTIN	14300
36 POAS I II	1400
37 ALTROJAS	1470
38 LA VIEJA	15200
39 LA ESPERANZA	5000
40 QUEBRADA AZUL	250
41 PROY EOLICO PRIVADO	19800

**COSTOS DE CONSTRUCCION DE LOS PROYECTOS DE
GENERACION PRIVADA**

. EN LOS CUADROS Y FIGURAS ADJUNTAS SE MUESTRAN LOS COSTOS DE CONSTRUCCION Y DE INSTALACION PRESENTADOS POR LOS GENERADORES PRIVADOS EN LOS DOCUMENTOS DE ELEGIBILIDAD O DE ESTUDIOS DE VIABILIDAD. PARA PODER COMPARARLOS A UNA MISMA FECHA, SE AJUSTARON A ENERO 1993 UTILIZANDO INDICES DE COSTOS DE CONSTRUCCION EXTERNOS DEL PERIODO 1982-1992. ESTOS INDICES SON TRIMESTRALES POR LO QUE EN ALGUNOS CASOS LAS ACTUALIZACIONES SON APROXIMADAS.

FUENTE: VALORES DE U.S. BUREAU OF RECLAMATION. TABLA DE INDICES ELABORADA POR EL DPTO. ESTUDIOS ECONOMICOS Y FINANCIEROS DE LA DIR. PLANIFICACION ELECTRICA DEL ICE.

. TIPO DE CAMBIO UTILIZADO 1\$= 138.07 COLONES.

. SE MUESTRAN TRES CUADROS, PARA PROYECTOS CUYAS POTENCIAS OSCILAN ENTRE MENOR A 5000 kw, ENTRE 5000-10000 kw Y ENTRE 10000-17000 kw. SE OBTIENEN COSTOS UNITARIOS PROMEDIOS DE LOS PROYECTOS UTILIZADOS.

. DE LOS 32 PROYECTOS UTILIZADOS PARA OBTENER INFORMACION DE COSTOS, SE OBSERVA QUE EXISTEN 19 PROYECTOS CUYO COSTO DE INSTALACION OSCILA ENTRE 1000-1500 \$/kw REPRESENTANDO UN 59.38 %. HAY UN PROYECTO CUYO COSTO ES MAYOR A 2000 \$/kw.

. EL COSTO INSTALADO PROMEDIO DE LOS 32 PROYECTOS ANALIZADOS ES DE 1306 \$/kw.

PROYECTOS DE GENERACION PRIVADA

RESUMEN DE COSTOS DE LAS PRINCIPALES OBRAS

PROYECTOS DE POTENCIA ENTRE 0 Y 8000 KW
 COSTOS EN DOLARES A ENERO DE 1993 TIPO DE CAMBIO 18 = 138.07

ITEM	UNID	1) PROYECTO DOS NOVILLOS (300 KW)			2) PROYECTO RIO RUBIO (400 KW)			3) PROYECTO LA PAZ ARRIBA (1370 KW)			4) PROYECTO CAÑO GRANDE (1000 KW)			5) PROYECTO GUERCATA (3400 KW)			6) PROYECTO EL ANGEL (3800 KW)		
		CANT.	PRECIO UNIT	COSTO TOTAL	CANT.	PRECIO UNIT	COSTO TOTAL	CANT.	PRECIO UNIT	COSTO TOTAL	CANT.	PRECIO UNIT	COSTO TOTAL	CANT.	PRECIO UNIT	COSTO TOTAL	CANT.	PRECIO UNIT	COSTO TOTAL
		PRESA 1	M3	828	71.10	44 438.18	848.8	160.74	37 104.00	848	104.82	88 874.00	898	219.00	153 348.18	885	223.73	153 260.00	100
PRESA 2	M3										844	100.00	103 411.41						
CANAL DE CONDUCCION 1	M	800	46.00	22 877.07	370	23.40	8 870.78	700	182.97	162 447.00	703	432.78	343 198.82	870	321.87	218 654.00			
TUNEL	M																100	2 024.97	403 978.82
TUBERIA BAJA PRESION	M																40	602.73	20 109.18
TUBERIA DE PRESION 1	M	80	4 898.18	214 308.01	1280	120.43	154 166.48	180	820.48	140 716.48	318.6	388.11	124 321.82	800	882.14	331 070.00	180	2 719.31	489 478.54
TUBERIA DE PRESION 2	M												232.6	388.17	89 863.78				
CABA MAQUINAS 1	M2	80	219.00	13 178.71	48	474.80	21 343.27	110	281.83	31 012.71	100	784.00	72 408.00	181	688.82	106 344.00	188	3 088.88	573 978.20
CABA MAQUINAS 2	M2												100	711.30	71 130.21				
EQUIPO ELECTROMECC.	OL			188 797.53			88 027.83			870 188.18			770 108.84			1 088 862.20			1 778 818.82
LINEAS DE TRANSMISION	KM	8.8	1 846.88	8 487.88							2	12 872.33	25 844.88						
CAMINOS NUEVOS	KM	1.3	31 318.88	40 718.43							3	19 788.18	59 307.58	4	81 862.88	246 288.88			

COSTOS PROMEDIOS

COSTOS
(8)

PRESA	M3	180
CANAL DE CONDUCCION 1	M	203
TUNEL	M	2 820
TUBERIA BAJA PRESION	M	603
TUBERIA DE PRESION	M	487
CABA MAQUINAS	M2	812
EQUIPO ELECTROMECC.	OL	812 888
LINEAS DE TRANSMISION	KM	7 288
CAMINOS NUEVOS	KM	37 847

NOTA:

EN EL CALCULO DE LOS COSTOS PROMEDIOS NO FUERON TOMADOS EN CUENTA AQUELLOS COSTOS CUYO VALOR ES EXTREMO.

PROYECTOS DE POTENCIAS ENTRE 5000 Y 10000 KW
 COSTOS EN DOLARES A ENERO DE 1993. TIPO DE CAMBIO 1\$ = 138.07

ITEM	UNID	1) PROYECTO DON PEDRO (5000 KW)			2) PROYECTO GUACIMO (7000 KW)			3) PROYECTO LOMAS (8000 KW)			4) PROYECTO RIO LAJAS (10000 KW)		
		CANT	PRECIO UNIT	COSTO TOTAL	CANT	PRECIO UNIT	COSTO TOTAL	CANT	PRECIO UNIT	COSTO TOTAL	CANT	PRECIO UNIT	COSTO TOTAL
- PRESA 1	M3	1123	368.04	411 065.00	1035	308.48	319 258.78	573	3 381.55	1 937 828.53	845.9	299.29	253 170.20
- PRESA 2	M3				1035	308.48	319 258.78	573	3 381.55	1 937 828.53	2808.9	248.18	648 830.29
- PRESA 3	M3										2568.9	236.43	608 883.18
- CANAL DE CONDUCCION 1	M.	2730	724.01	1 978 558.00	1440	244.78	352 458.48	5000	18.04	90 208.50	450	78.62	35 378.55
- CANAL DE CONDUCCION 2	M.										780	117.29	89 142.22
- CANAL DE CONDUCCION 3	M.										1800	183.44	309 488.48
- TUNEL	M.							700	1 183.80	828 732.81			
- TUBERIA BAJA PRESION	M.				1480	444.34	648 720.73				2285	1 081.24	2 448 017.10
- TUBERIA DE PRESION 1	M.	2940	1 391.80	4 081 302.00	1800	870.44	1 566 792.00	7632	524.50	4 002 861.89			
- CASA MAQUINAS 1	M2	378.5	4 817.42	1 738 458.14	238	0.00		220	3 668.13	808 548.37	230	8 587.82	1 517 520.68
- EQUIPO ELECTROMECC.	GL			3 485 724.93						2 757 178.48			1 813 287.28
- LINEAS DE TRANSMISION	KM	15	53 804.33	807 065.00	2.7	11 351.35	30 648.65	5	12 670.39	63 351.98			
- CAMINOS REPARACION	KM	12	11 158.45	133 913.40									
- CAMINOS NUEVOS	KM	3	55 797.10	167 391.30	5.7	32 281.74	183 891.89	7	41 633.75	291 436.25	5	30 452.60	152 282.99
- CAMINOS MANTENIMIENTO	KM/año	30	8 115.85	243 478.50									

COSTOS PROMEDIOS

COSTO
(\$)

- PRESA	M3	294
- CANAL DE CONDUCCION	M.	320
- TUNEL	M.	1 184
- TUBERIA BAJA PRESION	M.	783
- TUBERIA DE PRESION	M.	882
- CASA MAQUINAS	M2	4 080
- EQUIPO ELECTROMECC.	GL	7 858 191
- LINEAS DE TRANSMISION	KM	25 842
- CAMINOS REPARACION	KM	11 158
- CAMINOS NUEVOS	KM	40 038
- CAMINOS MANTENIMIENTO	KM/año	8 118

NOTA:

En el cálculo de los costos promedios no fueron tomados en cuenta aquellos costos cuyo valor es extremo.

PROYECCION DE POTENCIA ENTRE 19200 Y 11000 KW
COSTOS EN COLONES A FIN DE 1982. IPO DE CAMBIO 18 - 130.07

ITEM	UNID	3) PROYECTO DONA JULIA (1,320.00 KW)			8) PROYECTO DONA JULIA (1,320.00 KW)			9) PROYECTO DONA JULIA (1,320.00 KW)			10) PROYECTO LA VISTA (1,000.00 KW)			11) PROYECTO DON RAFAEL (1,000.00 KW)			12) PROYECTO PLATANAS (1,000.00 KW)			13) PROYECTO RIO BANANOS (1,000.00 KW)			14) PROYECTO VOLCAN DE (1,000.00 KW)		
		CANT.	PRECIO UNIT.	COSTO TOTAL	CANT.	PRECIO UNIT.	COSTO TOTAL	CANT.	PRECIO UNIT.	COSTO TOTAL	CANT.	PRECIO UNIT.	COSTO TOTAL	CANT.	PRECIO UNIT.	COSTO TOTAL	CANT.	PRECIO UNIT.	COSTO TOTAL	CANT.	PRECIO UNIT.	COSTO TOTAL	CANT.	PRECIO UNIT.	COSTO TOTAL
PRESA 1	M	3	377.88	1,133.74	1077	211.02	226,325.34	1185	273.57	324,918.02	1880	305.84	572,983.12	1120	124.42	139,348.80	1234.44	145.77	179,840.03	250.04	910.71	227,571.03	1234.44	145.77	179,840.03
PRESA 2	M				600	258.30	154,980.00	1185	273.57	324,918.02				1090	124.16	134,314.40	2503.16	222.30	556,131.00	2503.16	1,601.20	2,608,160.00	2503.16	1,601.20	2,608,160.00
PRESA 3	M				700	100.00	70,000.00						3070	113.37	347,844.90	1120	124.42	139,348.80	1120	124.42	139,348.80	1120	124.42	139,348.80	
PRESA 4	M																								
CANAL DE CONDUCCION 1	M				6000	202.00	1,212,000.00	4800	460.85	2,214,080.00	6000	777.76	4,666,560.00	3400	226.12	769,808.00	4275	337.40	1,442,122.50	1400	127.46	178,444.00	250.04	910.71	227,571.03
CANAL DE CONDUCCION 2	M																								
CANAL DE CONDUCCION 3	M																								
CANAL DE CONDUCCION 4	M																								
TUBERIA BAJA PRESION	M	1000	1,607.77	1,607,770.00	1000	1,428.00	1,428,000.00	1000	1,428.00	1,428,000.00	1000	1,428.00	1,428,000.00	1000	1,428.00	1,428,000.00	1000	1,428.00	1,428,000.00	1000	1,428.00	1,428,000.00	1000	1,428.00	1,428,000.00
TUBERIA DE PRESION 1	M	1000	9,100.00	9,100,000.00	1000	9,100.00	9,100,000.00	1000	9,100.00	9,100,000.00	1000	9,100.00	9,100,000.00	1000	9,100.00	9,100,000.00	1000	9,100.00	9,100,000.00	1000	9,100.00	9,100,000.00	1000	9,100.00	9,100,000.00
TUBERIA DE PRESION 2	M																								
TUBERIA DE PRESION 3	M																								
CASA MAQUINAS 1	M	400	4,743.00	1,897,200.00	172	1,702.08	292,757.76	172	1,702.08	292,757.76	160	222.00	35,520.00	307	307.00	94,221.00	300	1,120.00	336,000.00	610	1,720.76	1,050,723.60	420	4,664.76	1,960,009.20
CASA MAQUINAS 2	M				128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44
CASA MAQUINAS 3	M				128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44	128	204.48	26,173.44
EQUIPO ELECTRONIC	CL																								
LAMPAS DE TRANSICION	CL	28	28,703.00	803,684.00	2	707.04	1,414.08	2	707.04	1,414.08	2	707.04	1,414.08	2	707.04	1,414.08	2	707.04	1,414.08	2	707.04	1,414.08	2	707.04	1,414.08
CAMBIO REFRACCION	CL				3	1,004.00	3,012.00	3	1,004.00	3,012.00	3	1,004.00	3,012.00	3	1,004.00	3,012.00	3	1,004.00	3,012.00	3	1,004.00	3,012.00	3	1,004.00	3,012.00
CAMBIO ALAMBRE	CL																								
CAMBIO MANTENIMIENTO	CL																								
				COSTO TOTAL			3,746,320.76			3,746,320.76			3,746,320.76			3,746,320.76			3,746,320.76			3,746,320.76			3,746,320.76

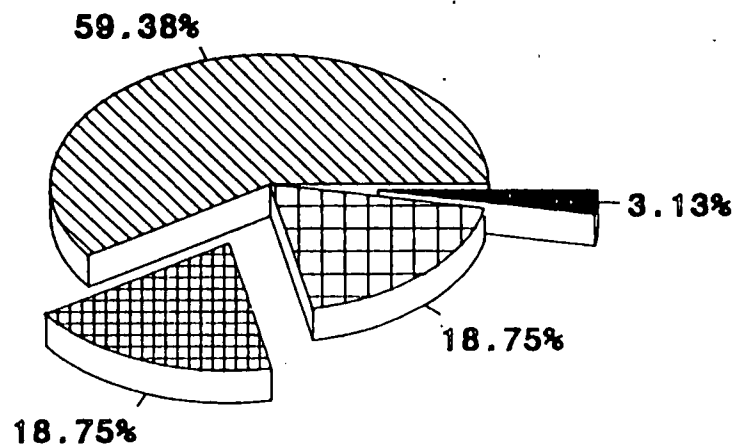
COSTOS PROBLEMAS

ITEM	UNID	CANT.	PRECIO UNIT.	COSTO TOTAL
PRESA	M	20	20	400.00
CANAL DE CONDUCCION	M	20	20	400.00
TUBERIA BAJA PRESION	M	1,000	1,000	1,000,000.00
TUBERIA DE PRESION	M	1,741	1,741	3,031,741.00
CASA MAQUINAS	M	3,729	3,729	13,912,729.00
EQUIPO ELECTRONIC	CL	4,307.218	4,307.218	18,548,218.00
LAMPAS DE TRANSICION	CL	30,672	30,672	938,524.80
CAMBIO REFRACCION	CL	11,185	11,185	124,843.50
CAMBIO ALAMBRE	CL	61,088	61,088	3,725,222.40
CAMBIO MANTENIMIENTO	CL	8,110	8,110	65,882.00

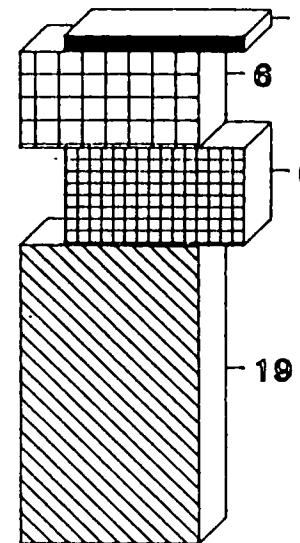
NOTA: EN EL CALCULO DE LOS COSTOS NO FUERON TOMADOS EN CUENTA ADEMAS LOS COSTOS QUE SON VALORES EXTREMOS

GENERACION PRIVADA

COSTOS DE INSTALACION \$/KW A ENERO DE 1993



PORCENTAJES



NUMERO DE PROYECTOS
DATOS UTILIZADOS

\$ / KW (INSTALADO)

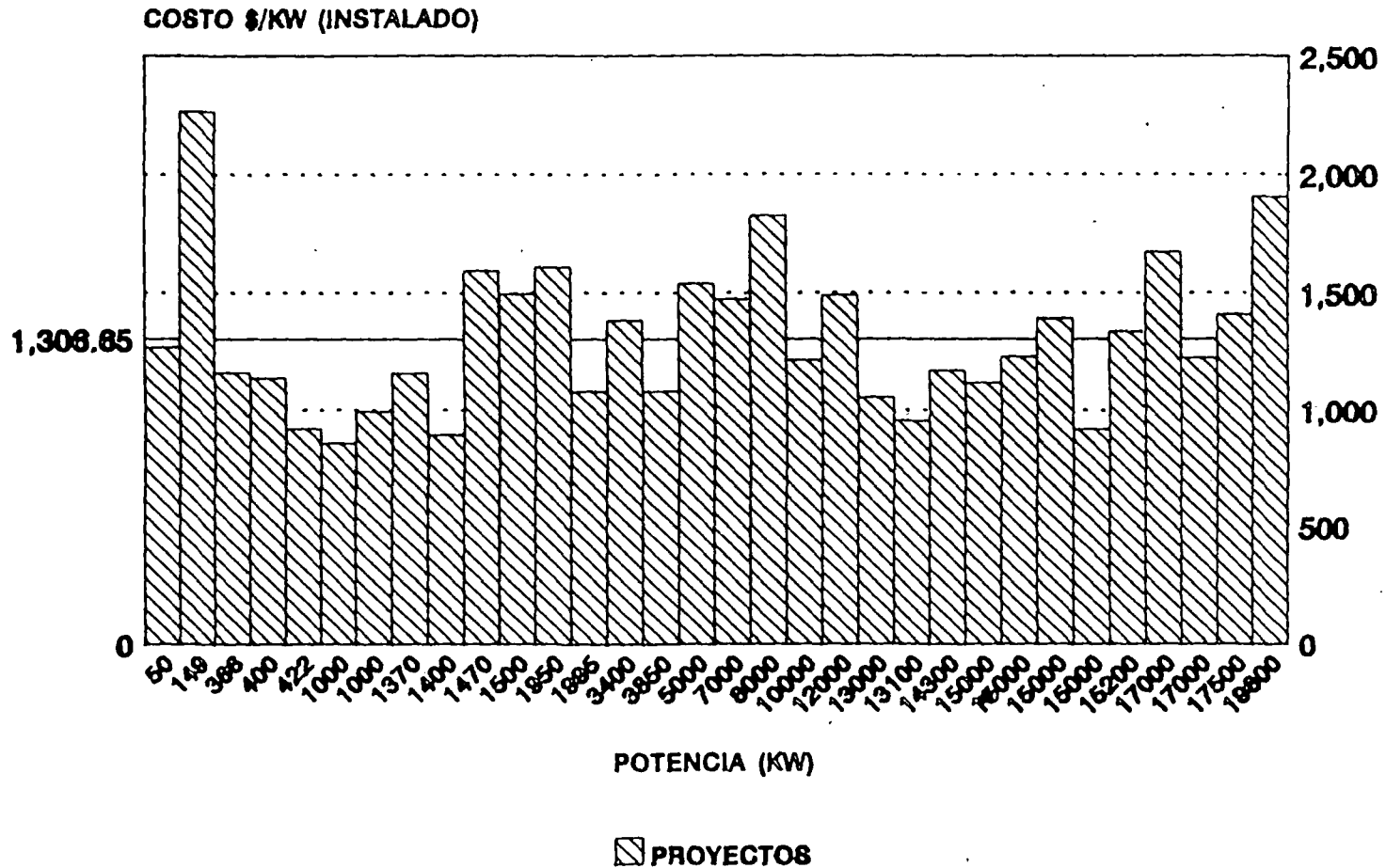
\$ 500-1000
 \$ 1000-1500
 \$ 1500-2000
 \$ 2000-2500

COSTO PROMEDIO: 1,308.85

SET-1993
MINIS

GENERACION PRIVADA

COSTO PROMEDIO A ENERO DE 1993



**GENERACION Y MONTOS PAGADOS A LAS PLANTAS EN
OPERACION**

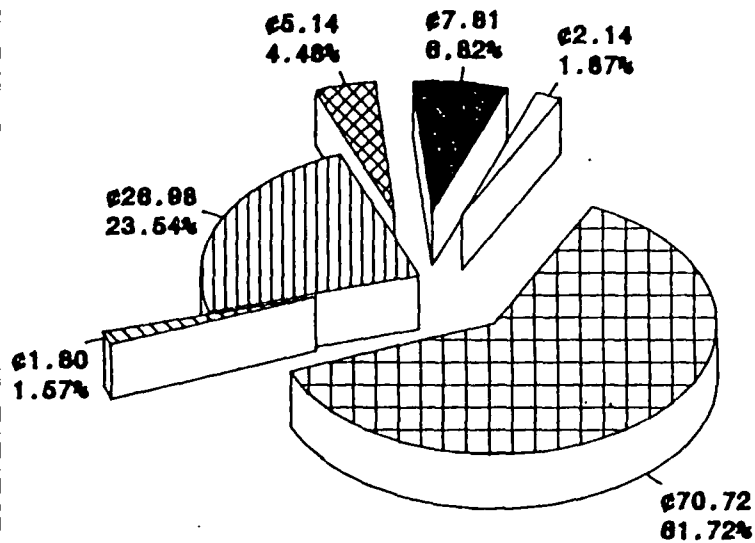
. LAS PLANTAS DE GENERACION PRIVADA QUE ESTAN EN OPERACION SON: SAN RAFAEL, EL VIEJO (BAGAZO), TAPEZCO, EL ANGEL, PEJIBAYE Y SARCHI

. DURANTE EL AÑO 1992 TODAS LAS PLANTAS GENERARON UN TOTAL DE 21695.4 MWH, POR LO QUE EL ICE PAGO UN TOTAL DE 114594811 COLONES. RECIBIENDO LA PLANTA EL ANGEL EL 61.72 % DEL TOTAL.

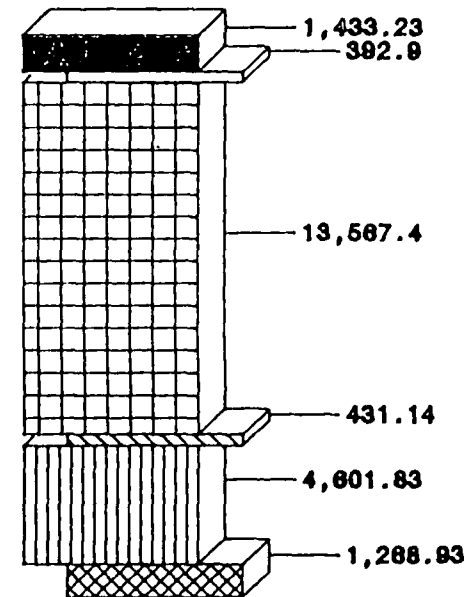
. LA GENERACION PARA 1993 HASTA EL MES DE JULIO FUE DE 13461.41 MWH. PAGANDOSE UN MONTO TOTAL DE 98583903 COLONES. RECIBIENDO LA PLANTA EL ANGEL UN 71.97 % DEL TOTAL.

GENERACION PRIVADA

GENERACION Y MONTOS POR PLANTA EN EL AÑO 1992



(MILLONES DE COLONES Y PORCENTAJES)



(GENERACION EN MWH)

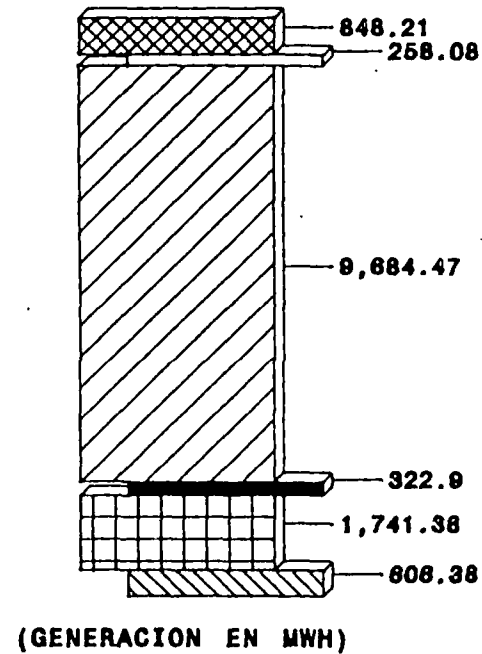
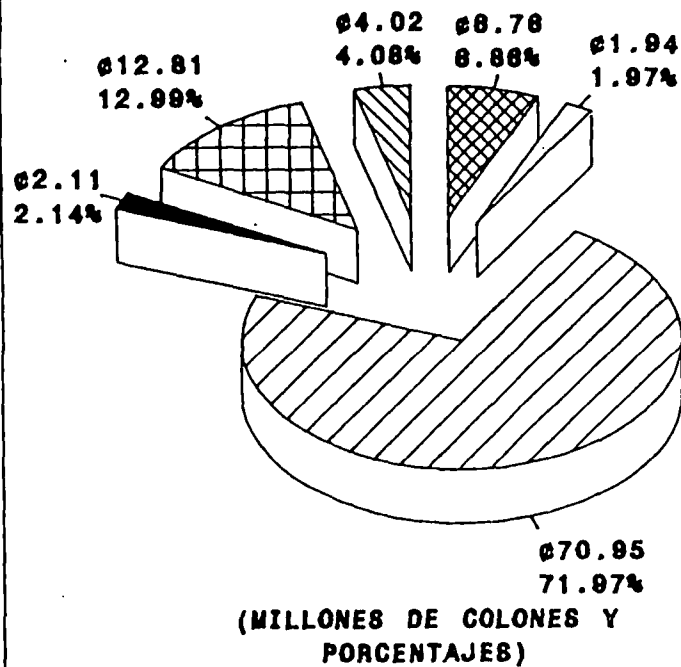
SAN RAFAEL
 EL VIEJO
 TAPEZCO
 EL ANGEL
 PEJIBAYE
 SARCHI

MONTO TOTAL PAGADO: 114 584 811.00 colones y GENERACION TOTAL ANUAL: 21,895.4 MWH

SET-1993
MINI

GENERACION PRIVADA

GENERACION Y MONTOS POR PLANTA A JULIO DE 1993



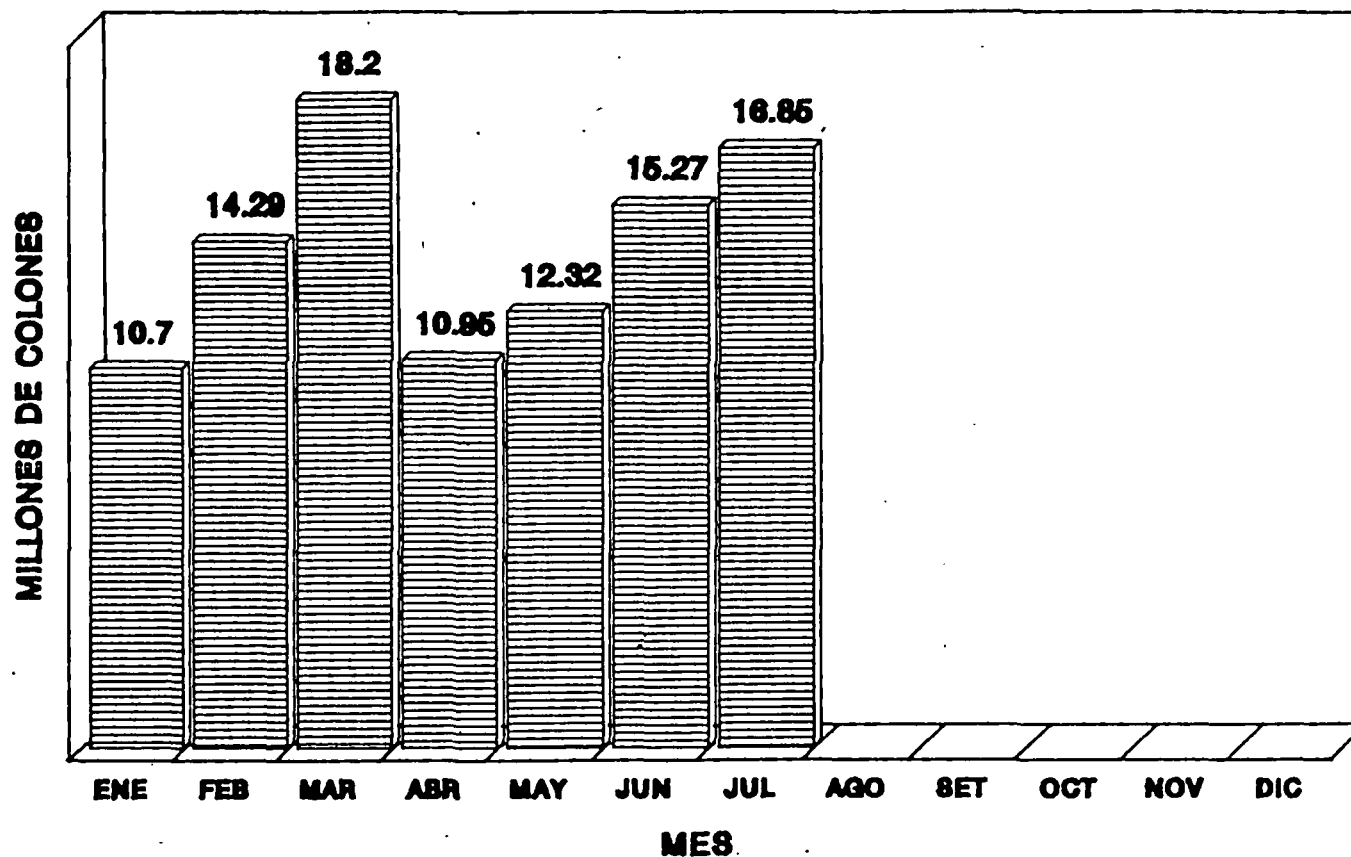
SAN RAFAEL
 EL VIEJO
 TAPEZCO
 EL ANGEL
 PEJIBAYE
 SANTA RUFINA

MONTO TOTAL PAGADO: 98 583 903.00 colones y GENERACION TOTAL: 13,481.41 MWH

SEY-1993
MINI10

GENERACION PRIVADA

MONTOS PAGADOS EN 1993



MONTO TOTAL PAGADO 99 583 903,00 COLONES

SET-1993
MINIO

FAX



UURI

Earth Science Laboratory
391 Chipeta Way, Ste C
Salt Lake City, UT 84109-1295
Phone: (801) 584-4422
FAX: (801) 584-4453

To:

John Ryan

Fax #:

202-371-5115

From:

Dennis Nielson

Date:

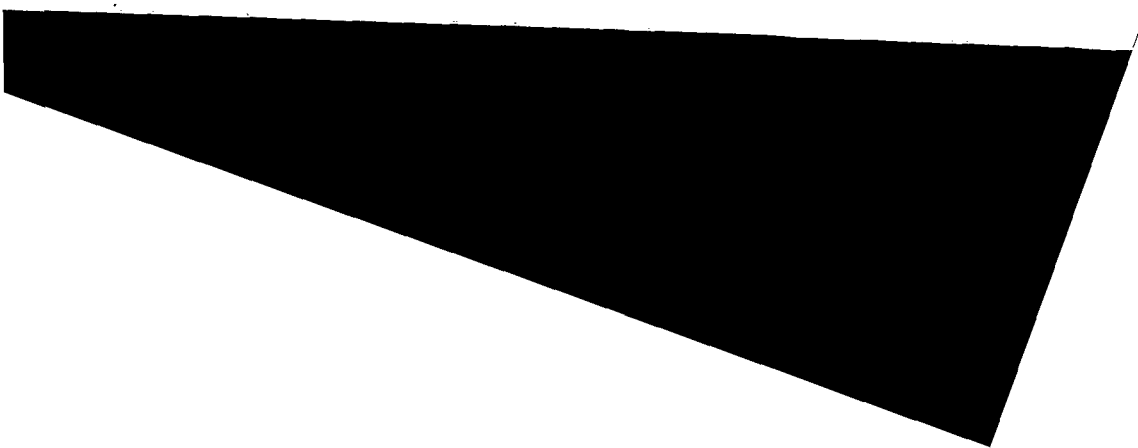
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4

Comments:



UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-584-4422

Mr. John Ryan
Coordinator, Project Finance
IFREE
Suite 930
750 First Street, N. E.
Washington, D. C. 20002

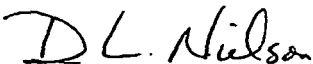
Dear Mr. Ryan:

This is an amendment to our request for travel funds to investigate geothermal opportunities in Costa Rica. As you requested we have suggested adding two additional people to the team.

1. We have requested through the attached letter to Mr. William White that Mr. Gary Ward be assigned to accompany us.
2. Mr. Domenic Falcone, a Principal in Creston Financial Group has been suggested as a representative of the financial community. His qualifications have been forwarded to you by Martin Booth.

Please contact myself or Mike Wright if there are further questions or suggestions. I will be out of the country between February 24 and March 14, so Mike will be the better contact for the next few weeks.

Sincerely,



Dennis L. Nielson
Associate Director

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-584-4422

Mr. William White
Deputy Director
U.S. Department of Energy
1000 Independence Ave., S.W.
Washington, DC 20585

February 3, 1994

Dear Bill,

The geothermal industry is very much interested in developing easier and more successful methods of doing business in Latin America. As a result of your interest in the potential for geothermal power development to displace a large, environmentally damaging hydro project in Costa Rica, several of our member companies have gotten together to submit a proposal to DOE for geothermal work in that country. The proposed project would blaze a trail for other U.S. companies to follow in (1) negotiating a geothermal concession, (2) complying with environmental and other regulations, (3) negotiating a power-purchase agreement with the Costa Rican utility ICE, and (4) exploration, drilling and construction of a geothermal power plant in Costa Rica. As you know, the Costa Ricans in the past have given U.S. companies only relatively small pieces of geothermal projects, with the major portions usually being contracted to Italian geothermal companies. The Italian government has been very aggressive in pursuing geothermal projects for its industry in countries throughout the world.

Development of geothermal power generation has been extremely slow in Costa Rica, especially given the enormity of the resource. We believe that the process could be speeded up considerably using U.S. expertise and the new business environment for developing private power in that country. However, the first geothermal project to actually navigate the complete path will be the most difficult and, if successful, will form a model that other U.S. companies can follow.

The proposed project has been discussed with Tom Hall in DOE's CORECT program who suggested that we present the proposal to the U.S. ECRE office. We have been given strong encouragement by Judy Siegel at ECRE and John Ryan who runs their IFREE program. They have indicated that a cost-shared project may be funded if we have support from your office. These organizations made funding available to organize a trip to Costa Rica and other Central American countries to examine project feasibility first hand. Such a trip is

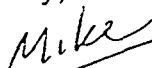
tentatively planned for early June, 1994, after installation on the new government in Costa Rica following February elections. Our project has also been discussed with Gary Ward, who I understand accompanied you on your trip to Costa Rica, and who is enthusiastic and supportive.

It would help us greatly if you would be willing to do two things:

1. Indicate your support for our project to Gary Ward and ask him to pass on this support to the CORECT and ECRE people; and,
2. Designate Ward as your representative to accompany us on our forthcoming trip to Costa Rica and other Central American countries, and to maintain cognizance of this project.

The geothermal industry is certain that several goals of the Clinton Administration can be furthered through your support. Installation of geothermal power generation can be accomplished in Latin America in the short term, helping to alleviate environmental problems, maintaining 1990 levels of CO₂ emissions and creating jobs for Americans through export of our goods and services. We thank you for your help.

Sincerely,



Phillip Michael Wright, President
National Geothermal Association



GEOHERMAL DEVELOPMENT ASSOCIATES

251 RALSTON STREET • RENO, NEVADA 89503
PHONE (702) 322-0938 • FAX (702) 322-1320

February 4, 1994

Mr. John Ryan
IFREE
750 First Street N.E.
Suite 930
Washington, DC 20002

Dear John:

Re: Private Geothermal Development, Costa Rica

It was a pleasure talking with you on February 1 regarding the proposed investigation into opportunities for private geothermal power development in Costa Rica. We believe that DOE's presence and strong support in this endeavor will be very beneficial to American business, and to Costa Rica as well. In response to your requirements for a financial representative that is part of the investment and banking community, I am enclosing background material on the Creston Financial Group.

Mr. Domenic Falcone, a founder and principal of this firm, is well known to us, and was suggested by Mike Wright of UURI. We believe that Mr. Falcone's long association with the geothermal community, primarily in the financing of projects, makes him an ideal choice.

I would appreciate your comment on our recommendation. Also, as I stated on the telephone, please call if you have any questions regarding our joint proposal.

Sincerely,
GEOHERMAL DEVELOPMENT ASSOCIATES

G. Martin Booth III
President

GMB/sb

xc: Dennis Nielson - UURI

PROPOSAL FOR ENHANCING THE U. S. GEOTHERMAL
INDUSTRY'S OPPORTUNITIES FOR DEVELOPMENT OF
GEOTHERMAL-ELECTRICAL POWER IN COSTA RICA

TO

U. S. DEPARTMENT OF ENERGY

BY

GEOTHERMAL DEVELOPMENT ASSOCIATES
Reno, Nevada

DAMES & MOORE
San Francisco, California

UNIVERSITY OF UTAH RESEARCH INSTITUTE
Salt Lake City, Utah

DECEMBER 13, 1993

INTRODUCTION

Environmental Motivation

Mr. William White, Deputy Secretary of Energy, learned in a meeting of Central American energy ministers, that the Republic of Costa Rica is planning a major hydroelectric project. This project will destroy a large percentage of the rainforest in Costa Rica. Geothermal energy offers a readily available alternative that will minimize rainforest destruction. Geothermal is the only renewable energy technology that offers proven base load electrical at a cost competitive with hydroelectric power.

Business Climate

The Republic of Costa Rica is a country of 2.6 million inhabitants that has the highest *per capita* energy consumption in Central America. The country is politically stable. A study of geothermal markets done for the California Energy Commission rates Costa Rica as fourth in the world in terms of geothermal business opportunity and as having relatively low business risk. Although the population is relatively small, we understand that Costa Rica is planning to increase electricity exports to neighboring countries.

Costa Rican Law Number 7200 authorizes the generation of electrical power by private firms. Therefore, there exists the legal basis for U. S. companies to develop electrical power plants using private power financing mechanisms. However, Law 7200 also limits to 20 MWe the size of the project that may be developed. This could require development in 20 MW increments or the use of Build-Operate-Transfer financing which would result in the project eventually being entirely owned by the national utility, Instituto Costarricense de Electricidad (ICE). Law 7200 requires 1. an account of eligibility to be granted by ICE, and 2. an environmental impact/assessment to be approved by MIRENEM (Costa Rica's EPA) prior to the granting of a concession to a private organization. An initial environmental bond of 4% of the project's value will be required when the contract is submitted.

Costa Rica will soon produce 55 MWe from the first development phase at the Miravalles Geothermal Field. The first 55 MWe power plant was supplied by Fuji of Japan with 4-1/2% financing by the Japanese. The well field was financed through the Interamerican Development Bank (IDB). An Italian firm provides reservoir engineering and management. U. S. firms provide drilling (Nabors) and cementing services (Halliburton) and supply well-head equipment (A/Z Grant). Electroconsult of Italy did the power plant design.

Under the second phase (55 MWe development), U. S. companies was selected for the drilling and reservoir engineering and reservoir management portions of the project. An Italian firm has been selected to design the power plant, and an Italian or Japanese company will probably be selected to provide the power plant.

ICE has maintained management control over the entire Miravalles project. Decisions are made at the highest levels of government, and this has resulted in project delays. Since the passage of Law No. 7200, ICE has been promoting the development of private power. This provides Costa Rica with the opportunity to increase their electrical generating capacity while not adding to their national debt.

The U. S. geothermal trade organization, the National Geothermal Association, has evaluated overseas geothermal development projects, and has concluded that 60-80% of the total expenditures are returned to the U. S. in the form of jobs or purchases of equipment. The project proposed here will be undertaken by a team of U. S. companies, and will use primarily U. S. expertise and equipment on the project.

Geothermal Resources

The Republic of Costa Rica contains abundant undeveloped geothermal resources. An assessment carried out by ICE, under support from the United Nations, estimates that there is 1000 MWe of geothermal potential. Independently, the U. S. National Geothermal Association has estimated the geothermal potential of Costa Rica at 3500 MWe. ICE rates the best prospects in the country at Miravalles and Rincon de la Vieja with estimated capacities of 160 to 190 MWe each. Second priority areas include Irazu-Turrialba, Tenorio, Platinar, Poas and Barva with estimated capacities of 100-115 MWe each.

As outlined above, ICE is concentrating on geothermal development of Miravalles. There is no indication that ICE or other entities are currently working on bringing other geothermal resources on line. We feel there is a window of opportunity for the U. S. geothermal industry to develop one or more of the other high-potential sites using private power concepts.

PROPOSAL

Statement of Work

The objectives of this proposal are to blaze a trail that can be followed by other companies in the U. S. geothermal

industry in developing geothermal resources in Costa Rica. We will select a suitable geothermal resource in Costa Rica, apply for and receive a certification of eligibility from the National Electricity Service, prepare an environmental impact study and to carry out negotiations with ICE for a power purchase agreement. At that point, financing for well field and power plant development will be acquired from private sources. The successful completion of the project up through the power purchase agreement will set a precedence for private power development in Costa Rica that can be emulated by other U. S. companies.

It should be stressed that the team presented here has the technical and financial ability to complete the project, bring geothermal electricity on-line, and operate this business in a profitable mode.

The project will take place in four phases: resource feasibility, certification of eligibility, environmental assessment and power purchase negotiations.

Phase 1. Resource Feasibility

1.1 Resource Evaluation

A team of resource experts will visit geothermal prospects in Costa Rica to prioritize their development potential. This will include geologic reconnaissance of prospective areas and evaluation of any survey work on the sites.

1.2 Infrastructure Analysis

The development of a geothermal resource requires site access by heavy equipment and transmission right-of-way for the generated power. These and other infrastructure factors must be included in an analysis of the feasibility of resources development. This data will be collected by engineers during our initial visit to Costa Rica.

1.3 Legal and Institutional Considerations

Costa Rica is on record supporting the concept of private power development through Law #7200. However, it is important for us to understand the detailed procedures that must be followed to reach agreement on a power purchase contract. It is also critical to understand the rules governing investment, the repatriation of profits and Costa Rican tax laws. Our business team will discuss these aspects with representatives of ICE and other government officials during several visits to Costa Rica.

1.4 Report

The information from the Resource Feasibility phase will be combined in a report to USDOE that may be distributed to the U. S. geothermal and other renewable energy companies. Much of the fundamental work we will do will be transferable to other U. S. companies.

The result of this part of the project will be identification of an area for which we can negotiate a power purchase agreement. This area will be identified to DOE at the time of the delivery of the Phase 1 report.

Phase 2. Certification of Eligibility

The team will make application to the National Electricity Service to be named eligible to undertake a specific project. Approval of eligibility is required by Law 7200.

Phase 3. Environmental Assessment

Law 7200 requires that MIRENEM must approve the environmental assessment, and their approval must be presented to the National Electricity Service by the project developer. The environmental assessment must include the following.

1. Possible impact by the activity on the natural and human environment.
2. The inevitable adverse effects if the activity is carried out.
3. The sustained effects on the flora, fauna, air and water.
4. Determination of the specific areas that will suffer deforestation.
5. Quantity of possible waste material generated.
6. Effects on population and human settlement.
7. Programs for reforestation, control of soil erosion, control of water and air contamination and plans for waste handling.
8. Contingency plans to prevent, detect and control adverse effects on the ecosystem.

This phase of the project will result in a report on the path and methodologies used to complete successfully the environmental assessment in such a fashion as to be acceptable to MIRENEM. This report will be made available to the public.

Phase 4. Power Purchase Agreement

Following the completion of Phases 2 and 3, a power purchase agreement can be negotiated with ICE. This power purchase agreement is required to finance the development portion of the project.

Budget

The budgets presented below are estimated at the present time.

Phase 1. Resource Feasibility	\$300,000
Phase 2. Certification of Eligibility	\$ 50,000
Phase 3. Environmental Assessment	\$400,000
Phase 4. Power Purchase Agreement	\$ 50,000
	<hr/>
Total	\$800,000

Description of Development Team

The development team proposed here has had a good working relationship on past projects. There is capability on this team to conduct a project from initial geological surveys through power plant operation. A brief summary of the capabilities of the individual companies are contained in the paragraphs below.

All of the companies on this team are members of the National Geothermal Association (NGA). Through their NGA membership, all of these companies have received a Certificate of Review from the Department of Commerce that enhances their ability to work on overseas projects.

Geothermal Development Associates (GDA). Geothermal Development Associates has been a power project developer and consultant to the geothermal industry since its incorporation in 1978. GDA is experienced in project management, resource assessment, drilling management, project feasibility, project financing, engineering design, construction supervision, start-up and performance testing, power sales contract negotiations, utility interconnection studies, and permitting. The firm has been involved in all phases of power plant development in California, Nevada and Utah. Projects include binary cycle, single-flash, and dual-flash systems, and range in size from as little as 600 KW to 28 MW capacity. GDA presently holds important geothermal leasehold interests at four prime sites in Nevada and is actively pursuing multiple developments in Indonesia, Philippines and Latin America.

Dames and Moore. Dames & Moore is a worldwide professional firm providing consultation in the earth and environmental sciences, engineering, design and regulatory assistance fields. Since its founding in 1938, the firm has grown in size and technical capability with currently over 93,000 projects

completed for nearly 24,000 clients throughout the world. The organization employs more than 3,500 professional and support staff based in 110 offices spanning the globe.

Dames & Moore has a large and diverse staff of scientists, planners, engineers and technicians with expertise in all environmental disciplines. Environmental services routinely provided by Dames & Moore include existing conditions surveys, inventories, impact evaluations and planning for appropriate mitigation measures. Dames & Moore was one of the first consulting firms to prepare an Environmental Impact Statement under requirements of the U. S. National Environmental Policy Act of 1969 (NEPA).

For many years, Dames & Moore has provided technical services to the geothermal industry, including geotechnical and environmental planning of both high- and low-temperature resources. Recently we expanded our services to include environmental management of steamfield and power plant operations. Dames & Moore functions as either contractor or project manager. We provide a fully integrated program that includes geologic, geophysical, geochemical, hydrologic, permitting and engineering services typically required for any geothermal related project.

University of Utah Research Institute (UURI). The University of Utah Research Institute is a non-profit research company owned by the University of Utah. UURI's management is separate from the University's, and it receives no public funds. For the past 15 years, UURI has served as one of the principal research organizations for the U. S. Department of Energy's geothermal program. In this mode, UURI has worked on methodologies for the cost-effective exploration and utilization of geothermal resources. UURI's staff concentrates on the exploration for geothermal resources from initial reconnaissance through production well drilling.

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

January 14, 1994

Mr. John Ryan
Coordinator, Project Finance
IFREE
Suite 930
750 First Street, N. E.
Washington, D. C. 20002

Dear Mr. Ryan:

This is a request for travel funds to allow three geothermal experts to travel to Costa Rica to investigate the opportunities for private power development.

Mr. William White, Deputy Secretary of Energy, learned in a meeting of Central American energy ministers, that the Republic of Costa Rica is planning a major hydroelectric project. This project will destroy a large percentage of the rainforest in Costa Rica. Geothermal energy offers a readily available alternative that will minimize rainforest destruction. Geothermal is the only renewable energy technology that offers base load electricity at a cost competitive with hydroelectric power.

Costa Rican Law Number 7200 authorizes the generation of electrical power by private firms. Therefore, there exists the legal basis for U. S. companies to develop electrical power plants using private power financing mechanisms. However, Law 7200 also limits to 20 MWe the size of the project that may be developed. This could require development in 20 MW increments or the use of Build-Operate-Transfer financing which would result in the project eventually being entirely owned by the national utility, Instituto Costarricense de Electricidad (ICE). Law 7200 requires 1. an account of eligibility to be granted by ICE, and 2. an environmental impact/assessment to be approved by MIRENEM (Costa Rica's EPA) prior to the granting of a concession to a private organization.

The Republic of Costa Rica contains abundant undeveloped geothermal resources. An assessment carried out by ICE, under support from the United Nations, estimates that there is 1000 MWe of geothermal potential. Independently, the U. S. National Geothermal Association has estimated the geothermal potential of Costa Rica at 3500 MWe. ICE rates the best prospects in the country at Miravalles and Rincon de la Vieja with estimated capacities of 160 to 190 MWe each. Second priority areas include Irazu-Turrialba, Tenorio, Platinar, Poas and Barva with estimated capacities of 100-115 MWe each.

ICE is concentrating on geothermal development of Miravalles. There is no indication that ICE or other entities are currently working on bringing other geothermal resources on line. We feel there is a window of opportunity for the U. S. geothermal industry to develop one or more of the other high-potential sites using private power concepts.

We are requesting \$10,000 to cover the travel expenses for sending three geothermal experts to Costa Rica in order to evaluate the business opportunities. These people are Martin Booth, President of Geothermal Development Associates (GDA); Paul Brophy of Dames & Moore; and Dennis Nielson of the University of Utah Research Institute. Mr. Booth will be responsible for the business aspects of the meetings; Mr. Brophy will be responsible for environmental questions; and Dr. Nielson will be responsible for collecting information on resource potential. The resumes of these individuals are appended to this letter.

The proposed trip to Costa Rica will accomplish the following tasks.

1. Determine the intent of Law 7200 as it applies to the maximum of 20 mw per generating facility. Evaluate how this limit applies to a Build-Operate-Transfer financing method.
2. Meeting with officials of ICE to determine geographic priorities for development of power.
3. Collect information on geothermal resource assessment for the country of Costa Rica.
4. Determine environmental requirements for geothermal development.
5. Determine how smoothly and quickly the private power development process outlined in Law 7200 will work.
6. Evaluate the potential for rural electrification (off-grid) projects in Costa Rica.

The three individuals supported by this request will be joined by a representative of the U. S. Department of Energy's geothermal program from Lawrence Berkeley Laboratory.

A trip report will be written that outlines the findings of this delegation.

Sincerely,

A handwritten signature in cursive script that reads "DL Nielson". The letters are fluid and connected, with a prominent loop at the end of the last name.

Dennis L. Nielson
Associate Director

RESUME

G. Martin Booth III
251 Ralston Street
Reno, Nevada 89503
Office: (702) 322-0938
Home: (702) 747-5676

EDUCATION:

M. S. Geology, 1965
Mackay School of Mines
University of Nevada, Reno
Reno, Nevada

B. S. Geology, 1957
Franklin & Marshall College
Lancaster, Pennsylvania

PROFESSIONAL REGISTRATION, CERTIFICATION & MEMBERSHIPS:

State of California
Registered Geologist No. 192
Association of Professional Geological Scientists
Certified Professional Geologist No. 1550
American Association of Petroleum Geologists
Certified Petroleum Geologist No. 1110
American Association of Petroleum Geologists
Energy Minerals (Geothermal, Coal, Nuclear, etc.)
Society of Independent Professional Earth Scientists
Member No. 401
Geological Society of America
Society of Mining Engineers of AIME
Geothermal Resources Council
National Geothermal Association, Director
Geological Society of Nevada

PROFESSIONAL EMPLOYMENT:

November 1978 to Present:

President and Director, Geothermal Development Associates, Reno, Nevada. Directs and coordinates the company's activities; major areas of work and research are in geothermal resources and geology.

June 1968 to Present:

Consulting Geologist, Reno, Nevada, in petroleum and mineral resources; exploration and mineral property assessment; emphasis on the intermountain region of Nevada, Utah, and California; clients: private companies, investment groups, and individuals; Federal and Nevada State government agencies; and utilities.

June 1960 to June 1968:

Exploration and Project Geologist with The Superior Oil Company and Superior Oil International, Inc. in Denver, Colorado; Tripoli, Libya; and Houston, Texas. Responsibilities included oil and gas prospect generation, well site supervision, field mapping, photogeologic/geomorphic mapping, oil submittal evaluation, regional geologic studies, economic evaluations, joint venture operations, project management and coordination of foreign and domestic petroleum exploration projects.

Summer of 1957:

Underground Miner, New Jersey Zinc Company, Ogdensburg, New Jersey.

Summery of 1956:

Field Geologist, International Nickel Company, Ely, Minnesota

PAUL BROPHY

Title: Senior Project Manager/Senior Geologist

Expertise:

Environmental and Geothermal Geology
Hydrogeology
Environmental Sciences

**Academic
Background**

M.S., 1976, Mining and Exploration Geology, University
of Northern Queensland, Australia.

M.S., 1970, Geophysics, University of Leeds, England.

B.S., 1969, Geology, University of London, England.

Experience: Twenty-three years of worldwide experience in
project management of geothermal, hazardous/non-hazardous waste,
engineering geology, mining and mineral exploration projects.

Dames & Moore: 1989 - Present

Third-party review for six geothermal sites in the Republic of
Philippines. Volcanic and structural setting of hydrothermal
systems, resource evaluation and establishment of development
strategy options. Luzon, Philippines.

Litigation support regarding waste management practices for major
geothermal developer. Imperial Valley, California.

Project Director for geologic and hydrogeologic investigation for
siting Class III municipal waste landfill on Indian Reservation
lands. Included was documentation to support EIS preparation,
submission of a comprehensive facility permit application,
representations to State and Federal agencies and public hearing
presentations.

Consultant for construction of a deep, non-hazardous injection
well and associated EPA Underground Injection Control Program
permit process. Lodi, California.

Associate, Harding Lawson Associates (1988-1989)

Manager, Engineering Geology and Underground Storage Tank Groups.
Technical, fiscal, and administrative responsibility for 18
geologists and associated support staff.

District Geologist, California Energy Co., Inc. (1981-1988)

Management of geologic, geophysical and geochemical activities
related to development of 240Mw, high temperature geothermal
resources at Coso Hot Springs, California.

RESUME

Dennis L. Nielson
Associate Director
University of Utah Research Institute.

EDUCATION

B.A., Geology (1970)
Beloit College, Beloit, Wisconsin

M.A., Geology (1972)
Dartmouth College, Hanover, New Hampshire

Ph.D., Geology (1974)
Dartmouth College, Hanover, New Hampshire

M.B.A., Business Administration (1986)
University of Utah, Salt Lake City, Utah

SOCIETY AFFILIATIONS

Geological Society of America-Fellow
Society of Economic Geologists-Fellow
American Geophysical Union-Member
Geothermal Resources Council-Member
Utah Geological Association-Member
Association of Geoscientists for International Development
ASTM-Member (Committee on Solar, Geothermal and Alternate Energy Sources)
International Geothermal Association-Member

EMPLOYMENT HISTORY

University of Utah Research Institute, 4/78 to present
Responsibilities include research into geologic aspects of geothermal systems and business development. Presently serve as Associate Director. Served as project manager for major projects including the geothermal exploration of Ascension Island, South Atlantic Ocean.

President of National Geothermal Association-1991

The Anaconda Company, 6/74-3/78
Staff Geologist responsible for uranium exploration in frontier environments.

Great Lakes Exploration Co., summers of 1971 and 1970

Field geologist responsible for regional exploration for massive sulfide deposits in the Precambrian shield of Wisconsin and Michigan.

Bear Creek Mining Co., fall, 1968

Field Assistant on development projects for stratiform copper and volcanogenic massive sulfide ore deposits.

PUBLICATIONS

Over 100 technical publications principally dealing with active geothermal systems.

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

MEMO TO: MARSHALL REED

FROM: MIKE WRIGHT

SUBJECT: CONVERSATION WITH CHRISTIANNE FIGUERES

May 24, 1994

I talked with Sra. Figueres today while she was on her car phone on the way to the airport for a one-day trip to Costa Rica. She made some interesting and important points as follows:

1. She knows that the current quota for private power development in Costa Rica is oversubscribed, but says that within two months that should change. There is some legislation being proposed that would increase or remove the limits on power-plant size and on total percentage of power obtained in Costa Rica from private development.
2. She is well aware of the BOT concept, and says that it is now at the forefront of consideration by the new government for power development in Costa Rica.
3. She would be very interested in a meeting with me and/or with an industry/DOE delegation during the week of 13 June, with her preferred dates being the 13th or the 16th. She is busy the whole day on the 15th.
4. In response to my question of what the geothermal industry could do at this point to help her, she said that she would like us to put in writing, perhaps in bullet form, the conditions needed to promote the geothermal industry's investment in the Costa Rican power sector. Such items will be useful in devising the new laws that are under development now.

I obviously need to write something to the industry asking for their input on this issue and then get back to her on the results.

***** -COMM. JOURNAL- ***** DATE MAY-24-1994 ***** TIME 12:12 ***** P. 1

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-U OF U RESEARCH -

***** (FAX-310 V2.12) * - 001 584 4453- *****

- Ober Susante -

- due now

- new reqs to change

- BOT - is now forecast -

- what do to help ->

put in writing key reqs

bullet points

- Costa Rica is interesting, but
conditions before assess -
for legislation -

- does her own agenda

15th - brush

13, 16 great, preferred

Christianne Figueres -
(Sister of Costa Rican President)



Hamilton Group (Arlington, VA)
703-243-1333

Aimee Christensen - late 20's

DOE

586-4576

Internet Energy Policy

- Is involved in Hampshire Summit in DE.

Strategy on Climate

- may be fairly - but even parties

frankly @ meeting

- made light of ems, inputs of hydro they have

- can not copy of pro ICE

- offer pay ex - survey was sent in did
what he said for meetings so didn't

in private levels
+ 15% of appropriate cap & land

- they are now withdrawing for them
15% - locked all surplus etc -
we have copy of all proposals + ICE
copy of the - no ~~ICE~~ hydro, wind,
hydro, regu etc =

- " industrial pro in category of
program ICE under. needs a boost -
copy in etc.

- why at all prices
drought prices

- She is aware of fact written in that clause
writing next in margin - say other
part in CA 96 meeting.

Investment in a bank?

I'll be back on 13th June - another meeting -

Army went out to dinner of client + ex-auditor
+ Paul? VP of E&T, was Dep Sec Industrial -
+ Bud Swann at dinner -

- Degree in Anthropology
may be more liberal + progressive

- 20 mWe per plant + 15% total will be
private

projects proposed, mostly hydro, are over-
subscribed. There is no growth

"we understand the new pres wants to
boost renewables -- we would like to encourage
gt -

- clean

- insurance against drought prices

- using joint implementation, it should be possible
to attract gt and hydro + utilities to invest in gt
→ BOT to get around private law -

- want a four?

I'll be there week 13th June

**COSTA RICAN LAW AUTHORIZING
AUTONOMOUS OR PARALLEL
ELECTRICITY GENERATION**

(English Translation)

Law No. 7200

**As Published in *La Gaceta*
October 18, 1990**

Translation by IDEA Inc. for A.I.D. Office of Energy

**RENEWABLE ENERGY AND ENVIRONMENT PROGRAM
WINROCK INTERNATIONAL INSTITUTE FOR AGRICULTURAL DEVELOPMENT
1611 N. KENT ST. SUITE 600
ARLINGTON, VA 22209
TELE: (703) 525-9430 FAX: (703) 243-1175**

THE LEGISLATIVE ASSEMBLY OF THE REPUBLIC OF COSTA RICA
DECREES:
LAW THAT AUTHORIZES AUTONOMOUS OR PARALLEL ELECTRICITY
PRODUCTION

Article 1: Autonomous or parallel generation is defined as the electrical power produced by electric plants of limited capacity, owned by private enterprises and rural electrification cooperatives which can be integrated into the National Electric System.

Article 2: Plants of limited capacity are defined as hydroelectric plants, and those that are non-conventional, which do not surpass 20,000 KW.

Article 3: It is declared to be of public interest the purchase of electrical power by the I.C.E. from rural electric cooperatives, and those private enterprises in which at least 65% of the social capital belongs to Costa Rican citizens, that have established central electrical plants of limited capacity for the exploitation of hydraulic potential on a small scale, and also from non-conventional sources of energy as long as these have previously not been part of the national electrical system.

Article 4: Conventional sources of energy are defined as all those that utilize hydrocarbons, mineral coal, or water as their basic elements.

Article 5: The National Electricity Service (SNE) will reserve the right to grant concessions for the development of electric plants of limited capacity up to a maximum of 20,000 KW, and for a time period not exceeding 15 years. The SNE will reserve the right to make extensions, modifications, or transfers without requiring legislative authorization. However, legislative authorization is required when the operation surpasses the 20,000 KW limit, or when it is less than 20,000 KW and the party has other approved concessions which, with the additional capacity, surpasses said quantity.

What has been established in the preceding paragraph in reference to the limit of kilowatts will also be apply to concessions granted to fiscal or judicial parties not considered in Articles 1 and 2 of this law.

Article 6: To grant a concession to develop an electrical plant of limited capacity, the National Electricity Service, in addition to what has been stipulated in Law 258 of the 18th of August of 1941, should demand an account of eligibility granted by the Costa Rican Electricity Institute. Such account of eligibility must be provided within a time period not exceeding 120 days from the day of presentation.

Article 7: The I.C.E. is enabled to deem eligible a project for the development of an electrical plant of limited capacity as long as the potential for parallel generation does not exceed more than fifteen per cent of the combined power of the electric plants of the national electric system. Moreover, I.C.E. may refuse applications that will interfere with a project(s) or concession(s) which have already been granted or are being processed.

Article 8: In addition to an account of eligibility to which Article 6 refers, in regards to electrical plants of limited capacity larger or equal to 2,000 KW, the interested party should present to the National Electricity Service a certification of approval of an environmental impact assessment conducted by an expert in the field, which should be presented to MIRENEM for approval or refusal within a time period of sixty (60) days from the time of its presentation.

Article 9: The final decision made by the Department of I.C.E. in charge of the account of eligibility, and the Department of MIRENEM in charge of the environmental impact assessment, is appealable through the respective superior hierarchy within fifteen days after their notification.

Article 10: The environmental impact assessment, to which Article 8 of this law refers, will include at a minimum the following:

- a) Indication of the possible impact by the activity on the natural and human environment.
- b) The inevitable adverse effects if the activity is carried out.
- c) The sustained effects on the flora and on the fauna, pointing out the effects on the vegetation, the soil, animals, and the quality of the water and air.
- c.b) Determination of specific areas that will suffer deforestation, if that is the case.
- d) Quantity of possible waste material generated.
- e) Effects on population and human settlement.
- f) Programs for reforestation, control of soil erosion, control of water and air contamination, and plans for waste handling.
- g) Contingency plans to prevent, detect and control adverse effects on the ecosystem.

Article 11: To ensure the accomplishment of the programs of control and environmental recuperation, the grantee should submit, with the provisional contract, an unconditional guarantee of accomplishment in favor of MIRENEM, equivalent to four per cent of the project's value during the period of its construction and will be held in force for a period of one year from the time the project went into operation. Said guarantee will be reduced to an amount equivalent to one per cent of the project's value and will be held in force during the period of the concession. These percentages can be adjusted by MIRENEM in accordance with the quantification of potential damages which will be determined by the environmental impact assessment. This guarantee should be emitted by any of the banks of the National Banking System, or by The National Insurance Institute to MIRENEM's satisfaction, and this guarantee may be executed partially or totally by the above mentioned ministry, as soon as it is shown that a damage is done and that it has not been mitigated by the autonomous producer. MIRENEM can execute directly and officially or through contract, corrections to any environmental deterioration or damage that may

originate in relation to a granted electrical concession. If at the end of the concession the guarantee has not been executed, it will be returned partially or totally, whatever the case may be.

Article 12: It is MIRENEM's responsibility to establish the rules and conditions of any kind in order to protect the fulfillment of the program of environmental control and recuperation of the electrical plants of limited capacity. In case that the grantees do not adhere to the conditions established by MIRENEM, the National Electricity Service, by request of MIRENEM, may declare the expiration of the concession.

Article 13: The Costa Rican Electricity Institute will be authorized to subscribe contracts for the purchase of electric power, as part of its normal activities, which should be ratified by the S.N.E. In accordance with what has been set forth in Law No. 258 of the 18th of August, 1941.

Article 14: The tariffs for the purchase of electric power by I.C.E. require establishment of a fixed price on the part of the National Electricity Service, which prior to the issue of a final resolution will solicit the opinion of the affected concessions. I.C.E. will present requests for tariff changes on each occasion, these changes should be the most favorable to the public consumer, within the principle of avoided capital and operating costs of the Interconnected National System using national economic criterion. Periodic adjustments of tariffs included in the buy and sale contract, will take into account the usual factors of variation of costs, monetary devaluation, local inflation, and other contingencies, and these adjustments will be executed by an automatic formula established by The National Electricity Service. These adjustments and prices do not require the approval of the Executive Branch. The structure of prices will consider the characteristics of energy supply by electric plants of limited capacity.

Article 15: The electricity purchased will be the surplus that the producer has at a measured point after having supplied his own necessities.

Article 16: The Central Bank has the authority to exceed the maximum limit of credit in the case of loans granted by commercial banks for the development of industries that have been selected, and to those who are interested in fabricating the electromechanical equipment necessary for electricity plants of limited capacity. To this purpose, the related operations will be exempt from what is set forth in Article 61, Clause 5) of the Organic Law of the National Banking System, and Article 85, clause 1, literal b, of the Organic Law of the Central Bank of Costa Rica.

Article 17: Private enterprises and rural electrification cooperatives, producers of autonomous or parallel electrical power, will enjoy the same exonerations as the Costa Rican Electricity Institute on the importation of machinery and equipment for the conduction of water, and to turbine, generate, control, regulate, transform and transmit electrical power.

Article 18: Private enterprises and rural electrification cooperatives that supply electricity to the Costa Rican Electricity Institute in accordance to what has been established in this law can protect themselves under Article 7, clause 2 of annex 3, Law of Industrial Production Incentives of Law 7017 of the 16th of December, 1985.

Article 19: Private enterprises and rural electric cooperatives that supply electricity to the Costa Rican Electricity Institute in accordance to what has been established in this law can deduct loses from gross revenues, in the same manner as industrial enterprises do in accordance with that established in clause g of Article 8 of Law 7092 of the 21st of April, 1988, Law of Taxable Revenue.

Article 20: For the effects of this law, private enterprises are defined as those to which Article 3 of this law refers.

Article 21: Repeal Article 22 of Law 7131 of the 16th of August, 1989 (Special Budget of May 1989) and Article 7, of Law 258, of August 18, 1941 (Law of the National Electricity Service)

Article 22: The Executive Branch will regulate the present law within three months of its publication. The lack of regulation will not obstruct the application of the law.

Article 23: To be effective from the date of publication.

Sole Transitory - Solicitations for electricity concessions pending legislative approval will be governed by that established in Article 5 of the present law.

FOR: DOFLECA

ROUTINE -- UNCLASSIFIED -- DSSCS MESSAGE -- 18236 CHARACTERS
VZCZCMSS1661
ACTION = DOE,OIN IDD(-),EETID(-)
DOE,DOE AN1(2),CMS(1),EP(5)
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MLN = 24642 DAN = 404-065750
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EZ02:
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FM AMEMBASSY SAN JOSE
TO RUEHC/SECSTATE WASHDC 0904
INFO RUEBBPA/USDOE WASHDC
RUEHZA/ALCA COLLECTIVE
BT
UNCLAS SECTION 01 OF 03 SAN JOSE 03398
***** SECTION BREAK *****
SECTION 01 OF 03

DEPARTMENT FOR EB/OGE/ECC, ARA/ECP AND ARA/CEN

DOE FOR OFFICE OF INTERNATIONAL AFFAIRS - GARY WARD

E.O. 12356: N/A

TAGS: ENGR, SENV, CS

SUBJECT: COSTA RICA'S ELECTRICAL ENERGY SITUATION AND
POLICY AT THE START OF THE FIGUERES ADMINISTRATION

EZ05:

REF: (B) 93 SAN JOSE 7926 (B) SAN JOSE 361

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ELECTRICITY COMPANY ICE PLACE HIGH PRIORITY ON
CONSTRUCTION OF HYDROELECTRIC PLANTS, CONSIDERED AS
NON-POLLUTING SOURCES OF RENEWABLE ENERGY. ICE HAS
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3. MOREOVER, THE NEW GOVERNMENT AND ICE BELIEVE HYDRO-GENERATED ELECTRICITY IS AMONG THE CLEANEST SOURCES OF ENERGY AVAILABLE. THE FIGUERES' GOVERNMENT AND ICE SEE HYDRO POWER AS RENEWABLE AND NON-POLLUTING, AND MUCH BETTER THAN THE ALTERNATIVES FOR GENERATING LARGE QUANTITIES OF POWER, E.G., NUCLEAR AND FOSSIL-FUEL PLANTS. THE GOVERNMENT AND ICE ARE APPARENTLY NOT SO CONCERNED ABOUT THE DISADVANTAGES OF DAMMING UP RIVERS, E.G., LOSS OF RECREATIONAL AREAS, ETC. THUS, THE CHANGE OF GOVERNMENT PORTENDS NO DE-EMPHASIS ON THE USE OF HYDROELECTRIC POWER IN COSTA RICA, ESPECIALLY GIVEN FIGUERES' STRESS ON SUSTAINABLE DEVELOPMENT AND RENEWABLE SOURCES OF ENERGY.

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5. THE FOUR DAMS THAT ICE PLANS TO BUILD NEXT ARE THE FOLLOWING:

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UNCLAS SECTION 02 OF 03 SAN JOSE 03398

DEPARTMENT FOR EB/OGE/ECC, ARA/ECP AND ARA/CEN

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D) PIRRIS, ON THE PIRRIS RIVER, SOUTH OF SAN JOSE IS IN
THE PLANNING STAGE. ITS 128 MEGAWATTS ARE SCHEDULED TO
GO ON STREAM AFTER THE YEAR 2005.

6. IN ADDITION TO THE FOUR DAMS ABOVE, ICE WOULD LIKE
TO BUILD THE BORUCA PROJECT, AN EXTREMELY LARGE PROJECT
(1,520 MW). THIS PROJECT (WHICH WOULD BE LARGER THAN
THE COUNTRY'S TOTAL CURRENT CAPACITY OF ABOUT 1,200
MEGAWATTS) APPEARS TO BE ICE'S "DREAM." ICE TENDS TO
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PROJECT.

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8. THE BORUCA PROJECT WOULD INVOLVE DAMMING THE RIO
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120 KILOMETERS SOUTH-EAST OF SAN JOSE. IT PROBABLY
COULD NOT BE BUILT FOR AT LEAST TWENTY YEARS, IF EVER,
GIVEN THE PROBABLE SERIOUS OBJECTIONS OF
ENVIRONMENTALISTS.

FOSSIL-FUEL PLANTS

9. ICE TECHNICAL PERSONNEL FEEL THAT A PROPOSED

COAL-FIRED PLANT NEAR LIMON WOULD PROBABLY NOT BE ACCEPTED IN THE PRESENT ERA OF "CLEAN SOURCES OF ENERGY," THAT THE MINIMUM ECONOMIC SIZE WOULD BE 125 MEGAWATTS, AND THAT THE QUALITY OF LOCAL COAL IS TOO POOR. IN ADDITION, ICE PREFERS HYDROELECTRIC PROJECTS, INTER ALIA, BECAUSE A COAL-FIRED PLANT WOULD PRESUMABLY BE UNDER THE AUTHORITY OF RECOPE - THE STATE-OWNED PETROLEUM COMPANY.

10. ON MAY 9 PRESIDENT FIGUERES PUBLICLY MENTIONED THAT ICE PRESIDENT DE LA TORRE WAS ABOUT TO REQUEST PERMISSION TO BUILD A 35 MEGAWATT FOSSIL-FUEL PLANT IN LIMON PROVINCE. FIGUERES SAID HE WOULD TELL DE LA TORRE THAT SUCH A PROJECT IS NOT CONSISTENT WITH SUSTAINABLE DEVELOPMENT AND THAT ICE SHOULD DEVELOP AN ALTERNATIVE IDEA FOR SUPPLYING LIMON PROVINCE.

ALTERNATIVE SOURCES OF ENERGY

11. FIGUERES ALSO STRESSED THE NEED FOR USING ALTERNATIVE SOURCES OF ELECTRIC ENERGY. THE GOVERNMENT AND ICE APPARENTLY BELIEVE THAT SUCH ALTERNATIVE SOURCES CAN GENERATE ONLY ENOUGH POWER TO SUPPLEMENT HYDRO POWER. COSTA RICA REPORTEDLY HAS THE BEST CONDITIONS IN THE WORLD FOR WIND-POWER, WHICH FOR THIS COUNTRY IS A PERFECT COMPLEMENT TO HYDROPOWER, AS THE STRONGEST WINDS ARE IN THE DRY SEASON (JANUARY TO APRIL), WHEN THE HYDRO LEVELS ARE AT THEIR LOWEST. (SEE REF B.)

12. FIGUERES ALSO EMPHASIZED THE NEED FOR COSTA RICA TO INTRODUCE ENERGY CONSERVATION, PARTICULARLY DEMAND MANAGEMENT, SINCE THIS IS CHEAPER THAN BUILDING NEW PLANTS AND GOOD FOR THE ENVIRONMENT.

UNCLAS SECTION 03 OF 03 SAN JOSE 03398

DEPARTMENT FOR EB/OGE/ECC, ARA/ECP AND ARA/CEN

DOE FOR OFFICE OF INTERNATIONAL AFFAIRS - GARY WARD

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13. ICE IS ALSO INTERESTED IN DEVELOPING ALTERNATIVE SOURCES OF ENERGY, I.E., GEOTHERMAL, WIND-DRIVEN, AND GARBAGE-FUELED PLANTS. THE HANDLING OF GARBAGE IS A MAJOR POLITICAL AND ECONOMIC ISSUE IN COSTA RICA. WE

HAVE HEARD THAT SEVERAL FRENCH COMPANIES HAVE OFFERED TECHNOLOGIES TO USE GARBAGE TO FUEL ELECTRICITY PLANTS. WE UNDERSTAND THAT SO FAR ONLY ONE U.S. FIRM HAS EXPRESSED AN INTEREST IN SUCH PROJECTS. HOWEVER, THE PROPOSAL INVOLVED DERIVING POWER FROM THE GARBAGE DUMP FUMES, RATHER THAN THE GARBAGE ITSELF. ICE REJECTED THIS U.S. PROPOSAL AS UNPROVEN TECHNOLOGY CAPABLE OF GENERATING ONLY A TINY AMOUNT OF ELECTRICITY.

14. WE UNDERSTAND THAT ICE WOULD BE WILLING TO CONSIDER GARBAGE-FUELED ELECTRIC PROJECTS FROM U.S. COMPANIES, ALTHOUGH THE COST OF PRODUCING ELECTRIC ENERGY USING SUCH TECHNOLOGY WOULD PROBABLY EXCEED ICE'S LONG-TERM AVERAGE COST. INTERESTED U.S. COMPANIES SHOULD ALSO CONTACT GOCR AGENCIES, E.G., THE MINISTRY OF NATURAL RESOURCES, ENERGY AND MINES, AND MINISTRY OF PLANNING, AS WELL AS THE LOCAL COMMUNITIES IN SAN JOSE. THE LATTER ARE ULTIMATELY RESPONSIBILITY FOR FINDING A SOLUTION. ON MAY 9 PRESIDENT FIGUERES CALLED FOR DEVELOPED COUNTRIES TO OFFER COSTA RICA TECHNICAL ASSISTANCE TO FIND AN APPROPRIATE SOLUTION TO THE GARBAGE PROBLEM.

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DEPARTMENT OF ENERGY

PAGE 01 OF 03 CSN = 1587 30/00352
 PRECEDENCE = RFORMAT = ACF127CLASS = UNCLAS CODEWORD (S) =
 .CAVEAT (S) =
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 HANDLE VIA
 AUTO = ARM
 MATCH = RHEBDOE, EAID, ENVIRONMENT, ENVIRONMENT, PREL, SENV, SENV
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 (DOE) IDD (-), EETID (-)
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 FM AMEMBASSY MANAGUA
 TO RUEHC/SECSTATE WASHDC 5593
 INFO RUEHZA/ALCA COLLECTIVE
 BT
 UNCLAS SECTION 01 OF 02 MANAGUA 002379

GUATEMALA ALSO FOR AID/RP

STATE ALSO FOR AID/LAC/CEN

E.O. 12356: N/A
 TAGS: PREL, SENV, EAID, KSUM, NU
 SUBJ: SUMMIT OF THE AMERICAS: THE NICARAGUANS THINK GREEN

1. SUMMARY: THE GON IS WORKING ON HOSTING A PRE-SUMMIT OF CENTRAL AMERICAN PRESIDENTS TO LAY THE GROUNDWORK FOR CREATING A UNIFIED CENTRAL AMERICAN POSITION ON THE ENVIRONMENT TO BE PRESENTED IN MIAMI AT THE DECEMBER SUMMIT. VICE PRESIDENT GORE AND INTERIOR SECRETARY BABBITT WOULD BE INVITED TO THE NICARAGUAN EVENT. GON VIEWS THEIR INITIATIVE AS A CHANCE TO LAUNCH A NEW STRATEGY TO ENSURE SUSTAINED DEVELOPMENT AND TO PROTECT THE REGION'S RICH BIO-DIVERSITY. THE EVENT WOULD ALSO PROVIDE AN OPPORTUNITY TO GIVE NICARAGUANS A MORE POSITIVE IMAGE. END SUMMARY

2. IN ANY DISCUSSIONS ABOUT THE SUMMIT OF THE AMERICAS, FOREIGN MINISTER ERNESTO REAL HAS ALWAYS EMPHASIZED THAT THE CENTRAL AMERICANS SHOULD PRESENT JOINT PROPOSALS. ALTHOUGH LEAL MAY STILL PROPOSE OTHER THEMES WITH HIS CENTRAL AMERICAN COUNTERPARTS, THE "ENVIRONMENT AND CENTRAL AMERICA" HAS EVOLVED AS THE SUBJECT OF PRIMARY INTEREST FOR THE NICARAGUANS VIS A VIS THE SUMMIT.

3. THE NICARAGUANS HAD BEEN CONSIDERING HOLDING CENTRAL AMERICAN ECOLOGY SUMMIT FOR SOME TIME. LAST SPRING, HIGH LEVEL REPRESENTATIVES FROM THE GON TRAVELED TO WASHINGTON AND MET WITH SECRETARY BABBITT. AT THAT MEETING, DISCUSSIONS WERE HELD ON AN INITIATIVE BY THE GON TO HOLD AN ECOLOGICAL SUMMIT INVOLVING ALL OF THE CENTRAL AMERICAN PRESIDENTS, INCLUDING SECRETARY BABBITT AND VICE PRESIDENT GORE TO ATTEND. SECRETARY BABBITT WAS REPORTEDLY ENTHUSIASTIC ABOUT THE IDEA. THE NICARAGUANS, HOWEVER, TOOK NO SPECIFIC FOLLOW-UP ACTION AT THE TIME.

4. THE IDEA WAS REVIVED IN MARCH DURING A CONVERSATION IN WHICH NATURAL RESOURCES (MARENA) MINISTER JAIME INCER TOLD THE AMBASSADOR ABOUT HIS HOPES TO GET IT BACK ON TRACK, PARTICULARLY AFTER HE BECOMES CHAIRMAN AND SENIOR MINISTER IN THE CENTRAL AMERICAN ECOLOGY MINISTERS' GROUP IN JUNE. INCER NOTED THAT AN ECOLOGY SUMMIT WOULD BE A LOGICAL

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ADJUNCT TO GUATEMALAN PRESIDENT DE LEON'S PROPOSED CREATION OF AN ALLIANCE FOR SUSTAINABLE DEVELOPMENT, WHICH WAS A FOLLOW-UP TO THE NOVEMBER MEETING BETWEEN PRESIDENT CLINTON AND THE CENTRAL AMERICAN HEADS OF STATE. AMBASSADOR AGREED WITH INCER, BUT ENCOURAGED HIM TO GET THE PROJECT MOVING IMMEDIATELY

5. ON APRIL 20 AMBASSADOR MET OVER BREAKFAST WITH PRESIDENCY MINISTER ANTONIO LACAYO, FOREIGN MINISTER ERNESTO LEAL, INCER AND CENTRAL AMERICAN UNIVERSITY (UCA) RECTOR XAVIER GOROSTIAGA TO DISCUSS THE PROJECT. (GOROSTIAGA, WHOSE UNIVERSITY HAS AN EXCELLENT ENVIRONMENTAL PROGRAM IN CONJUNCTION WITH THE UNIVERSITY OF MARYLAND, IS VERY INTERESTED IN UCA'S HAVING A ROLE IN THE ECOLOGY SUMMIT AND HAS ALSO RAISED IT WITH THE INTER-AMERICAN DIALOGUE.) THE NICARAGUANS BELIEVE THEY SHOULD HOST THIS ECOLOGY EVENT GIVEN THAT, AMONG OTHER THINGS, THE IDEA OF WORKING WITH THE OTHER CENTRAL AMERICANS ON ECOLOGY WAS ORIGINATED BY THEM, AND BECAUSE OF INCER'S SENIORITY IN THE REGION AS NATURAL RESOURCES MINISTER. EACH COUNTRY WOULD FOCUS ON A PARTICULAR ENVIRONMENTAL THEME. E. G., NICARAGUA WITH TWO OCEANS, AND TWO GREAT LAKES WOULD CONCENTRATE ON AQUATIC RESOURCES.

6. AS A FIRST STAB AT DEFINING THE SCOPE OF THE EVENT, RECTOR GOROSTIAGA WITH THE HELP OF A UNIVERSITY OF MARYLAND EXPERT, DEVELOPED A DRAFT STRATEGY PAPER FOR CONSIDERATION THAT PROPOSES THE FOLLOWING GOALS FOR THE ECOLOGY SUMMIT:

-- "HELP FOCUS ON STRENGTHENING ENVIRONMENTAL OBJECTIVES OF ALL COUNTRIES THROUGHOUT THE ISTHMUS, TO REDUCE TRANSNATIONAL CONFLICTS OVER NATURAL RESOURCES AND EMBARK ON A UNIFIED APPROACH TO MEET THOSE GOALS";

-- CENTER ON SIX ISSUES "COMMON TO ALL OF THE COUNTRIES INVOLVED":

"A) ESTABLISHING REGIONAL COOPERATION IN SOLVING COMMON ENVIRONMENTAL PROBLEMS;

B) THE HUMAN ECOLOGY OF INDIGENOUS PEOPLES AND PRESERVING THEIR CULTURAL INTEGRITY;

UNCLAS SECTION 02 OF 02 MANAGUA 002379

GUATEMALA ALSO FOR AID/RP

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E. O. 12356: N/A

TAGS: PREL, SENV, EAID, KSUM, NU

SUBJ: SUMMIT OF THE AMERICAS: THE NICARAGUANS THINK GREEN

C) THE ROLE OF WOMEN IN ENVIRONMENT SUSTAINABILITY;

D) HUMAN RESOURCE DEVELOPMENT TO FACE THE ENVIRONMENTAL CHALLENGES OF THE NEXT CENTURY;

E) THE PROTECTION OF BIO-DIVERSITY THROUGHOUT THE REGION; AND

F) PROTECTING FLYWAYS AND OVER-WINTERING HABITATS OF MIGRATORY BIRDS"; AND,

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-- SERVE "AS A MECHANISM TO ACTIVELY PURSUE THE NEW ENVIRONMENTAL INITIATIVES SET FORTH BY THE NEW U. S. ADMINISTRATION"

7. AT THIS POINT WE UNDERSTAND THE GON HAS WRITTEN TO ALL THE CENTRAL AMERICAN COUNTRIES ABOUT THE INITIATIVE. FOREIGN MINISTER LEAL TOLD AMBASSADOR THEY EXPECTED TO DISCUSS THEIR INITIATIVE WITH THE OTHER COUNTRIES AT THE COSTA RICAN INAUGURATION MAY 7.

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FOR: DOFLECA

ROUTINE -- UNCLASSIFIED -- DSSCS MESSAGE -- 18236 CHARACTERS
VZCZCMSS1661
ACTION = DOE,OIN IDD(-),EETID(-)
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INFO = ** UNASSIGNED **
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DEPARTMENT FOR EB/DGE/ECC, ARA/ECP AND ARA/CEN

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FOSSIL-FUEL PLANTS

9. ICE TECHNICAL PERSONNEL FEEL THAT A PROPOSED

COAL-FIRED PLANT NEAR LIMON WOULD PROBABLY NOT BE ACCEPTED IN THE PRESENT ERA OF "CLEAN SOURCES OF ENERGY," THAT THE MINIMUM ECONOMIC SIZE WOULD BE 125 MEGAWATTS, AND THAT THE QUALITY OF LOCAL COAL IS TOO POOR. IN ADDITION, ICE PREFERS HYDROELECTRIC PROJECTS, INTER ALIA, BECAUSE A COAL-FIRED PLANT WOULD PRESUMABLY BE UNDER THE AUTHORITY OF RECOPE - THE STATE-OWNED PETROLEUM COMPANY.

10. ON MAY 9 PRESIDENT FIGUERES PUBLICLY MENTIONED THAT ICE PRESIDENT DE LA TORRE WAS ABOUT TO REQUEST PERMISSION TO BUILD A 35 MEGAWATT FOSSIL-FUEL PLANT IN LIMON PROVINCE. FIGUERES SAID HE WOULD TELL DE LA TORRE THAT SUCH A PROJECT IS NOT CONSISTENT WITH SUSTAINABLE DEVELOPMENT AND THAT ICE SHOULD DEVELOP AN ALTERNATIVE IDEA FOR SUPPLYING LIMON PROVINCE.

ALTERNATIVE SOURCES OF ENERGY

11. FIGUERES ALSO STRESSED THE NEED FOR USING ALTERNATIVE SOURCES OF ELECTRIC ENERGY. THE GOVERNMENT AND ICE APPARENTLY BELIEVE THAT SUCH ALTERNATIVE SOURCES CAN GENERATE ONLY ENOUGH POWER TO SUPPLEMENT HYDRO POWER. COSTA RICA REPORTEDLY HAS THE BEST CONDITIONS IN THE WORLD FOR WIND-POWER, WHICH FOR THIS COUNTRY IS A PERFECT COMPLEMENT TO HYDROPOWER, AS THE STRONGEST WINDS ARE IN THE DRY SEASON (JANUARY TO APRIL), WHEN THE HYDRO LEVELS ARE AT THEIR LOWEST. (SEE REF B.)

12. FIGUERES ALSO EMPHASIZED THE NEED FOR COSTA RICA TO INTRODUCE ENERGY CONSERVATION, PARTICULARLY DEMAND MANAGEMENT, SINCE THIS IS CHEAPER THAN BUILDING NEW PLANTS AND GOOD FOR THE ENVIRONMENT.

UNCLAS SECTION 03 OF 03 SAN JOSE 03398

DEPARTMENT FOR EB/OGE/ECC, ARA/ECP AND ARA/CEN

DOE FOR OFFICE OF INTERNATIONAL AFFAIRS - GARY WARD

E.O. 12356: N/A

TAGS: ENGR, SENV, CS

SUBJECT: COSTA RICA'S ELECTRICAL ENERGY SITUATION AND POLICY AT THE START OF THE FIGUERES ADMINISTRATION

13. ICE IS ALSO INTERESTED IN DEVELOPING ALTERNATIVE SOURCES OF ENERGY, I.E., GEOTHERMAL, WIND-DRIVEN, AND GARBAGE-FUELED PLANTS. THE HANDLING OF GARBAGE IS A MAJOR POLITICAL AND ECONOMIC ISSUE IN COSTA RICA. WE

FOCUS ON
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COSTA RICA

A GEOTHERMAL INTERNATIONAL SERIES

Sponsored by:

**U.S. DEPARTMENT OF ENERGY
GEOTHERMAL TECHNOLOGY DIVISION (GTD)**

Prepared for:

**LOS ALAMOS NATIONAL LABORATORY
Under Contract No. 9-X36-3652C**

Prepared by:

**MERIDIAN CORPORATION
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FOCUS ON

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PREFACE

The *Focus on Series* is prepared to give the U.S. Geothermal Industry a quick profile of several foreign countries. The countries depicted were chosen for both their promising geothermal resources and for their various stages of geothermal development, which can translate into opportunities for the U.S. geothermal industry. The series presents condensed statistics and information regarding each country's population, economic growth and energy balance with special emphasis on the country's geothermal resources, stage of geothermal development and most recent activities or key players in geothermal development. The series also offers an extensive list of references and key contacts, both in the U.S. and in the target country, which can be used to obtain detailed information.

The series is available for the following countries:
Argentina, Azores (Portugal), China, Costa Rica, Ecuador, El Salvador, Ethiopia, Guatemala, Honduras, Indonesia, Jordan, Mexico, St. Lucia, Thailand.

Additional countries might be available in the future.

The series is to be used in conjunction with four other publications specifically designed to assist the U.S. geothermal industry in identifying and taking advantage of geothermal activities and opportunities abroad, namely:

- The "*Review of International Geothermal Activities and Assessment of U.S. Industry Opportunities.*" Final Report, August 1987. Prepared for Los Alamos National Laboratory.
- The "*Summary Report*" of the above publication.
- "*Equipment and Services for Worldwide Applications,*" U.S. Department of Energy.
- The "*Listing of U.S. Companies that Supply Goods and Services for Geothermal Explorers, Developers and Producers Internationally,*" August 1987, prepared by GRC.

Copies of these publications can be obtained from the Geothermal Technology Division of the U.S. Department of Energy. Correspondence should be addressed to:

Dr. John E. Mock
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1000 Independence Avenue
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(202) 586-5340

NOTE

Data presented in this document are based on several U.S. government official publications as well as international organizations, namely:

- Background Notes (U.S. Department of State)
- Foreign Economic Trends (U.S. Department of Commerce)
- World Development Report 1987 (World Bank)
- International Data Base for the U.S. Renewable Energy Industry, May 1986 (U.S. Department of Energy)

The country's geothermal resources write-up is a revision and update of the Appendix in the "Review of International Geothermal Activities and Assessment of U.S. Industry Opportunities." LANL, August 1987.

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Official Name: Republic of Costa Rica

Area: 51,022 sq. km. (19,700 sq. mi.)

Capital: San Jose

Population (1985): 2.6 million

Population Growth Rate: 2.6%

Languages: Spanish

Economic Indicators:

Real GDP (1985): \$3.71 billion

Real Annual Growth Rate (1985): 2.2%

Per Capita Income (1985): \$1,352

Avg. Inflation Rate (1985): 15%

Trade and Balance of Payments:

(1985) Exports: \$928 million; Major Markets: U.S., Central American Common Market (CACM), FRG

(1985) Imports: \$1,037 million; Major Suppliers: U.S., CACM, Japan

(April 1986) Exchange Rate: 20 colones = US \$1 (official);
54.40 colones = US \$1 (market)

Energy Profile: (Based on 1982 data unless otherwise indicated)

- Commercial Fuel Energy Consumption:

Total: 1.325 million ton of oil equivalent (mtoe)

1-Yr. Growth: 13.2%

- Commercial Fuel Breakdown:

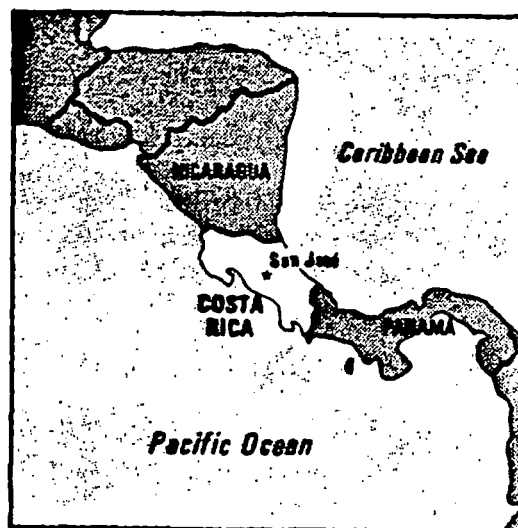
Liquid Fuels Pct: 58%

Solid Fuel Pct: *

Natural Gas Pct: *

Electric Pct: 42%

Commercial Fuel Consumption Growth Rate (1970-1980): 7.1%



* Negligible

- Electricity Generation Capacity:
 - (1982) Total Installed Elec. Capacity: 657 MW
 - Hydro: 71%
 - Hydro Potential: 9,071 MW
 - Steam: 2%
 - Gas Turbine: 0%
 - Diesel: 27%
 - Other: 0%

- Electricity Sales:
 - Total: 1,879 GWh
 - Residential: 45%
 - Commercial: 19%
 - Industrial: 34%
 - Government: *
 - Other: 2%
 - Average Electricity Price: 2.90 US cents/kWh

- Geothermal Power Generation Status:
 - Reservoir Potential (MW): No figures provided, but considered high.
 - Temperature Range: Around 240°C

- Activities to Date: Detailed exploration, exploratory drilling and 55 MWe of future on-line power generation, (by 1990).

- Geographic Locations: Northern region

- Countries Actively Involved: Italy, U.S.

- General Need for Assistance: Feasibility studies in other promising areas, exploration drilling, reservoir modeling and commercial power generation.

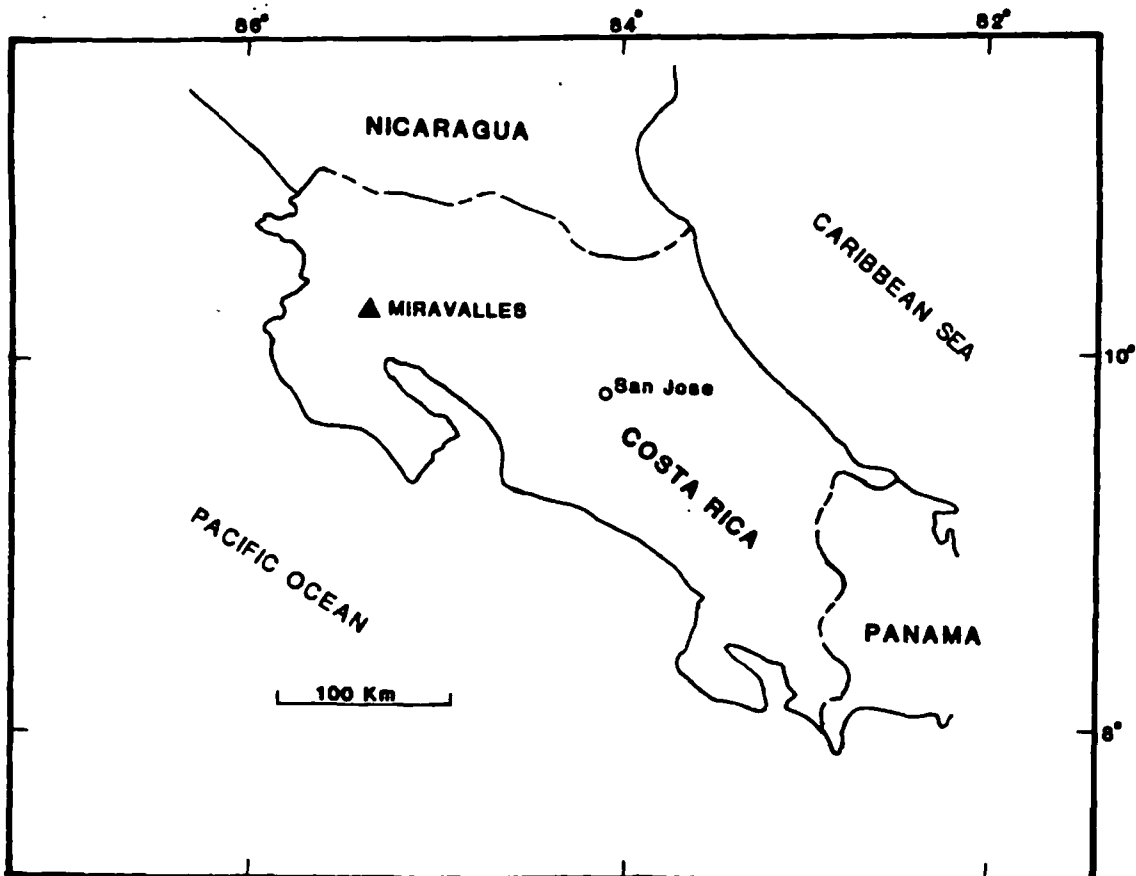
* Negligible

GEOTHERMAL RESOURCES

As a product of the subduction of the Cocos plate beneath the Caribbean plate, Costa Rica is a volcanically active region. Hot springs are very prevalent in the central part of the country. Systematic geothermal exploration has yet to be done in Costa Rica. Until a systematic reconnaissance is conducted, there is no estimate of the country's geothermal potential. Los Alamos geologists are likely to start soon a reconnaissance program financed by AID.

Geothermal energy has been of interest in Costa Rica since 1959, when preliminary nationwide inventories of thermal manifestations were made. Subsequent visits by United Nations geothermal experts indicated the importance of detailed exploration in the thermal areas of the volcanic Guanacaste Range. Between 1964 and 1974, however, no specific effort was made toward geothermal development.

Interest in geothermal development was renewed in 1975 and a regional assessment was begun in the area surrounding the Miravalles, Ricon de la Vieja, and Santa Maria volcanoes. Based on a prefeasibility study funded with Inter-American Development Bank (IDB) assistance, Miravalles was targeted as the most promising area.



The Las Hornillas de Miravalles geothermal area is located within the Guanacaste geothermal province. The Guanacaste area is characterized by a line of surface thermal features, 30 km in length, occurring along the flank of an active volcanic chain. As recommended by the reconnaissance studies, three wells were drilled into the 240°C reservoir. Production drilling began at Miravalles in 1979 and continued through 1980 with the completion of three wells to depths of 1200 to 1300 m.

A new drilling program was initiated in March 1984 aimed at drilling 5 to 6 deep wells. The new drilling program was advised by Electroconsult of Italy and funded by IDB. This drilling led to a 23 MWe single-flash or a 32 MWe double-flash wellhead potential. It is projected that a power generating station of 55 MWe single-flash well be on-line by 1990. A second power plant is tentatively scheduled for 1994.

In addition to the areas mentioned, preliminary studies have indicated that 54 localities may hold geothermal potential. Many of these areas possess moderate-temperature resources and therefore, may be attractive for binary electric generation technology. Other areas that have been explored in the Guanacaste region include Las Pailas, Salitral, and Boringuen where geochemistry has indicated high (240°C) subsurface temperatures.

The Instituto Costarricense de Electricidad (ICE) is the agency within the country that began planning for geothermal development. To date only Miravalles has undergone feasibility studies but prefeasibility studies have been performed at Pailas-Rincon de la Viega. Other fields have been identified but not assessed.

Bibliography:

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California Division of Oil and Gas, 1980, "Costa Rican Geothermal Development at Miravalles," Part I. Geothermal Hot Line, Vol. 10, No. 2

Corrales, Manuel F., 1985, "Costa Rica: Country Update Report," Geothermal Resources Council (GRC), 1985 International Symposium on Geothermal Energy, International Volume, pp. 57-63.

Furgerson, R.B., and Afonso, P.S., 1977, "Electrical Investigations in the Guanacaste Geothermal Area (Costa Rica)," Geothermal Resources Council Transactions, Vol. 1, pp. 99-100.

Hodgson, S.F., 1985, "Central America Energy Resources Project," Geothermal Hot Line, July 1985, Vol. No. 1, pp. 23-28.

LANL, 1987, The Energy Situation in Five Central American Countries, Central American Energy and Resource Project, June 1987. (LA-10988-MS) pp. 85-87.

**REFERENCES
AND
KEY CONTACTS**

A. Business Climate Sources of Information

The following references are suggested for timely information on the business climate in Costa Rica.

U.S. GOVERNMENT PUBLICATIONS

U.S. Department of Commerce

- Foreign Economic Trends (FET) and their Implications for the U.S.
- Overseas Business Reports (OBR)

U.S. Department of State

- Background Notes

NON-GOVERNMENT PUBLICATIONS

- International Series, published by Ernst and Whinney
- Businessman's Guide to....., published by Price Waterhouse and Co.
- Information Guide: Doing Business in, published by Price Waterhouse and Co.
- Task and Trade Guide, published by Arthur Andersen
- Task and Investment Profile, published by Touche Ross and Co.

B. Geothermal-Related Sources of Information

The following reports and documents are suggested for further information regarding geothermal energy and export opportunities overseas:

Los Alamos National Laboratory:

- Review of International Geothermal Activities and Assessment of U.S. Industry Opportunities

U.S. Department of Energy

- Equipment and services for Worldwide Applications
- Guide to the International Development and Funding Institutions for the U.S. Renewable Energy Industry
- Federal Export Assistance Programs Applicable to the U.S. Renewable Energy Industry
- International Data Base for the U.S. Renewable Energy Industry
- Committee on Renewable Energy Commerce and Trade: CORECT's Second Year - October 1985-November 1986

California Energy Commission (CEC)

- Foreign Geothermal Energy Market Analysis
- Small Scale Electric Systems Using Geothermal Energy: A Guide to Development

U.S. Department of Commerce - International Trade Administration

- A Competitive Assessment of the U.S. Renewable Energy Equipment Industry

U.S. Export Council for Renewable Energy

- International Renewable Energy Industry Trade Policy

C. KEY CONTACTS

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- DOC Marketing Periodicals

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NOTE

June 10, 1994

The enclosed material concerning Central America are for your files. If you have any questions, please do not hesitate to contact me at (202) 586-8076.

Marshall Reed
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The Official Gazette No. 51 of March 15, 1993

No. 7329

THE LEGISLATIVE ASSEMBLY OF THE REPUBLIC OF COSTA RICA

DECREES:

THE GENERAL LAW FOR PUBLIC WORKS CONCESSIONS

CHAPTER I

General

Article 1. The concession of public works belongs to the realm of public law through which the State commissions an individual the execution of works and temporarily transmits to such individual the necessary legal powers to operate it, through the payment of a valuable consideration or rate to be paid by consumers, with the authority, monitoring and control of the Administration, but under the concessionaire's own risk and behalf.

Article 2. The Administration awarding such concession shall conserve the ownership right of the public property and it shall hold title to the provision of the public service.

The concessionaire is responsible for the care, repair and maintenance of the works and all the assets of the concession and the responsibility of providing the public service, in accordance with this Law, its Regulations and the Concession Agreement.

Article 3. The Executive Branch, the decentralized agencies and the municipalities may award concessions to construct, repair, expand, conserve and restore public works and their corresponding operation, based on the provisions of this Law.

Article 4. The President of the Republic and the corresponding Minister shall grant the public works concessions pertaining to the Executive Branch, in accordance with the provisions of this Law.

If the public works is under the jurisdiction of a decentralized entity, upon its request and based on this Law, the Government Council may issue the corresponding directive to process the concession.

The municipalities may grant in concession, through a vote of not less than the two thirds of their total membership, works for the provision of their own public services, in the interest of their communities, whenever they cannot provide them directly in an efficient manner.

The National General Comptroller, to which all municipal agreements authorizing the processing of a concession shall be sent, may challenge the agreement on legal grounds.

In any case, the environmental impact of the project shall be taken into consideration, thus the opinion of the Ministry of Natural Resources, Mining and Energy must be obtained. The Ministry shall supervise the construction of the works and service provision, with respect to the environment.

Article 5. No public works may be awarded in concession whenever its award may entail a restriction to fundamental rights in connection with freedom of movements, health and education unless, besides the works under concession, there are others through which the State provides those services.

Neither can works fundamental to the protection of national sovereignty or national security or that affect freedom, peace or security for the population, or the goods through which the State or the public entities provide services under an exclusive or monopolistic system, be granted under concession.

Article 6. National railroads, docks and airports, the latter while they are in service, cannot be sold, leased or used as collateral, directly or indirectly, nor can they be, under any circumstance, outside of State ownership and control.

The concessions awarded to construct and operate new railroad, dock and airport facilities shall be processed in accordance with this Law and approved by the Legislative Assembly within the corresponding term in accordance to its internal Order, Management and Discipline Regulations.

Supplementary or non-essential public services located in railroads, docks and airports may be granted under concession.

Article 7. The operation of the property subject to concession shall always be regarded as beneficial to the public interest. This purpose shall be met with the provision of the public service in accordance with the following principles: national convenience, legality, generality, continuity, efficiency, adaptiveness and fair compensation.

Article 8. The concessionaire's rights and obligations and, in its case, the rights and obligations of subcontractors cannot be transferred, granted in trust or placed as collateral. No agreement on the use, lease, administration or operation, total or partial, of the assets subject to the concession may be entered into without prior and explicit consent from the awarding Administration and the approval of the National General Comptroller's Office.

If the bid is awarded to a foreign legal entity, it should move its corporate headquarters to the national territory before signing the corresponding contract. Should it decide not to move its headquarters, it shall incorporate a domestic open stock corporation, whose capital shall entirely belong to it, so that this company be the concessionaire. Concessionaire's stock shall be registered.

The corporation shall have its shareholders registration book updated and make available to the awarding Administration and to the National General Comptroller's Office. Any transfer of its shares requires, to be valid, prior authorization in writing from the awarding Administration and the approval of the National General Comptroller's Office. This requirement shall be recorded in the registry in which the corporation is registered.

The provisions of this paragraph shall apply when the concessionaire is a Costa Rican company.

Failure to comply with this Article's provisions shall cause termination of the concession.

Article 9. The term of the concession shall not be greater than twenty-five years and it shall begin on the date in which the Administration receives the public works at its full satisfaction.

When dealing with railroad, airport and dock projects, given the complexity of the works and the time required to recover the investment, the concession shall be for up to fifty years.

Article 10. Any public works concession agreement awarded under this Law shall be approved by the National General Comptroller's Office; it shall be published in the "Official Gazette"; it shall be executed as a public deed before the State Notary and shall be recorded in the Special Section of the Public Registry to be created for this purpose. The contract cannot be executed until these actions have been taken.

The contract shall include all the agreements between the awarding Administration and the concessionaire for the execution of the works and the rights and obligations of the concessionaire to provide the public service.

Article 11. Whatever this Law and its Regulations do not provide for, the provisions of the National Financial Administration Law, the Public Administration General Law and the Administrative Contentious Jurisdiction Law, shall apply.

CHAPTER II

Contracting and Execution of the Works

Article 12. Any concession granted under this Law shall be subject to public competitive bidding procedures.

Article 13. The bidding documents shall include the general conditions and a summary of technical specifications, sufficient enough to identify unequivocally the works and the public services to be provided, as well as aspects to be valued and the mechanisms for their weighing.

Article 14. Whenever the bidder shall not construct the works, totally or partially, it shall indicate in the bid the individuals who will construct it and provide the contracts and technical and financial certifications for all participants. In these cases, both the concessionaire and the subcontractors shall be jointly responsible for the execution of the works.

All other conditions being equal, preference shall be given to subcontracting domestic companies.

Funds from loans approved by the Legislative Assembly or through public institutions shall not be used to finance concessionaires, nor shall the State grant guarantees to this end.

Article 15. Participation and compliance guarantees shall be provided in accordance with the regulations established by the National Financial Administration Law and the Administrative Contracting Regulations.

During the operation of the works stage, the Regulations of this Law shall set any additional guarantees to ensure the appropriate execution of the contract and the eventual substitution of such guarantees in case of loss or deterioration.

Article 16. To select the concessionaire, the Administration shall take into consideration the following:

- a) The budget assigned to the works, the technical specifications and the work program.
- b) Payment of indemnities for the necessary expropriations.
- c) The modality of the services to be provided and their benefits to users.
- d) Economic evaluation of project, with cost, benefits and profitability analysis.
- e) Rate system or the contractual obligation required.
- f) The bidder's financial capability and the origin of its resources.

- g) The bidder's experience in similar projects.
- h) Any other aspect of public interest or of specific importance for the corresponding works or public service.

Special importance shall be given to the bidder's commitment that, all other conditions being equal, it shall use, directly or through subcontractors, the highest number of specialized or operational human resources who, at that time, work in the awarding Administration.

Article 17. The concessionaire and, in its case, the subcontractors are committed to honor the work program until completion of the works. If the program is not honored or the works are not executed, in accordance with technical specifications agreed upon, the contract shall be terminated and the guarantees provided shall be forfeited as well as all concession rights.

In the event of acts of God or force majeure duly verified, the awarding Administration may grant an extension to complete the works, following a decision from the National Comptroller's Office.

The execution of works shall be made on behalf and at the risk of the Concessionaire and authorized subcontractors.

Article 18. The awarding Administration shall carry out constant supervision during all stages of construction of the works, to verify that it adheres to contract provisions.

Upon completion of the construction phase, a minute shall be drafted on the status of the works and contract compliance or non-compliance. The minute shall be signed by all contracting parties and the professionals in charge of the inspection and execution of the works. Once these proceedings are satisfactorily completed, the awarding Administration shall receive the works and incorporate them into its endowment.

Article 19. The concessionaire shall indemnify, with its own resources, all damages caused to third parties as a consequence of project execution or the conservation and operation of the works, unless those damages were caused as a result of actions imposed by the State or the awarding Administration's failure to comply with its obligations.

The goods originating from demolitions, felling of trees and forests and all other natural resources, shall be property of the State. These can only be employed in the works or be transferred to the concessionaire, if this has been provided for explicitly in the Bidding Documents and its contractual value deducted or compensated.

The concessionaire shall be responsible before the State for all damage caused to the environment which have not been considered in the Contract and in the designs of the works.

Non-compliance with these responsibilities shall cause the termination of the concession.

Article 20: Whenever acquisition of real estate or liens on real estate become necessary for purposes of this Law, the following procedures shall be observed:

The Minister of Public Works and Transportation, at the request of the Administration, may directly acquire, through Administration asset swaps or through donations, and with prior endorsement from the National General Comptroller's Office, the assets or rights that are necessary for its objectives, whatever their value, in accordance with the assessment made to that effect.

In case of direct purchase, should the owner not accept the price set, expropriation proceedings shall be undertaken as indicated in this Article. In all cases, a previous assessment shall be made of all property and rights which may be necessary to purchase. Such assessment shall be made by the General Directorate of Direct Taxation of the Finance Ministry, which shall be authorized to use, in these functions, experts from other Ministries or institutions.

The Ministry of Public Works and Transportation, at the request of the Administration, shall make an administrative file including blueprints of the land intended for expropriation, a certification, if appropriate, of the registration or recording of the corresponding estate and all other necessary data. Besides, it shall request, along with sending such documentation, that the Special Assessment Section of the General Directorate of Direct Taxation, to proceed to calculate the amount of indemnity to be paid to the owner of the affected estate. Once the report from the General Directorate of Direct Taxation has been submitted, the Ministry shall request the owner or his/her representative to express, within the next five working days, whether it is willing to sell at the set price, the estate required, so that he/she appears to grant the title deed.

If the owner does not accept the price or if he/she disregards the summons, the procedure to verify the public interest for the expropriation shall proceed immediately, in accordance with the procedures of Article 308 and following of the Public Administration General Law. Once this proceeding is completed, the executive expropriation decree shall be issued, and once this is published, the corresponding file shall be sent to the General Comptroller's Office, so that, on behalf of the State, it continues with the proceedings until its completion before the corresponding jurisdiction.

To set the final price, the judge may appoint a professional expert from the list that for that purpose, is provided by the Federal College of Engineers and Architects.

The cash deposit set by the General Directorate of Direct Taxation as indemnity, deposited to the order of the owner in Court, authorizes the Administration to take possession of the expropriated property. The owner may withdraw the deposited amount without limitation of continuing with expropriation proceedings. Once the final judgment issued by the court becomes effective, the amount owed shall be paid to the owner and the Public Registry shall be ordered to proceed with the corresponding recording in the name of the State or in the name of the awarding Administration. The Public Registry shall be in charge of the corresponding registration proceedings, without limitation to third parties with the best rights. This action may be taken even when the estate is not registered or there are indivisible rights or the owner owes taxes and fees to the State, in which case that amount shall be deducted from the price to be paid to the owner for the expropriation.

The General Directorate of Direct Taxation, in all cases, shall register the documents acquired by the Administration and it shall recover the taxes from the expropriated owner. In case that the estate belongs to a probate trust, to a bankruptcy proceeding, an absent person, a disabled person or to a minor, the procedures shall be followed with the corresponding legal representative. Whenever there are joint owners in the estate, the proceedings shall be verified and shall be notified to all co-owners and the amount of the indemnity shall be paid by the court to the interested parties, in accordance with the provisions of the Civil Code.

In the case of estates to be donated, for the Administration to take possession of them, it shall be enough with the submission of private document in which the owner, in the presence of three witnesses, promises the donation. The owner shall still be obliged to grant the deed of title, before a State Notary within fifteen days following the date of the private document.

The Administration shall pay the experts' fees in accordance with the table used by Banco Nacional de Costa Rica for those purposes; exception being made of special cases in which the court, through justified resolution, estimates and considers that fees should be different.

Article 21. Payment of the indemnities referred to in the previous Articles shall be made by the concessionaire whenever this has being established in the contract. The concessionaire shall make the corresponding deposit at the time required by the awarding Administration and may appear in person in expropriation proceedings.

Article 22. The Public Administration may grant leave without pay for up to four years, without extension, to public servants willing to work temporarily with concessionaire companies under the terms established by this Law. These workers shall be authorized to terminate their working relationship with the Public Administration with full recognition and payment of their legal benefits. The Public Administration shall grant the leave after selecting those concerned through internal competition, which shall be

established in the Regulations of this Law, and if and when this does not hurt provision of services.

Denial of leave by the Public Administration shall be made through a justified resolution.

Public servants who participated in the development of the cartel, in the process of awarding the concession or in the service operation contract may not benefit from the provisions of this Article.

Violation of the previous provision shall be punished by termination without terminal benefits for the staff member involved and for whomever authorized the leave, without limitation to other legal liabilities applicable.

CHAPTER III

Provision of Service

Article 23. The concessionaire has the responsibility of providing the service strictly subject to the conditions established in this Law, its Regulations and in the concession contract.

The concessionaire shall comply with the provisions issued by the awarding Administration, in case of national emergency or to ensure continuity in the provision of the service, without limitation to the indemnities applicable in its favor.

Article 24. The concessionaire may not use the estate or the works, totally or partially, for purposes other than those originally provided for. Non-compliance of this provision shall cause the termination of contract. ADDENDUM. Nor may it install new services without the authorization of the awarding Administration, after a decision from the National General Comptroller's Office.

Article 25. The awarding Administration shall exercise the necessary control over the concession goods and services at all times to verify compliance with this Law, its Regulations and those of the concession contract.

Article 26. The contractual obligation received by the concessionaire shall be the rate or compensation to be paid by service users.

The rate or economic compensation shall be set on the basis of economic reasonability and social interest factors, such as investments effectively made and their recovery within the concession term, technically acceptable operation and conservation expenses, the fair profit of the concessionaire and the economic capability of users.

Whenever it is necessary to decrease the incidence of investment costs on rates, the Administration may allocate in its budget compensation funds.

Article 27. The awarding Administration power to modify rates may not be delegated; but, to be applied, it shall require the approval of the National Electricity Service, for concessions granted by the Executive Branch and the decentralized entities and from the National General Comptroller's Office for concessions granted by the municipalities.

Article 28. The concessionaire shall have the right to request rate changes when, because of reasons external to its responsibilities, the economic and financial balance of the concession as provided for in the contract is affected. The concessionaire shall justify its request with the corresponding documentation.

The application shall be published in the "Official Gazette", so that any concerned party may appear and challenge the petition before the granting Administration itself or the corresponding entity in accordance with Article 27 of this Law.

The time limit for challenging this petition shall be fifteen days.

Article 29. The metric system shall be used to set the rates.

Rates shall be expressed in the domestic currency, with its different values.

Article 30. Rates shall be set through justified resolution, they shall be published by the awarding Administration in the "Official Gazette" and shall be applied by the concessionaire, without any variation.

Article 31. The rates shall always be general for all users requesting the services. Equal treatment is hereby guaranteed to all users.

Special and individual agreements on rates and modalities in the provision of services are forbidden.

Non-compliance of these provisions shall be cause for termination of the concession.

Article 32. The awarding Administration may modify, for public interest reasons, the characteristics of service provision.

The concessionaire may not refuse to continue providing the service; but the awarding Administration shall indemnify or compensate the concessionaire if the same proves that the modification altered the economic benefits that were taken into account in the concession contract.

If the new provisions on service provision do not have a damaging economic impact on the concessionaire, the latter may not take any legal action against the awarding Administration.

Article 33. All individuals are guaranteed the right to press charges, submit petitions or present complaints before the awarding Administration, with a view that their rights or interests be protected, damaged by the concession or service provision.

The awarding Administration shall hear the concessionaire on the charges, petition or complaint submitted and shall take immediately the corresponding actions, in accordance with this Law and with the administrative procedure established by the General Law on Public Administration.

CHAPTER IV

Termination of the Concession

Article 34. The following shall be cause for termination of a concession:

1. The annulment of the awarding act or of the concession contract.
2. The impossibility of compliance as a result of actions adopted by State powers after the contract.
3. The recovery for reasons of public interest.
4. Termination by non-compliance of concessionaire.
5. Expiration of concession term.
6. Any other established in the contract.

Article 35. Whenever termination of the concession takes place for any reason, the awarding Administration shall receive the works subject to concession in good condition and correct operation, free of encumbrances and without any cost, except for the applicable indemnities in accordance with this Law.

The National General Comptroller's Office shall undertake an inspection, inventory and securing of assets proceeding, citing the concessionaire. The proceeding shall take place with enough lead time, to protect the interests, as determined by the National General Comptroller's Office.

Article 36. The absolute annulment of the concession contract shall be declared whenever the provisions of this Law or the National Law of Financial Administration have been violated, either implicitly or explicitly.

The concession contract absolutely voided shall not be assumed as being legitimate, nor can its execution be ordered.

The absolute annulment of the contract or the act, whenever evident and apparent, may not be resolved legally nor by indemnification or ratification.

Absolute annulment, whenever evident and apparent, shall be declared ex-officio, without need to resort to the damaging process indicated by the Regulatory Law of the Administrative Contentious Jurisdiction.

Wherever this Law is silent, the provisions on annulments of the General Law of Public Administration shall be applicable.

Article 37. Whenever the concessionaire is unable to comply because of general or economic measures adopted by the State powers after the contract has been executed, the issue shall be presented to the awarding Administration which shall immediately proceed with the corresponding processing.

The termination declaration shall only be issued whenever apparent legal or timing reasons exist that make it impossible for the concessionaire to continue with providing the service.

The awarding Administration shall transfer the issue to the Ministry of Public Works and Transportation to continue with the processing of assessments and indemnities, according to the provisions of Article 20 of this Law, as applicable.

In the corresponding indemnities, only investments actually made shall be taken into account and a reasonable profit during the concession term, as well as the current status of assets and the losses that could have occurred by causes attributable to the concessionaire, to the awarding Administration or to the users, due to the suspension of service or the deficiencies in its provision.

Once the final termination act of the administrative action becomes effective, the awarding Administration shall receive the assets of the concession without the need to previously verify payment of the indemnity to which the concessionaire may be entitled.

The corresponding liquidation shall require the approval of the National General Comptroller's Office.

Article 38. Whenever the awarding Administration determines that there are justified reasons of national convenience to assume direct service provision, recovery of the concession may be decreed by reason of public interest.

Before executing the final administrative recovery act, the awarding Administration shall indemnify, immediately and directly, the damages and losses caused to the concessionaire. For that, only investments actually made shall be taken into account as well as a reasonable profit during the term of the concession.

The awarding Administration shall transfer the issue to the Ministry of Public Works and Transportation so that it continues the processing of assessment and indemnities established by Article 20 of this Law, as applicable. The corresponding liquidation shall require the approval of the National General Comptroller's Office.

Article 39. The termination of the concession shall take place for the following causes:

- a) Unjustified failure to comply with the work program to execute the works.
- b) Violation of legal, general, continuity, adaptability and efficiency principles in the provision of the service.
- c) Non-application of authorized rates, damaging to users.
- d) Entering bankruptcy or Chapter 11 provisions by the concessionaire.
- e) Any other cause of serious non-compliance of responsibilities by the concessionaire derived from the awarding act and of this Law.

Once the administrative action for termination becomes administratively final, the awarding Administration may redeem, immediately, the guarantees provided by the Concessionaire.

Article 40. In cases where the concession expires, as provided for in Articles 36, 37, 38 and 39, the following rules shall be applicable:

1. The final administrative expiration act of the concession shall be issued after a favorable opinion from the National Comptroller's Office.

2. For concessions granted by the State, the expiration declaration shall be made by the Council of Government.

3. For concessions granted by decentralized entities, the declaration shall be made by the highest ranking executive body of the institution.

4. In the case of municipalities, the declaration shall be made by the corresponding Council.

Article 41. The awarding Administration, the concessionaire, private individuals with direct and legitimate interest and the entities mentioned in Articles 10 and 14 of the Regulatory Law of Administrative Contentious Jurisdiction, may occur to the jurisdictional level in defense of its rights.

The lodging of an appeal shall not impede the awarding Administration to execute the act or the challenged decision.

Article 42. The Executive Branch shall regulate this Law within ninety days following its publication.

Article 43: This Law repeals any other contrary to it.

Article 44: It becomes effective on the date of its publication.

The Executive Branch be Notified

The Legislative Assembly, San José, on the twentieth day of January Nineteen Hundred and Ninety Three. Roberto Tovar Faja, President. Alfredo Cruz Alvarez, First Assistant Secretary. Guillermo Zúñiga Trigueros, Second Assistant Secretary.

Given in the Presidency of the Republic, San José, on the ninth day of February Nineteen Hundred and Ninety Three. Execute it and Publish it.

R. A. CALDERON F. The Ministers of the Presidency, Lic. Rolando Lacié Castro and of Public Works and Transportation, Eng. Mariano Guardia Cañas. C-4624.



Department of Energy
Washington, DC 20585

October 11, 1994

Dr. Tsvi Meidav, President
Trans-Pacific Geothermal Corporation
1901 Harrison Street, Suite 1590
Oakland, CA 94612-3501

Dear Tsvi:

I know of your strong interest in geothermal development in Latin America, and I appreciate your support for the Department of Energy projects and outreach in that area. Your comments to Deputy Secretary Bill White concerning Costa Rica were helpful, and I thought you would be interested in these two new laws passed by the Costa Rican government.

We are hopeful that the Hydrocarbon Law is indicative of future privatization of energy sources such as geothermal in Costa Rica. The Concessions Law was suggested by ICE as the best legal route, at present, for the private financing of geothermal power development in Costa Rica. We are following the possibility of using this Concessions Law for BOT geothermal projects.

Thanks again for your support of the international and domestic activities of the Geothermal Division.

Sincerely,

A handwritten signature in cursive script that reads "Marshall Reed".

Marshall Reed, Program Manager
International Geothermal Program
Geothermal Division, EE-122

cc: P.M. Wright, Pres. GEA

AMERICAS' 21ST CENTURY PROGRAM

JUN 22 1994

Program Overview

Americas' 21st Century Program is a joint venture program aimed at developing environmentally sustainable energy options in the Latin America and Caribbean (LAC) region, while building a strong business and industrial capacity using U.S. produced renewable energy products and services. The program focuses on rural electrification through renewables but also addresses grid-connected applications. Specific objectives are to:

- catalyze host country and donor renewable energy project investments through U.S. cost sharing and technical assistance;
- provide for effective and efficient technology transfer emphasizing private sector joint ventures;
- contribute to LAC nation economic and social development objectives; and
- increase U.S. renewable energy technology markets, exports and manufacturing capacity leading to reduced system costs.

Americas' 21st Century builds upon the limited experience base with renewable energy that presently exists in the LAC region. It centralizes under one program the various renewable energy projects in which the U.S. Department of Energy (DOE) is participating in LAC, including those involving the office of Conservation and Renewable Energy (DOE/CE), International Affairs (DOE/IA), the Committee on Renewable Energy Commerce and Trade (CORECT), U.S. industry and the national laboratories (National Renewable Energy Laboratory, NREL, and Sandia National Laboratories, SNL).

U.S. renewable energy technologies represent a promising solution to the growing power needs of the LAC region because of the increasing technical sophistication and interest of several nations (e.g., Brazil, Mexico), the relative lack of rural electric power infrastructure, the increased environmental stress caused by growing urbanization, and the relatively high cost of existing sources of power. In addition, biomass technologies could address bio-diversity issues by creating sustainable economic value for recovering lands used for production and use of energy crops.

Program Strategy

The overall strategy to be pursued by Americas' 21st Century in developing a "sustainable" market base for renewables in LAC employs a 4-phased approach.

*For purposes of this paper the LAC region includes Mexico, the Caribbean, Central America, and South America.

Phase I involves participating in projects that will demonstrate the technical, economic, and financial viability of renewables, as well as to develop the necessary infrastructure (i.e., operation and maintenance capability, spare parts) to conduct these projects over the longer term. In most cases it is envisioned that the first project to be supported by Americas' 21st Century in a given country will involve a single technology, and a limited number of sites.

Building upon this successful project, Americas' 21st Century will be working in Phase II to expand the experience base to the conduct of other projects throughout the country. Phase II will not only increase the number of sites at which projects are performed, but additionally, will broaden the technology scope to include other renewable options as appropriate given the local resource, institutional, and energy situation.

In Phase III, the individual project successes that are on-going throughout the country will be bundled together into one or more larger projects that will receive national attention, visibility, and support. It is anticipated that Phase III will involve leveraging of donor and host country funds.

Phase IV involves an education campaign to transfer the positive experiences of renewables gained above to other countries in the region.

Program Implementation

Americas' 21st Century targets ongoing efforts in Mexico, Brazil, Central America and LAC/World Bank; however, other project initiatives are eligible. It would cover a number of activities including opportunity identification, marketing conditioning, project preparation, and incremental project financing. Eligible renewable energy technologies would have to be technically proven and economically viable. This initiation is similar in nature to the innovative energy technology transfer sections of EPAct sections 1211 and 1608, which are authorized at significant funding levels (\$100 million annually each) but have not yet received a corresponding budget obligation.

Program Resources

Total DOE funding for the project would be approximately \$50 million over the period FY 94-96; with first year funding of about \$4 million. It is anticipated that projects would be conducted on a 25% DOE contribution, 75% other organization cost-shared basis. Projects would require cost sharing by the host country government at least matching the DOE share.

External funding sources could include: other federal government agencies (e.g., U.S. AID, U.S. Export-Import Bank, Overseas Private Investment Corporation); bilateral donors; and multilateral financial institutions including the World Bank, the Inter-American Development Bank, and the Global Environmental Facility (GEF).

Exhibit 1 provides a breakdown of planned expenditures for the FY 94-96 period.

Exhibit 1
Americas' 21st Century
Resource Requirements, FY 94-96 - (\$M)

	FY '94	FY '95	FY '96
Mexico	\$ 1.2	\$ 6.0	\$ 6.0
Brazil	1.3	5.0	5.0
Central America (Costa Rica, Guatemala, Honduras)	0.5	4.0	4.0
LAC/World Bank	1.0	1.0	1.0
Project Related Training/Tech Assistance	0.3	2.0	2.0
New Project Opportunities	0.2	2.0	2.0
TOTAL	\$4.5	\$20.0	\$20.0

The Program Benefits

Americas' 21st Century Program represents a win-win situation for LAC and U.S. participants.

For the U.S., Americas' 21st Century advances U.S. industry growth and sales opportunities in a rapidly growing, high tech, yet competitive market area; creates U.S. job employment opportunities; contributes to an expanded U.S. manufacturing base which will reduce technology costs for domestic and foreign renewable energy applications; leverages DOE R&D funding into commercial applications; enhances U.S. trade with our neighboring nations; and provides substantial action towards reducing greenhouse gas emissions through cost-effective technology transfer rather than foreign aid.

For LAC countries, the program enhances regional economic and social development objectives; strengthens local renewable energy capabilities and institutions; makes a major contribution to growing energy demands, particularly in rural areas; and does not require the large foreign debt funding of more traditional energy options.

For bilateral and multilateral development agencies, the program offers an environmentally benign alternative to damaging conventional energy options and relies heavily on private sector participation -- issues of major concern to lending organizations.

PROGRAM INITIATIVE

A number of U.S./LAC renewable energy projects are already being supported or in planning by DOE. In order to improve the overall management and coordination of these activities, DOE is centralizing its LAC renewable energy efforts under the Americas' 21st Century Program

umbrella. Operationally, these projects will continue to be operated through the existing DOE contacts, however, Americas' 21st Century will provide oversight and guidance to ensure that these efforts satisfy the goals, objectives and guidelines of the program. Ongoing and planned activities are described in the Attachment, "Ongoing DOE LAC Renewable Energy Activities".

ATTACHMENT I

ONGOING DOE LAC RENEWABLE ENERGY ACTIVITIES

BRAZIL RURAL DEVELOPMENT ASSISTANCE PROJECT

Purpose

Initiated at the United Nations Conference on Environment and Development, the Brazil Rural Development Assistance Project seeks to bring electricity to homes, small businesses, educational and health facilities in remote locations in Brazil using U.S. renewable energy products and services. The current project focus is on the Northeastern States of the country, with the Department of Energy (DOE) serving as the U.S. lead for this effort. This project was initiated in recognition of the fact that over 40 million people in Brazil lack electricity to satisfy basic human needs and economic development, and this situation is not expected to change in the near term due to capital constraints and an urban energy sector focus.

Project Terms

The Brazil Rural Development Assistance Project is being conducted in three phases:

Phase I: State Demonstration Projects. DOE has agreed to cost-share in photovoltaic pilot projects in four states. The purpose of the pilot projects is to demonstrate PV systems in a variety of applications in the country; increase end-user and decisionmaker familiarity with the systems; develop local institutional capabilities in the installation, operation and maintenance of the systems; and identify and resolve any problems and or issues that may occur from PV deployment in Brazil. DOE commits a maximum of 50% of the project costs, with the states to supply the remainder. The DOE contribution takes the form of U.S. photovoltaic modules, as well as system components that can not be found in Brazil (i.e., batteries, controllers, etc.). Planned pilot activities include:

- In the States of Ceara and Pernambuco, DOE is cost-sharing in the installation of approximately 1,000 photovoltaic systems for use in a variety of household and community-based applications. The dedication of the first of these systems took place in December 1992, with full installation expected in late 1993. The response to these systems have been overwhelming in terms of their impact on improved lighting, enhanced educational activities, and improved medical vaccines. In the State of Ceara, DOE will also be participating in the demonstration of a PV village hybrid system in the tourist village of Jericoacoara. This system will be put in place by mid-1994.
- In the State of Bahia, DOE agreed to cost-share in a pilot effort that will initiate in early 1994 to evaluate productive uses for photovoltaics in the agricultural sector (i.e., water pumping, grain grinding/shredding, electric fencing). Pending the success of these efforts, the State is interested in a larger effort that may involve multilateral funding. Additionally, Bahia has announced that 5% of its new generation will come from renewables.
- In the State of Amazonas, DOE plans to co-sponsor a pilot effort, for start-up in March 1994, to evaluate the use of PV to replace or avoid the need for diesels

that are expensive to operation and maintain, and environmentally damaging. The situation is particularly acute in the State in trying to access diesel fuel during the rainy season when river access is impossible.

DOE is also working with several other states including Acre, Minas Gerais, Alagoas, and Sao Paulo to explore collaborative efforts that could complement the social, income-generating, and diesel replacement activities being conducted above.

Phase II: Statewide Project Expansion. In addition to project cost-sharing, DOE investment requires a commitment for broader statewide activities in PV and other renewable energy technologies pending a successful pilot outcomes. Each of the states identified above have provided DOE with this pledge, and one state, Ceara, has already approached the World Bank to initiate a large-scale integrated renewable energy project. In total, DOE anticipates a market of up to 500,000 PV installations alone in the next 3-5 years in Brazil at a total investment of approximately \$500 million.

Phase III: Institutional Development. To ensure a centralized point of contact and coordination for renewables within the country, DOE's National Renewable Energy Laboratory (NREL) and the Brazilian Center for Research on Electric Energy (CEPEL) are working to establish a strong renewable energy capability at the federal level within the country. NREL is providing on-going technical assistance and training on renewable energy technology performance, costs, applications, standards, and industry players. In addition to this activity in renewable energy for rural areas, DOE and the U.S. Export Council for Renewable Energy (U.S. ECRE) are working with ELECTROBRAS (Brazil's national utility) and the World Bank to sponsor an energy efficiency workshop in Brazil that will focus on industrial sector opportunities. This workshop is part of a broader effort to develop a World Bank-Brazil energy efficiency project.

Project Benefits

This project yields a number of benefits:

- enhances sales, profit and employment opportunities for U.S. firms.
- offers environmentally benign, cost competitive alternative to diesel, kerosene and grid extension.
- enables rural population to receive power and improves economic and social conditions.

MEXICO NONCONVENTIONAL RURAL ELECTRIFICATION PROGRAM

Purpose

The purpose of these renewable energy activities from the Mexican Government's perspective is to provide rural inhabitants with lighting and other social uses of electricity, as well as some productive use applications (e.g. grain milling, small industry activities). The purpose of DOE's participation in this project is to support the Mexican Government in its renewable energy activities, and to help establish a firm foundation on which to implement a greatly expanded program, thereby leading to increased exports of U.S. renewable energy technologies.

Project Terms

The Mexico Nonconventional Electrification Program has evolved through two phases, and is currently transitioning from the second to the third phase:

Phase I: Mexican Government Rural Electrification: For approximately three years the Government of Mexico has been employing renewable energy technologies in rural electrification and other rural application projects the National Solidarity Program (PRONASOL), a national anti-poverty and public works program. Renewable energy systems (primarily solar-electric photovoltaics) have been used to electrify several hundred rural communities totalling approximately 20,000 households.

In the fall of 1990, DOE learned of Mexico's innovative activities under PRONASOL to utilize renewables as the most cost effective option for rural electrification. It was determined that there were a number of types of technical support that the U.S. could provide to support the pilot program and facilitate additional renewable energy development in Mexico. For over two years, DOE has supported the PRONASOL and state renewable energy activities, through the informal working-level cooperation program known as PROCER (Programa de Cooperación en Energía Renovable), with U.S. participation implemented by Sandia National Laboratories' Design Assistance Center (DAC).

DOE support through PROCER focuses on training, technical assistance, and promotion of U.S. Mexican commercial cooperation. Overall coordination of the activities, including program development assistance, planning and unified reporting, is directed by Sandia/DAC, involving close interaction with the Secretariat of Social Development (SEDESOL), the Federal Electricity Commission (CFE), selected state governments, other Mexican counterparts, as well as AID/Mexico.

Phase II: Institutionalization: With continued DOE support, the Mexican Government moved to institutionalize activities on a permanent basis, incorporating the Nonconventional Rural Electrification program as a separate program with its own Federal budget line item. This program explicitly embraces multiple renewable energy technologies on a least-cost basis.

In the fall of 1992, AID/Mexico bought into the DOE activities, with a \$650K contribution to the PASA agreement with DOE. A more recent buy-in of \$4M has scaled up the efforts,

providing additional leveraging funding for what will very likely be a major expansion of the Mexican program. Under the expanded AID/DOE activities, DOE support will focus on the identification, selection, preparation and procurement of demonstration field projects, with a significant focus on productive use applications.

Phase III: Mexican Renewable Energy Program Expansion: DOE has been supporting the preparation of a \$100M World Bank loan request, and it is expected that the Mexican Government will increase its contribution from \$11M to about \$100M, leading to a \$200M program. The \$4M AID/Mexico contribution will be counted as a U.S. contribution to the Global Environmental Facility.

Project Benefits

This project yields a number of benefits:

- enhances sales, profit and employment opportunities for U.S. firms.
- offers environmentally benign, cost competitive alternative to diesel, kerosene and grid extension.
- enables rural population to receive power and improves economic and social conditions.

OTHER COUNTRIES

CENTRAL AMERICA

DOE has been engaged in cooperative activities aimed at advancing sustainable renewable energy development in Central America. These activities are designed to support renewable energy activities undertaken by the National Rural Electric Cooperative Association's Central America Rural Electrification Support program (NRECA/CARES), as well as AID-funded activities in the region, and come under the direction of Sandia/DAC. This program has been reviewed by Sandia/DAC for conformance with FY94 AOP and plans for FY94 DOE activities in the region.

DOE provides support to Sandia/DAC, NRECA and appropriate Central American agencies and institutions in identifying, screening and preparing projects and programs; project and program development and planning, where appropriate; and pre- and post- installation project and program evaluation, including assessments of economic, institutional and beneficiary impacts. The projects supported by DOE will be designed to be replicated throughout the region. Through Sandia, DOE will support the identification of appropriate agencies and other end-users interested in purchasing renewable energy technologies.

DOE will also provide support in the financing area, including policy dialogue with agencies and institutions to support LAC/FINESSE activities in the Central America region. These activities will support project preparation efforts involved in the development and implementation of financing schemes (working with agencies interested in developing financing activities).

Country-specific activities are highlighted below:

Guatemala

Guatemala continues to be the primary focus of a cooperative program in Central America. A Memorandum of Understanding (MOU or Convenio) on cooperation in renewable energy was signed in November, 1992, by the Guatemalan Ministry of Energy and NRECA/CARES. The MOU indicates that support for the use of renewable energy technologies in government programs in health, education, communications and potable water would be provided by DOE, Sandia and U.S. ECRE. For its part, NRECA/CARES, based in Guatemala City, has begun to integrate renewables as an increasing part of its program activities. NRECA/CARES stresses that it will need DOE support in this effort.

- In the first DOE-supported cooperative activity, a wind and solar water pumping workshop was sponsored in Guatemala City in May, 1992, attracting over 140 participants.
- NRECA, a local utility (EEGSA), and the University of Valle established a Renewable Energy Working Group to undertake near-term pilot projects in order to validate the technologies in-country and obtain user experience. The first pilot PV community rural electrification project is near completion. Sandia has

supported training of utility line technicians and end users, and continues to provide technical assistance, including system monitoring and evaluation assistance.

- Several municipalities have expressed interest in using federal public works money for renewable energy lighting, water pumping and productive use applications in their communities. One municipality has already purchased systems; at least two others are in line to do the same.

- In addition to the rural electrification related activities, there is interest in pursuing windfarm development in Guatemala.

Honduras

- Honduras will also receive initial attention under the Central American program discussed above, but to a somewhat lesser extent than Guatemala. ENERSOL, a U.S. based PVO, with support from DOE/SNL and NRECA, is replicating its Dominican Republic PV rural electrification model in Honduras. The goal is to begin private sector supply of PV systems. In particular, ENERSOL will focus on specific areas where Peace Corps volunteer support is available, including Roatan Island, Santa Barbara, and Tela. A DOE-sponsored team visited Roatan island in early April to provide technical assistance and training on Peace Corps PV water pumping and lighting projects and gather information concerning the wind resource at a number of villages. They also visited Barbarreta Island, adjacent to Roatan, in order to initiate resource assessment for a proposed national park with ecotourist and research facilities which would exclusively utilize renewable energy. DOE/SNL is also cooperating with USAID/Honduras in PV-powered water disinfection.

SOUTH AMERICA

ARGENTINA

The American Wind Energy Association (AWEA) and USAID recently sent a team to Argentina in early 1992 to investigate project/business opportunities. The team reported much interest in windfarm development, small systems, and possible joint ventures. The trip was followed by a trade mission in June 1992, which included hosting of the "First International Conference for Commercial Exchange of Wind Energy" in Rawson, Chubut Province.

AWEA and several of its members are moving to follow up on opportunities identified in Argentina, and will be interested in DOE support. Wind resource assessment, project prefeasibility studies, and technical assistance and training in incorporating windfarms into grids or minigrids and private power pricing issues have been identified as high priority needs.

BOLIVIA

The National Rural Electric Cooperative (NRECA) is beginning to undertake renewable energy activities in Bolivia as part of its USAID-supported rural electrification program. It is currently implementing a pilot project of 200 household PV systems and 20 school PV systems, in order to test the market and gather information. Two distinct delivery mechanisms are being tested: one utilizing private sector vendors, and the others involving an electric cooperative. NRECA is willing and able to greatly expand the PV activities, once a sustainable delivery mechanism is selected, PV activities will be expanded as will other renewable energy components (biomass, mini-hydro). NRECA is also beginning some biomass-related activities, and plans to develop a mini-hydro program in one year. Technical assistance has been provided by DOE in support of drafting specifications for system procurement and in proposal review criteria; further technical support is anticipated.

CHILE

AWEA has recently begun the opportunity identification process in Chile, focusing both on grid-connected windfarms and small off-grid applications. A U.S. Trade and Development Program (TDP) funded definitional mission was implemented by AWEA in September 1992. DOE is currently discussing with Chilean government officials its plans in the renewable energy area and possible DOE technical support.

CROSS-CUTTING

Project FINESSE

Project FINESSE (Financing of Energy Services for Small-Scale Energy Users) seeks to accelerate the adoption of alternative energy technologies – renewable energy and energy efficiency – in the developing world by channeling international development bank funding (i.e., the World Bank, Inter-American Development Bank) through in-country intermediary organizations (i.e., utilities, cooperatives, PVOs, etc.). Specific activities include conduct of country market studies to identify alternative energy project opportunities, preparation of business plans for developing and promoting alternative energy products and services, assessing the institutional and policy environment as it pertains to alternatives and conducting a workshop to assemble key decisionmakers to develop replicable models for institutionalizing alternatives in host country energy planning. Over the last two years, efforts have focused on Southeast Asia, in particular, Indonesia, Malaysia, Philippines and Thailand. As a result of FINESSE efforts, over \$800 million in alternative energy projects have been identified by the 4 countries, and the World Bank has established an office to evaluate and pursue bankable opportunities. As a result of its Asian success, DOE will work with the World Bank and the Inter-American Development Bank in implementing FINESSE in the Latin American region.

RESOURCE ASSESSMENT

by

Dave Renné

Office of Solar Energy Conversion Review
July 28-29, 1994
Colorado Springs, CO



BACKGROUND

The Resource Assessment Program *MISSION* is to Facilitate the Design and Deployment of U.S. Renewable Energy Industry Technologies by Providing High Quality, Relevant Resource Information (Solar, Wind, Biomass, Hydro, Geothermal).



Resource Assessment

RESOURCE ASSESSMENT PROGRAM GOALS

Develop and Disseminate Renewable Energy Resource Data and Information to:

- Produce "Value-Added" Products from Geophysical Data
- Screen Commercially Viable Resource Areas
- Reduce Design and Deployment Risks/Increase Investor Confidence
- Shorten Site Evaluation Time
- Enhance National and International Competitiveness of U.S. Industry



Resource Assessment

APPROACH: CURRENT AND FUTURE

Products and Tools/its

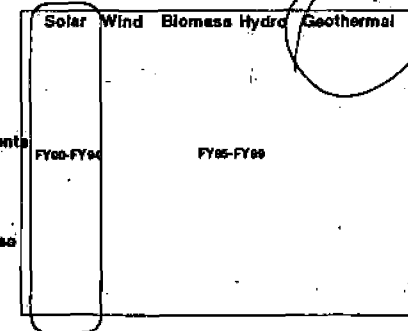
Spatial Data Gridding

Cooperative Measurements

International Resource Evaluations

Multi-Resource Data Base

Renewable Energy Data Center



Resource Assessment

APPROACH/STATUS: INTERNATIONAL SOLAR RESOURCE EVALUATIONS

- World-Wide Surface Data Acquisition
- International Satellite Data
- Model Applications
- Country-Specific Studies: Brazil, Mexico, China, India, Indonesia, Southern Africa

St. Petersburg



Resource Assessment

PUBLICLY-AVAILABLE DATA VS. "VALUE-ADDED" PRODUCTS SUPPLIED TO U.S. SOLAR INDUSTRY

PUBLICLY-AVAILABLE DATA

Surface Data (WRDC) - Available via Internet

Satellite Data

PRODUCTS FOR U.S. INDUSTRY FROM NREL'S REDC

Total Resource for flat plate and concentrator systems

Diurnal Resource Patterns

Solar Maps (Contours)

Solar Maps (Gridded)

TMY's

GIS Products (hybrid systems, etc.)

Satellite Mapping

Daylighting Design



Resource Assessment

FUTURE ACTIVITIES: INTERNATIONAL RESOURCE EVALUATIONS

- Data Assimilation (Surface, Satellite, Models)
- Country-Specific Assessments (Solar, Wind, Biomass, Microhydro, Geothermal)



Resource Assessment

APPROACH/STATUS: NATIONAL SPATIAL DATA GRIDDING

- U.S. Solar Maps from NSRDB
- U.S. Solar Maps from Tabular Data Sets
- Wind/Solar Hybrid Map (Conceptual Plan)



Resource Assessment

FUTURE ACTIVITIES: NATIONAL SPATIAL DATA GRIDDING (SOLAR)

- **Assimilate Surface and Satellite Data, Model Estimates**
- **Approx. 1/3 Degree Longitude by 1/4 Degree Latitude**
- **Certainty Ratings**
- **Diurnal Information for Load Matching**



Resource Assessment

APPROACH: MULTI-RESOURCE DATA BASE

- **Renewable Energy Data Bases Using Common Formats and Protocols**
- **Collaboration with Existing Programs (Wind, Biomass and Biofuels, Hydro, Geothermal)**
- **Provide Additional R&D Support as Required**

Status: FY95 Planning has Begun through Discussions with Program Managers



Resource Assessment

FUTURE ACTIVITIES: MULTI-RESOURCE DATA BASE

- **Continued and Expanded Collaborations with All Resource Categories**
- **Acquisition of International Resource Information**
- **Incorporation into Renewable Energy Data Center**



Resource Assessment

APPROACH/STATUS: RENEWABLE ENERGY DATA CENTER

- **Interactive Access to Multi-Resource Data Base at NREL**
- **On-Line User Support**
- **GIS as an Organization and Display Tool**
- **Conceptual Design, Hardware Acquisition has Begun**



Resource Assessment

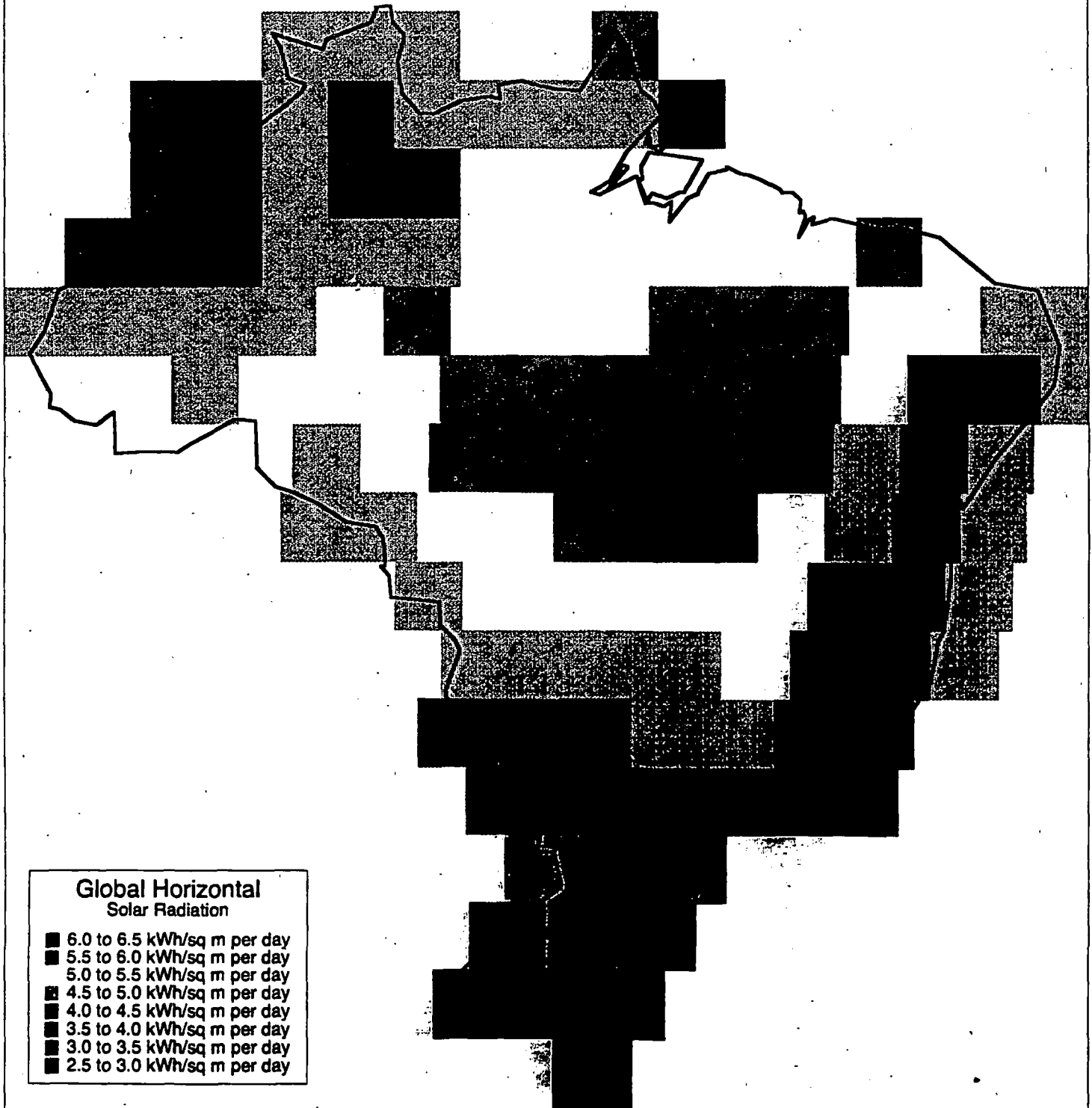
FUTURE ACTIVITIES: RENEWABLE ENERGY DATA CENTER

- **Data Access and Transfer by Internet**
- **Access via World-Wide Web**
- **Hardcopy, Magnetic Media, CD-ROM Distribution**

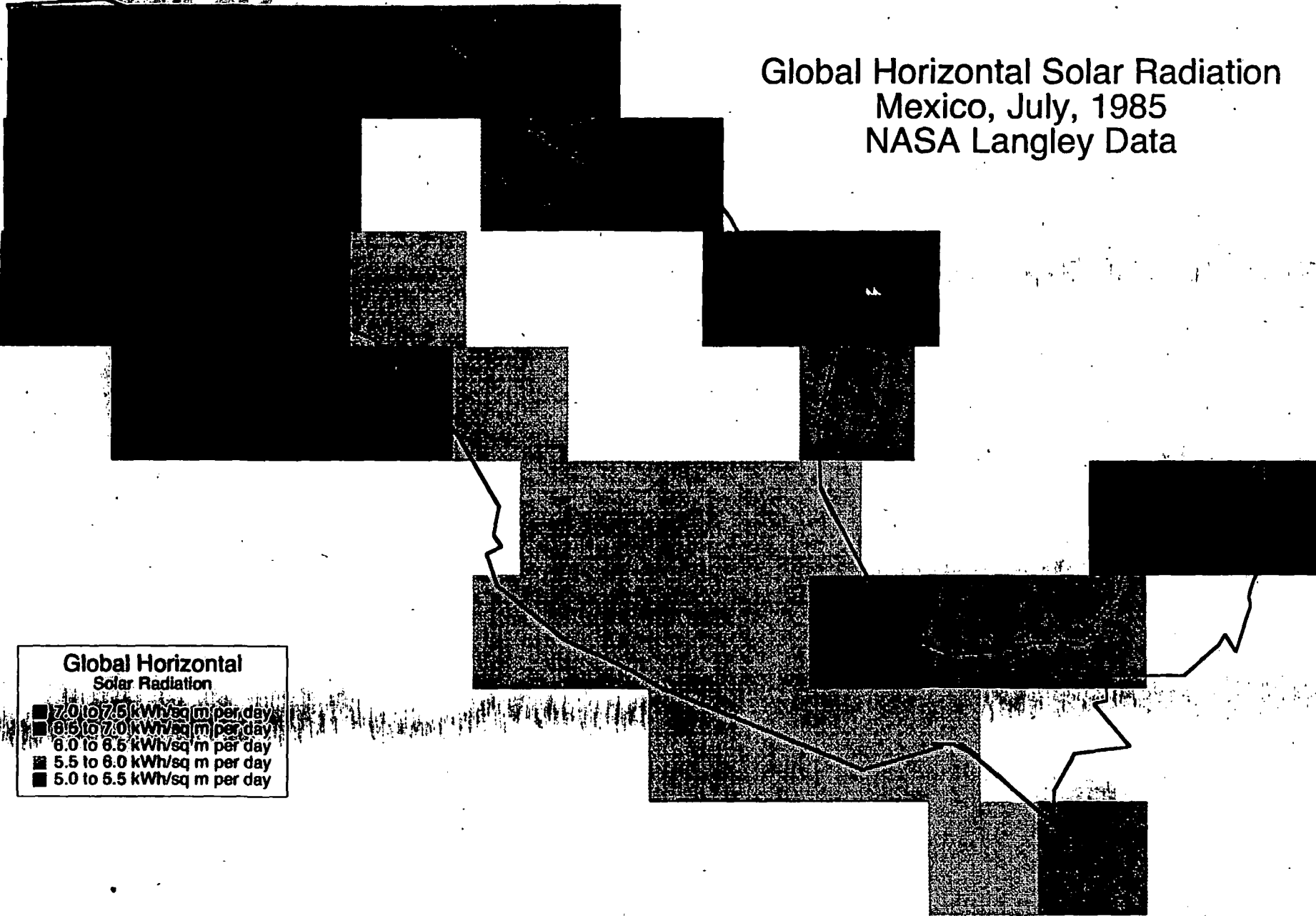


Resource Assessment

Global Horizontal Solar Radiation Brazil, July, 1985 NASA Langley Data



Global Horizontal Solar Radiation
Mexico, July, 1985
NASA Langley Data



Global Horizontal
Solar Radiation

- 7.0 to 7.5 kWh/sq m per day
- 6.5 to 7.0 kWh/sq m per day
- 6.0 to 6.5 kWh/sq m per day
- 5.5 to 6.0 kWh/sq m per day
- 5.0 to 5.5 kWh/sq m per day

Renewable Energy Opportunities in China

Presented at the Office of Solar Energy Conversion
International Activities Review

by William Wallace
National Renewable Energy Laboratory

July 28, 1994
Colorado Springs, Colorado

*Sexy trip in Jan.
Bud's new priority*

Background

- NREL/U.S. ECRE Trip to China
 - Supported by U.S. DOE and the UNDP
 - Represented the Office of Solar Energy Conversion
 - Established contact with key individuals in Beijing Commissions, Ministries, and key research institutes
 - Very high level of interest in Sino-American cooperation for joint renewable energy development in China
- Follow-on Activities Since China Visit
 - High level visits from China to the U.S. DOE (March/April)
 - World Bank renewable energy mission to China in March
 - Return visit by CAS to U.S. in April
 - Visits at U.S. DOE, World Bank, U.S. Senate, NREL, several utility companies
 - Continued discussions in Beijing/Inner Mongolia in June
- Other Recent Activities
 - Beijing Energy Efficiency Center established by SPC/PNL in December 1993
 - ORNL has established an IRP project in Hainan

DOE Interest in China

- Office of Fossil Energy
 - Acting Assistant Secretary, Jack Siegel, has made several trips to China, culminating in a major industry tour in June of 1993 (resulted in a series of recommendations to the Secretary of DOE)
 - China will be largest power market in the world over the next decade with addition of 100 GW of new generating capacity (mostly coal-fired steam turbines)
 - Number of provincial energy delegations have visited U.S. to negotiate construction and power contracts
- Umbrella Agreement
 - Signed with the State Science and Technology Commission in 1979
 - Visit by Song Jian at DOE (April 11), Commissioner of SSTC
 - Clean Coal Protocol agreement signed at DOE
 - Renewable energy and energy efficiency protocol being developed
 - Visit by Shi Dinghuan at DOE (March 4), Director of Dept. of Industrial Technology at SSTC, presented a proposal to Annan for projects in Tibet
 - Secretary O'Leary to visit China in mid-summer (now early 1995)

Objectives

- To promote the incorporation of renewable energy in high level strategic planning processes at the central and provincial government levels through cooperative actions with key decision makers
- To promote the development of sustainable renewable energy applications and markets in China and market opportunities for U.S. industry
- To promote the interests of U.S. industry in developing market opportunities and joint venture business opportunities in China

Renewable Energy Protocol Discussion

- **Sustainable Development**
The U.S. DOE is interested in working cooperatively with China promote the use of renewable energy technologies in sustainable development activities: for economic development; mitigation of environmental impacts; and as an alternative to fossil fuels contributing to the electrical generating capacity mix of China.
- **World Bank**
The U.S. DOE will work cooperatively with the World Bank to obtain loan financing for viable commercial renewable energy development opportunities.
- **Rural and Urban Development**
We see opportunities for the contribution of renewable energy technologies for the rural electrification and economic development of remote areas in China far away from electrical grids, and as a contributor to the electrical generating capacity for urban centers in grid-connected applications
- **Renewable Energy and Energy Efficiency**
RE and EE go together to achieve the maximum benefits in overall end-use efficiencies, minimizing energy use, and producing clean energy to mitigate environmental impacts.

Approach/Status

- Develop strategic relationships at central government and provincial levels, including government agencies, institutions, and the private business sector (e.g., Hainan, Inner Mongolia, and Gansu)
- Market Identification and Segmentation
- Specific Proposed Activities
 - Renewable Energy Center in Beijing
 - Renewable Energy Policy/Project Assessment
Focus on Inner Mongolia at provincial level
 - Rural Electrification in Western China (SELF Project)
 - Renewable Energy Development in Tibet
- Chinese Research Team for Renewable Energy Study Project
 - State Planning Commission
 - State Science and Technology Commission (Support)
 - Ministry of Electric Power
 - Chinese Academy of Sciences
 - Beijing Solar Energy Society
 - Beijing Petrochemical Development Co.
 - Eighteenth Research Institute of Electronics Ministry
 - Tianjin Institute of Power Sources

Future

- Start the Renewable Energy Policy/Project Study
- Interface with the Secretary's Trip to China
- Renewable Energy and Energy Efficiency Protocol Agreement
- Collaboration with the World Bank and U.S. Industry
- Assess Project Opportunities

PV Markets and Project Opportunities in China

- Remote/Telecommunications
 - Current cost-effective application; represents $\sim 1/3$ of module sales
 - Microwave relay and satellite ground stations; TV transmission; telephones
 - 100 W to 5 kW requirements
 - Will grow with China's high priority of improving communication system
- Remote Village Power/Agricultural Applications
 - Over 120 million people have no access to electricity, mainly western China
 - Over 300 coastal islands have no power or potable water
 - Good match between solar resource and need, also overlaps wind resource
 - SELF project in Gansu Province
 - Funded by the UNDP, Rockefeller Foundation, State Council and Province
 - 30 W systems to power lights, radio, television
 - First 100 systems installed using local infrastructure
 - 1000 home self-supporting project expansion planned
 - Large scale village power systems (10-30 kW in size)
 - Up to 9 such systems to be installed in Tibet (2 built)
 - Four 10 - 20 kW systems installed in China
 - Ministry of Agriculture "100 County" pilot project

PV Markets and Project Opportunities in China

- Demonstrations in Planning Stage
 - Controlled by State Planning Commission, State Science and Technology Commission, State Economic and Trade Commission, and Ministry of Electric Power
 - Up to three 100 kW systems under consideration (remote and grid-connected)
 - Remote 1000 home project, 100 W each
 - Residential grid-connected roof-top project (modeled after German 1000 home project), 500 homes 1-5 kW each
 - PV/wind hybrid system
- Manufacturing
 - Current Status: 5 MW production capacity, annual production ~1 MW
 - Desire to acquire polycrystalline and single crystal silicon technology
 - SSTC company wants to acquire thin-film production technology
 - Also need for technical and management training assistance
 - Balance-of-system components

Summary of China Trip
Supported by DOE's Office of Solar Energy Conversion (EE-OUT)
April, 1994

Trip: Visit to Beijing, and to Haikou/Sanya in Hainan Province during two weeks from January 23 through February 5, 1994. A trip report is available.

Personnel: Dr. Robert Stokes, Deputy Director of NREL, Team Leader
Ms. Judith Siegel, President, U.S. Export Council for Renewable Energy
Dr. William Wallace, Photovoltaics Division, NREL
Dr. Simon Tsuo, Basic Sciences Division, NREL

Representation: Represented NREL, the U.S. renewable energy industry on the trip. Robert Annan, the Director of the Office of Solar Energy Conversion in DOE, authorized the team to represent his office on the trip.

Objectives: i) Establish contact with key individuals in the central government in Beijing Commissions, Ministries, and research institutes having significant responsibility for renewable energy programs in China, ii) Assess the potential for developing cooperative programs with China for promoting renewable energy technology development and commercialization and identify potential cooperative activities, and iii) Assess specific renewable energy cooperative projects in Hainan Province at the invitation of the Chinese Academy of Sciences.

Organizations Visited:

Beijing: (Organization and Key Contact)

U.S. Embassy (Marco DiCapua)
United Nations Development Program Office in Beijing (Gong Tingrong)
Government officials in the State Council (Sun Honglie)
Chinese Academy of Sciences (Li Xiuguo)
State Science and Technology Commission (Zhang Guocheng)
Ministry of Electric Power (Yin Lian)
Ministry of Agriculture (Deng Keyun)

During a symposium organized for our visit, the following organizations were represented and contacted:

1. Tianjin Institute of Power Sources (Li Wen Zi)
2. The Sixth Research Institute of the Ministry of Electronics Industry (Wang Siheng)
3. Beijing General Research Institute for Non-Ferrous Metals (Lin Anzhong)
4. Beijing Solar Energy Research Institute (Zhou Shuai Xian)
5. The China International Center for Economic & Technical Exchanges (Yuan Qui Hui)
6. The 9th Semiconductor Device Factory of Beijing (Liu Tie Yong)
7. Chinese Academy of Sciences (Li Xiuguo)
8. Beijing East-Asia International Economics Institute (Ding Chenglong)
9. Hainan East-Asia PV Industries Corporation (Gu Ningke)

Hainan: (Organization and Key Contact)

We met several groups at the provincial and municipal levels. Key ones included:

1. Vice Governor of Hainan (Liu Ming Chi)
2. Party Commission Chairman of Sanya City (Zheng Wan)
3. International Advisory Committee (IAC) for the Economic Development of Hainan in Harmony with the Natural Environment (Huang Zongdao)
4. Hainan Department of Environment and Natural Resources (Zhang GeQuing)
5. Hainan Economic Cooperation Department (Xiao Ceneng)
6. Hainan Electric Power Industry Bureau (Xu Xiao Min)
7. Hainan East-Asia PV Industries Corporation (Gu Ningke)

Follow-On: i) A number of agencies (State Science and Technology Commission, Ministry of Electric Power, Ministry of Agriculture, Chinese Academy of Sciences, etc.) expressed a strong desire to work cooperatively with the Department of Energy, the U.S. Renewable Energy Industry, and NREL in developing renewable energy for China. General areas of desired cooperation included:

- Integrated resource planning and renewable energy technology and policy assessments,
- Collaborative Sino/U.S. identification of renewable energy projects,
- Pursuit of joint projects with the World Bank and other multilateral funding agencies,
- Development of renewable energy commercial opportunities, demonstration projects, and advanced technology transfer in cooperation with U.S. industry.

These results were transmitted in debriefings to DOE and the World Bank to:

- Robert Annan, Office of Solar Energy Conversion, EE
 - Loretta Schaeffer and Anil Cabraal (Asia Technical Department), Ernesto Terrado (Industry and Energy Department) and Takamasa Akiyama (International Economics Department) at the World Bank
 - Trip report was extensively circulated
- ii) NREL agreed to collaborate with the Chinese Academy of Sciences in the development of a renewable energy policy assessment project (in progress).
- iii) There was a strong desire expressed by the Hainan Provincial Government and the International Advisory Committee in Hainan for assistance in a renewable energy assessment for the province. NREL will also give technical assistance to a private sector group in Hainan for a village and building-integrated PV demonstration project in Hainan.

Other Significant Activities Related to China:

- i) Shi Ding Huan, Director of the Department of Industrial Technology of the State Science and Technology Commission, visited DOE on March 4. This was a precursor visit to that of Song Jian. A renewable energy proposal from the State Science and Technology Commission was presented to Robert Annan during this meeting.
- ii) On April 11, a state visit was conducted by Song Jian, Commissioner of the State Science and Technology Commission and a high level member of the State Council in China, to meet with DOE and Secretary O'Leary. A Clean Coal Technology protocol agreement was signed by DOE and the SSTC. Based on our visit to China, Song Jian also came prepared to discuss renewable energy and energy efficiency.
- iii) In December, 1993, PNL, LBL and the World Wildlife Fund established the Beijing Energy Efficiency Center (BECon) in Beijing managed by Zhou Dadi. BECon was established through the Energy Research Institute of the State Planning Commission in Beijing and is devoted to supplying information for energy efficiency technologies; assisting U.S. industry in China, cooperative policy development with the Chinese government, and performing special projects (e.g., IRP policy analysis). PNL would like to include renewable energy technology in BECon, and the EPA in collaboration with OSEC at DOE is considering funding this activity. Contact Jessica Hamburger (202/646-5207).
- iv) Neville Williams has established a rural electrification project in Gansu Province in China through the non-profit Solar Electric Light Fund with funding from the Rockefeller Foundation in the U.S. and the State Council and Gansu Provincial government in China. The project has electrified over 100 homes in remote rural villages with small PV/battery systems capable of powering a fluorescent light, radio, and television set. An expanded project of 1000 homes is in development. SELF has directly attacked the major infrastructure barriers to rural electrification in China, including local financing, affordability, local training for maintenance, and revenue collection. DOE's OSEC is considering assisting SELF in an expansion of the project. Contact Neville Williams (202/234-7265).
- v) Ernesto Terrado and Anil Cabraal (see above) visited China in March, 1994 to assess the status of renewable energy in China and explore the development of World Bank loan programs for renewables in China. The State Planning Commission will be forming technology teams to develop projects for the Bank's consideration through the pre-feasibility study mechanism and the World Bank will send technical experts to China to assist these technology groups. DOE's OSEC is working with the Bank.
- vi) China is being very aggressive in promoting foreign investment in the conventional electrical power market in China. Over 100 GW of new electrical generating capacity will be added by the year 2000, most being coal-fired steam turbines. During the first quarter of 1994, a number of Chinese provincial energy officials led by the Ministry of Electrical Power visited the U.S. to discuss power plant projects with U.S. vendors. Examples include: i) a PNL/LBL delegation in Washington, D.C. during March 1-3, ii) a DOE sponsored delegation in Oak Ridge on April 22, iii) a Ministry of Electric Power delegation associated with the "Power Generation in China Conference" in Atlanta, March 23-25, and others. Recently, the Lieutenant Governor's Office in California led a state delegation to China to explore conventional and renewable energy projects developed by BCS, Inc. (Ken Boras 410/997-7778).

Contact William Wallace (NREL, 303/384-6476) for further information.

SOLAR THERMAL ELECTRIC & BIOMASS POWER

PROGRAM OVERVIEW

INTERNATIONAL

GARY BURCH

July 28, 1994

BACKGROUND

- **THERE ARE THREE SOLAR THERMAL SYSTEMS TO BE MARKETED:**
 - **SOLAR TROUGHS**
 - **DISH/ENGINES**
 - **POWER TOWERS**

- **THERE ARE FIVE BIOMASS POWER SYSTEMS TO BE MARKETED:**
 - **COFIRING**
 - **GASIFIERS**
 - **ADVANCED DIRECT COMBUSTION**
 - **BIOCRUDE**
 - **SMALL FARM/FUEL CELLS**

- **EACH HAS A DIFFERENT TIME COURSE**

- **SOLAR THERMAL IS A PRODUCTION-RATE-SENSITIVE TECHNOLOGY**

- **FULLY INTEGRATED BIOMASS POWER REQUIRES MULTIPLE AND DIVERSE PLAYERS**

- **PROGRAM DEVELOPMENT HAS SEVERAL STEPS:**
 - **TECHNOLOGY DEVELOPMENT AND DEMONSTRATION**
 - **FIRST COMMERCIAL PROTOTYPE SYSTEM**
 - **MARKET DEVELOPMENT**

OBJECTIVES/APPROACHES

● OBJECTIVES

- **DEFINE DOMESTIC AND INTERNATIONAL MARKET OPPORTUNITIES TO ENHANCE INTRODUCTION OF TECHNOLOGY:**
 - **SOLAR THERMAL---SO PRODUCTION RATE WILL YIELD ECONOMIC VIABILITY**
 - **BIOMASS POWER---TO DEMONSTRATE TECHNICAL AND ECONOMIC FEASIBILITY OF FULLY INTEGRATED SYSTEMS**

● APPROACHES

- **COST-SHARE AND/OR SUPPLY FINANCIAL INCENTIVES IN U.S. FOR DEMONSTRATION AND FIRST COMMERCIAL PROTOTYPE SYSTEMS**
- **SUPPORT INDUSTRIES' EARLY CONTACTS WITH FOREIGN GOVERNMENTS TO CONSIDER PROJECTS**
- **WORK WITH WORLD BANK AND OTHER APPROPRIATE SOURCES OF EARLY-MARKET FUNDING**

STATUS

<u>TECHNOLOGY AREA</u>	<u>TECHNOLOGY AVAILABILITY</u>	<u>MARKET DEVELOPMENT</u>	<u>1st COMMERCIAL PROTOTYPE</u>
<u>SOLAR THERMAL</u>			
• SOLAR TROUGHS	1994	INDUSTRY STUDIES-1995 FOREIGN CONTACTS-1995	CURRENTLY OPERATING: NINE SEGS PLANTS(354MW) NEV. TEST SITE-1997
• DISH/ENGINES REMOTE-7.5kWe	1995	EVALUATE MEXICO-1994-95 NORTH AFRICA, INDIA (after MEXICO)	1996
UTILITY-25kWe	1997	VILLAGE/REMOTE POWER-1998 DISTRIBUTED POWER-1998	NEV. TEST SITE 1 MWe - 1998 10 MWe - 1999
• POWER TOWERS	1996-97	2000	NEV. TEST SITE 100-200MWe - 2000-02

STATUS (CONT'D)

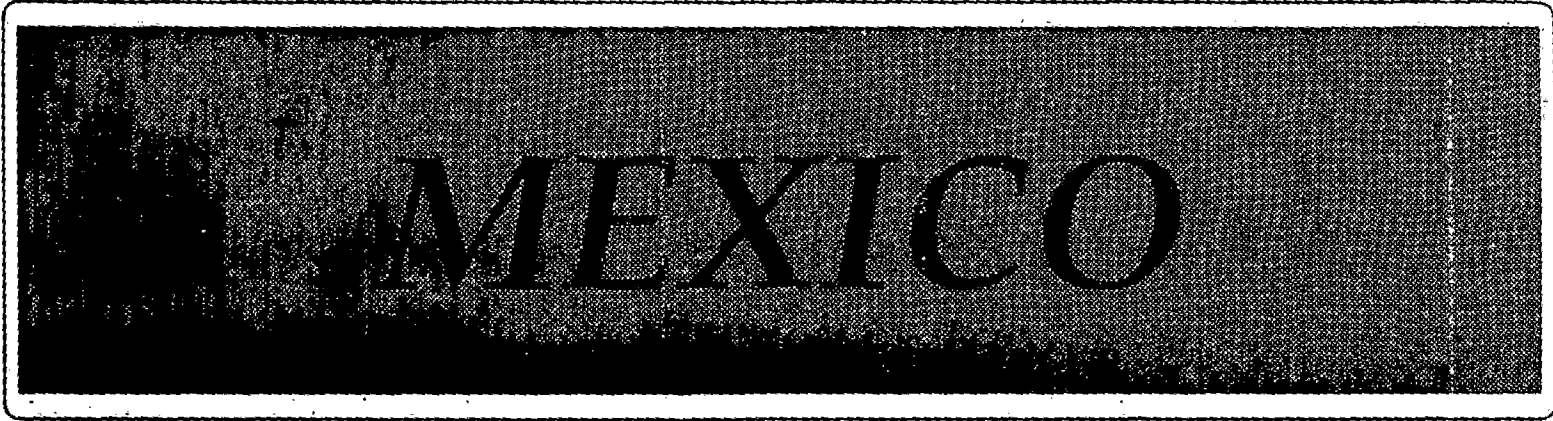
<u>TECHNOLOGY AREA</u>	<u>TECHNOLOGY AVAILABILITY</u>	<u>MARKET DEVELOPMENT</u>	<u>1st COMMERCIAL PROTOTYPE</u>
<u>BIOMASS POWER</u>			
• COFIRING	1994	NONE	TVA, SOUTHERN CO., NIAGARA-MOHAWK 1996
• GASIFIERS	1997-98	1996 FOR SMALL GASIFIERS	ALFALFA 1998-99 SWITCH GRASS COPRODUCTION PAPER/PULP INDUSTRY
• ADVANCED DIRECT COMBUSTION		1996	1998
• BIOCRUDE	1996-97	1995-96	KANSAS - 1996-97
• SMALL FARM/FUEL CELL SYSTEM	1996	1996	ALABAMA - 1998

FUTURE - *J.T. & BIOMASS* *(Burch)*

- DEVELOP AND DEMONSTRATE SYSTEMS
- SUPPORT INDUSTRY COMMERCIALIZATION EFFORTS
 - ✓ CUMMINS POWER GENERATION - 7.5kWe - MEXICO, CARIBBEAN, CENTRAL AMERICA
 - ✓ KJC - MEXICO, NORTH AFRICA, INDIA *to GEF*
Morocco - \$50M appx for troughs (80MW?) (Later NORTH AFRICA, INDIA, CHINA)
 - ✓ WESTINGHOUSE - [INDONESIA - *Integ. Power Corp. sm. pkged biomass units - very near term*]
 - ✓ OTHER STUDIES AS INDUSTRY SEEKS TO COMMERCIALIZE
- SUPPORT COUNTRY ASSESSMENTS *primarily by Winrock*
 - ✓ INDONESIA - SMALL BIOMASS UNITS
 - ✓ INDIA, CHINA - RICE PRODUCTION RESIDUE
 - ✓ INDIA, BRAZIL - SUGAR CANE
 - ✓ MEXICO, NORTH AFRICA, MIDEAST - 25 kWe DISH/STIRLING
 - ✓ MEXICO, NORTH AFRICA, MIDEAST - POWER TOWERS
- ESTABLISH TECHNOLOGY'S ACCEPTANCE BY FUNDING INSTITUTES (e.g., WORLD BANK, AID, ETC.)

INTERNATIONAL TECHNOLOGY DEVELOPMENT & EARLY MARKETS

<u>COUNTRY</u>	<u>TECHNOLOGY</u>	<u>DEVELOPMENT ACTIVITY</u>
● GERMANY	DISH/ENGINE	RECEIVER FOR BRAYTON ENGINE
● ISRAEL	DISH/ENGINE	RECEIVER FOR BRAYTON ENGINE
	POWER TOWER	HELIOSTAT MARKET
● SPAIN	POWER TOWER	VOLUMETRIC-AIR RECEIVER
	POWER TOWER	INTERNAL FALLING-FILM MOLTEN SALT RECEIVER



SANDIA DAC Programs in support of DOE and US/AID

*- look at A21st strategy
can use?*

*A21 + CORRECT + DSECM #600-
Grid Support / Distrib. Utility #800K*



MEXICO

STATUS

- ▶ US industry has strong presence (helped by DOE-e.g., SOLAREX)
- ▶ Draft agreements await signatures (DOE/SEMIP & SNL/IIIE)
- ▶ University of Sonora collaborative program
- ▶ FIRCO Sonora (\$500K): 7-10 PV water projects by 12/94 - *1st RFP's next week*
- ▶ Chihuahua RE Working Group (\$500K): 15-20 PV water projects by 12/94
- ▶ *National Financing Agency*
NAFINSA/FIDEAPECH 10:1 financing agreement (\$100K) in place by 11/94
AD #10
- ▶ Protected Areas Management (\$500K): 10 projects; workshop 8/94
- ▶ Chihuahua/Sonora Water Pumping workshops 9/94
- ▶ Cost-shared market survey being done with Cummins Solar Thermal *States of Baja & Sonora*

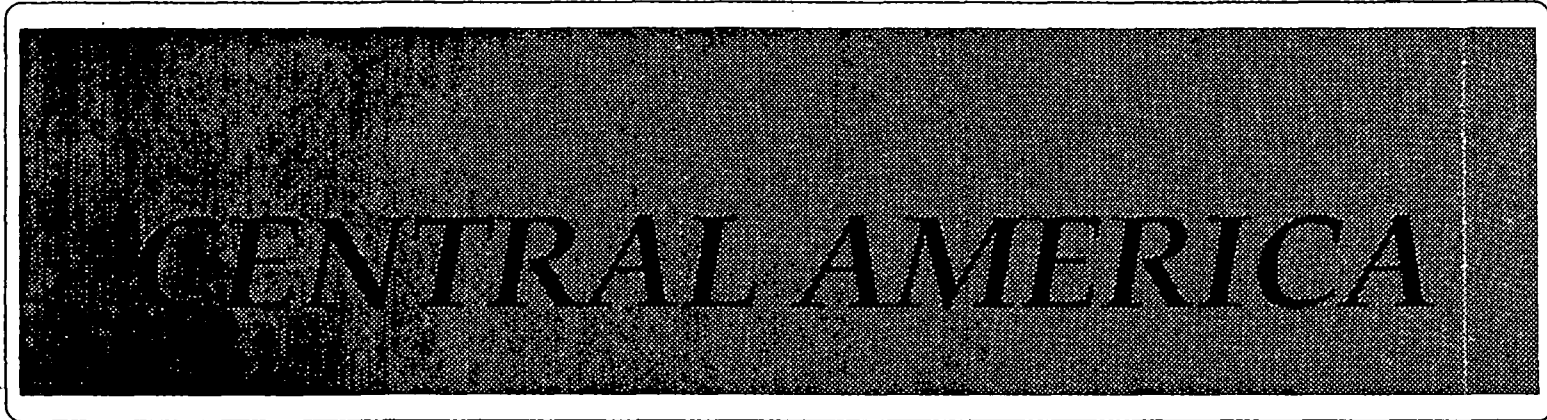


MEXICO

FUTURE

- ▶ **US AID Renewable Energy program to result in \$2.5M in hardware with \$2-10M estimated leveraging by 1996**
- ▶ **PRONASOL, World Bank and End-User Financing mechanisms may result in additional \$50M - \$100M for RE products.**
- ▶ **US ECRE position is that Mexico is a mature market best left to the private sector.** - For PV; illum & telecom. now water pumping by end of current progs.
mostly small-scale stuff now.
- ▶ **DOE program efforts to reduce, post-AID program, to selected technical assistance, project monitoring and training activities covered by agreements.**





**SANDIA DAC Programs in support of
DOE/OSEC AND CORECT/A21**

MAX HARCOURT





CENTRAL AMERICA



BACKGROUND

- * Sandia (DOE/OSEC and CORECT) program initiated in 1991 with Enersol SO-BASEC model in Honduras. Expanded to NRECA/CARES renewable component in 1992.
- * National Renewable Energy Working Groups formed in Guatemala, Honduras, Costa Rica, Nicaragua and El Salvador.
- * 15 million people have no electricity in Central America. Currently a regional electricity crisis exists due to drought and increasing demand.
- * There is a growing public sector interest in RE programs, and the private sector infrastructure in renewable energy technologies is increasing rapidly.



CENTRAL AMERICA



OBJECTIVES

- * Accelerate the acceptance and appropriate sustainable use of renewable energy technologies.
 - Educate and train key decision makers in government, utilities, private sector, and non-governmental organizations.
 - Help form RE working groups to coordinate support, disseminate information and implement projects.
 - Assist in implementing pilot projects by technical assistance, training and funding agency interface.
 - Assist in the development of local infrastructure by sponsoring community development, organization and training activities.
 - Access and educate environmentally focused groups and agencies to foster incorporation of RETs into their existing programs.

- * Facilitate the development of markets for US renewable energy products.
 - Work in close collaboration with ECRE, IFREE, SEIA and AWEA to ensure continuity and uniformity of implementation strategies.
 - Ensure complete access by US industry to Sandia activities in the region through trade association and direct communication.



CENTRAL AMERICA



APPROACH

- * Work through in-country agencies (NRECA, ENERSOL) to ensure stable, integrated base of operations.
- * Leverage DOE funds with those of other agencies (US AID, WINROCK, Private Donor Agencies, etc.) by accessing existing rural electrification and development programs, and inserting a renewable energy component.
- * Access the environmental community (US AID, WWF, TNC, CI, UN, etc.) by identifying protected area programs and educating local and international managers as to the benefits of RETs, in an environmental context, in their existing programs.
- * Access planning departments of national and municipal utilities to convince them that RETs have a place in their portfolios, and to assist them in implementing pilot projects.
- * Access government agencies (ministries of energy, health, natural resources) to educate planning and decision making officials, to ensure favorable policy treatment for RETs and their associated equipment, and to access public sector programs.



CENTRAL AMERICA



STATUS

- * Active RE Working Groups formed in Guatemala, Honduras, Costa Rica, Nicaragua and El Salvador.
- * Over 50 key decision makers trained and involved in use of RETs.
- * Two national utilities (EEGSA, ICE) and several municipal utilities (San Marcos, Coopesantos, etc.) have implemented pilot photovoltaic projects.
- * Protected Areas and National Parks are incorporating RETs (Tikal, Pico Bonito)
- * Numerous private sector and private development organizations have PV programs (PLAN International, US Peace Corps, COMARCA, CSJB, FEDECOH, ADEHJUMUR, etc.).
- * US AID water system design engineers in Honduras and Guatemala have been trained in PV and wind water pumping.
- * Over 300 PV systems are already installed in Honduras, >30 in Costa Rica, >300 in Guatemala. Over 1000 systems are being installed.
- * University programs established with Universidad del Valle, Universidad San Carlos, and the University of Honduras.
- * System performance and solar/wind resource monitoring programs are in place.
- * Local RE distributors are proliferating (48 in 5 countries), and most sell US products.



CENTRAL AMERICA



FUTURE

- * Expected linear expansion of Guatemalan, Honduran and Costa Rican programs. 3000 systems expected by the end of 1995.
- * Accelerated work with REWG's in Nicaragua and El Salvador.
- * Funding of ENERSOL proposal will result in 100:1 leveraging.
- * \$1.5 million program being planned with FHIS/IDB in Honduras.
- * As peace treaty is signed with Guatemalan rebels, the government is planning on using RETs for rural electrification. This is a potentially \$2 million program.



The Deputy Secretary of Energy

1000 Independence Avenue., S.W.

Washington, D.C. 20585

(202) 586-5500 • FAX (202) 586-0148

November 3, 1993

MEMORANDUM FOR **BOB SAN MARTIN**
FROM: **BILL WHITE** *BW*
SUBJECT: **GEOHERMAL DEVELOPMENT IN COSTA RICA**

As you know, Costa Rica is an amazing country, with 5 percent of the world's known species. It plans to increase its hydroelectric generating capacity by 5 percent a year. Environmental groups active within the company fear that they will need to damn up all of their wild rivers to do this.

Geothermal energy is an alternative. There are a number of active volcanoes. There are two geothermal projects being put in. Attached is a memo from an economics officer within our Embassy concerning two projects, Miravalles I and II. Currently they are both planned to be 55 megawatt plants. I find it hard to believe that no American firm can effectively compete with the technology offered by Mitsubishi.

I would like to use this as a test case to evaluate whether we can mobilize a plan for cracking a foreign market. This can be a real win both for American commerce and for the environment. Please give me your thoughts on this and a potential action plan.



M E M O R A N D U M

Tel. 506-20-39-39

COPY
Mike

To: Ben F. Fairfax, Econ Counselor
From: J. M. Quirós, Econ Section *JM*
Subject: COSTA RICA ENERGY SECTOR; ADDITIONAL NOTES
Date: 1 November 1993

Three large energy projects are scheduled to start construction during 1994 and 1995. These are:

The MIRAVALLS GEOTHERMAL PROJECT, phase II. Costa Rican Institute of Electricity (ICE). A 55 megawatt geothermal electricity generating plant located in Guanacaste province, next to Miravalles I, an identical project. Estimated value USD 94 million. To be financed by the Inter-American Development Bank (IDB).

Miravalles I is under construction. The bid was awarded to Mitsubishi Corporation for a total cost of 553 million yen (USD 55 million) in September 1992. The bid included financing by the Japanese Government. Only Japanese companies made offers (Mitsubishi, Toshiba and Fuji). The Italians, although they manufacture geothermal plants of this and larger sizes, did not make an offer.

Elliott Corp., a Pennsylvania company, was interested in participating in the bidding in Miravalles I, and is interested in Miravalles II. However, the largest unit it manufactures has a capacity of only 27.5 megawatts. It would participate in Miravalles II if ICE and IDB (the source of financing) were to accept two 27.5 MW units in place of the larger units.

However, ICE officials have informed the Embassy that the IDB financial contract does not allow for changes, unless new feasibility studies were to be submitted by ICE, which would take up to six months and thus delay the project. ICE officials seem to be interested in U.S. participation, if only to force the Japanese and Italians to lower their prices.

ANGOSTURA HYDROELECTRIC PLANT. Generating capacity 177 MW. Estimated value USD 350 million. The request for tenders is being prepared by ICE. IDB is to finance this project.

WIND-DRIVEN (AEOLIC) ELECTRICITY GENERATING PLANTS. 20 MW capacity. Approximate cost USD 40 million. IDB to finance. The request for tenders is being prepared by ICE.

Mike

2

DIRECCION
DE LEGISLACION
Y REGISTRO
DE LA
REPUBLICA DE COSTA RICA

COSTA RICAN LAW AUTHORIZING
AUTONOMOUS OR PARALLEL
ELECTRICITY GENERATION

(English Translation)

Law No. 7200

As Published in La Gaceta
October 18, 1990

Translation by IDEA Inc. for A.I.D. Office of Energy

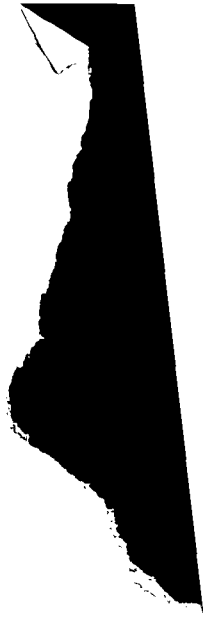
RENEWABLE ENERGY AND ENVIRONMENT PROGRAM
WINROCK INTERNATIONAL INSTITUTE FOR AGRICULTURAL DEVELOPMENT
1611 N.KENT ST. SUITE 600
ARLINGTON, VA 22209
TELE: (703) 525-9430 FAX: (703) 243-1175

THE LEGISLATIVE ASSEMBLY OF THE REPUBLIC OF COSTA RICA

DECREES:

LAW THAT AUTHORIZES AUTONOMOUS OR PARALLEL ELECTRICITY
PRODUCTION

- Article 1: Autonomous or parallel generation is defined as the electrical power produced by electric plants of limited capacity, owned by private enterprises and rural electrification cooperatives which can be integrated into the National Electric System.
- Article 2: Plants of limited capacity are defined as hydroelectric plants, and those that are non-conventional, which do not surpass 20,000 KW.
- Article 3: It is declared to be of public interest the purchase of electrical power by the I.C.E. from rural electric cooperatives, and those private enterprises in which at least 65% of the social capital belongs to Costa Rican citizens, that have established central electrical plants of limited capacity for the exploitation of hydraulic potential on a small scale, and also from non-conventional sources of energy as long as these have previously not been part of the national electrical system.
- Article 4: Conventional sources of energy are defined as all those that utilize hydrocarbons, mineral coal, or water as their basic elements.
- Article 5: The National Electricity Service (SNE) will reserve the right to grant concessions for the development of electric plants of limited capacity up to a maximum of 20,000 KW, and for a time period not exceeding 15 years. The SNE will reserve the right to make extensions, modifications, or transfers without requiring legislative authorization. However, legislative authorization is required when the operation surpasses the 20,000 KW limit, or when it is less than 20,000 KW and the party has other approved concessions which, with the additional capacity, surpasses said quantity.



What has been established in the preceding paragraph in reference to the limit of kilowatts will also be apply to concessions granted to fiscal or judicial parties not considered in Articles 1 and 2 of this law.

Article 6: To grant a concession to develop an electrical plant of limited capacity, the National Electricity Service, in addition to what has been stipulated in Law 258 of the 18th of August of 1941, should demand an account of eligibility granted by the Costa Rican Electricity Institute. Such account of eligibility must be provided within a time period not exceeding 120 days from the day of presentation.

Article 7: The L.C.E. is enabled to deem eligible a project for the development of an electrical plant of limited capacity as long as the potential for parallel generation does not exceed more than fifteen per cent of the combined power of the electric plants of the national electric system. Moreover, L.C.E. may refuse applications that will interfere with a project(s) or concession(s) which have already been granted or are being processed.

Article 8: In addition to an account of eligibility to which Article 6 refers, in regards to electrical plants of limited capacity larger or equal to 2,000 KW, the interested party should present to the National Electricity Service a certification of approval of an environmental impact assessment conducted by an expert in the field, which should be presented to MIRENEM for approval or refusal within a time period of sixty (60) days from the time of its presentation.

Article 9: The final decision made by the Department of L.C.E. in charge of the account of eligibility, and the Department of MIRENEM in charge of the environmental impact assessment, is appealable through the respective superior hierarchy within fifteen days after their notification.

Article 10: The environmental impact assessment, to which Article 8 of this law refers, will include at a minimum the following:

- a) Indication of the possible impact by the activity on the natural and human environment.
- b) The inevitable adverse effects if the activity is carried out.
- c) The sustained effects on the flora and on the fauna, pointing out the effects on the vegetation, the soil, animals, and the quality of the water and air.
- c.b) Determination of specific areas that will suffer deforestation, if that is the case.
- d) Quantity of possible waste material generated.
- e) Effects on population and human settlement.
- f) Programs for reforestation, control of soil erosion, control of water and air contamination, and plans for waste handling.
- g) Contingency plans to prevent, detect and control adverse effects on the ecosystem.

Article 11: To ensure the accomplishment of the programs of control and environmental recuperation, the grantee should submit, with the provisioned contract, an unconditional guarantee of accomplishment in favor of MIRENEM, equivalent to four per cent of the project's value during the period of its construction and will be held in force for a period of one year from the time the project went into operation. Said guarantee will be reduced to an amount equivalent to one per cent of the project's value and will be held in force during the period of the concession. These percentages can be adjusted by MIRENEM in accordance with the quantification of potential damages which will be determined by the environmental impact assessment. This guarantee should be emitted by any of the banks of the National Banking System, or by The National Insurance Institute to MIRENEM's satisfaction, and this guarantee may be executed partially or totally by the above mentioned ministry, as soon as it is shown that a damage is done and that it has not been mitigated by the autonomous producer. MIRENEM can execute directly and officially or through contract, corrections to any environmental deterioration or damage that may

originate in relation to a granted electrical concession. If at the end of the concession the guarantee has not been executed, it will be returned partially or totally, whatever the case may be.

Article 12: It is MIRENEM's responsibility to establish the rules and conditions of any kind in order to protect the fulfillment of the program of environmental control and recuperation of the electrical plants of limited capacity. In case that the grantees do not adhere to the conditions established by MIRENEM, the National Electricity Service, by request of MIRENEM, may declare the expiration of the concession.

Article 13: The Costa Rican Electricity Institute will be authorized to subscribe contracts for the purchase of electric power, as part of its normal activities, which should be ratified by the S.N.E. in accordance with what has been set forth in Law No. 258 of the 18th of August, 1941.

Article 14: The tariffs for the purchase of electric power by I.C.E. require establishment of a fixed price on the part of the National Electricity Service, which prior to the issue of a final resolution will solicit the opinion of the affected concessions. I.C.E. will present requests for tariff changes on each occasion, these changes should be the most favorable to the public consumer, within the principle of avoided capital and operating costs of the interconnected National System using national economic criterion. Periodic adjustments of tariffs included in the buy and sale contract, will take into account the usual factors of variation of costs, monetary devaluation, local inflation, and other contingencies, and these adjustments will be executed by an automatic formula established by The National Electricity Service. These adjustments and prices do not require the approval of the Executive Branch. The structure of prices will consider the characteristics of energy supply by electric plants of limited capacity.

Article 15: The electricity purchased will be the surplus that the producer has at a measured point after having supplied his own necessities.

Article 16: The Central Bank has the authority to exceed the maximum limit of credit in the case of loans granted by commercial banks for the development of industries that have been selected, and to those who are interested in fabricating the electromechanical equipment necessary for electricity plants of limited capacity. To this purpose, the related operations will be exempt from what is set forth in Article 61, Clause 5) of the Organic Law of the National Banking System, and Article 85, clause 1, literal b, of the Organic Law of the Central Bank of Costa Rica.

Article 17: Private enterprises and rural electrification cooperatives, producers of autonomous or parallel electrical power, will enjoy the same exonerations as the Costa Rican Electricity Institute on the importation of machinery and equipment for the conduction of water, and to turbinate, generate, control, regulate, transform and transmit electrical power.

Article 18: Private enterprises and rural electrification cooperatives that supply electricity to the Costa Rican Electricity Institute in accordance to what has been established in this law can protect themselves under Article 7, clause 2 of annex 3, Law of Industrial Production Incentives of Law 7017 of the 16th of December, 1985.

Article 19: Private enterprises and rural electric cooperatives that supply electricity to the Costa Rican Electricity Institute in accordance to what has been established in this law can deduct loses from gross revenues, in the same manner as industrial enterprises do in accordance with that established in clause g of Article 8 of Law 7092 of the 21st of April, 1988, Law of Taxable Revenue.

Article 20: For the effects of this law, private enterprises are defined as those to which Article 3 of this law refers.

Article 21: Repeal Article 22 of Law 7131 of the 16th of August, 1989 (Special Budget of May 1989) and Article 7, of Law 258, of August 18, 1941 (Law of the National Electricity Service)

Article 22: The Executive Branch will regulate the present law within three months of its publication. The lack of regulation will not obstruct the application of the law.

Article 23: To be effective from the date of publication.

Sole Transitory - Solicitations for electricity concessions pending legislative approval will be governed by that established in Article 5 of the present law.

PRESENTED IN THE HALL OF SESSIONS OF THE COMMISSION OF GOVERNMENT AND ADMINISTRATION. San Jose, on the eight day of August, 1990.

Victor Evelio Castro Retana
PRESIDENT

Santana Esquivel Ramirez
SECRETARY

Reinaldo Maxwell Kennedy

Fernando Acevedo Hurtado

Alberto Esquivel Volio

Ovidio Pacheco Salazar

Sonia Rodriguez Quesada

Sigifredo Aiza Campos

Carlos L. Rodriguez Hernandez

DEPUTIES

ib.

Com. Gob. y Adm.

13 de agosto de 1990

DRAFT

ES - _____

MEMORANDUM FOR DEPUTY SECRETARY

FROM: Robert L. San Martin
Deputy Assistant Secretary for
Utility Technologies
Energy Efficiency and Renewable Energy

THROUGH: Frank M. Stewart, Jr.
Acting Assistant Secretary
Energy Efficiency and Renewable Energy

SUBJECT: Effective Competition by the U.S. Geothermal Industry in
Costa Rica

In response to your memorandum of November 2, 1993 on geothermal opportunities in Costa Rica, the Office of Utility Technologies has prepared an action plan to address the issues you have raised.

BACKGROUND

Instituto Costarricense de Electricidad (ICE), a national utility, is currently developing the Miravalles geothermal field in several phases. Phases one and two, now underway, will each culminate in the operation of a 55MW geothermal power plant. Exercising close control, the Costa Rican government, acts as its own general contractor, and subcontracts for specific parts of the project. (An attachment highlights the status of geothermal development in Costa Rica.)

Contracts are in place for the first phase of development and plant construction. In phase one, U.S. firms won contracts for well drilling and cementing and for the supply of well-head equipment. An Italian firm was selected for reservoir engineering and management and for power plant design. A Japanese firm, with strong support from its government, won a major contract for the steam turbine and generator for the first 55MW power plant. A predominant factor in this decision was the Japanese offer to provide 4 1/2% financing and an eight year grace period before initial payments. (An attachment describes the position of U.S. geothermal companies in international markets.) A reason for Italian success at obtaining contracts is vigorous support by their embassy in Costa Rica.

STATUS

The Costa Rican government now is preparing a package for the turbine and generator in the second phase of the project, and plans to release the package within three months. U.S. firms already have been chosen for the drilling and the reservoir engineering and management contracts. An Italian firm was selected to design the power plant, and an Italian or Japanese manufacturer is virtually certain to provide the turbine (see attachment on U.S. geothermal industry and international markets).

PLAN

To strengthen the chances for U.S. companies to obtain phase two contracts, the Department should encourage strong support for their efforts by the U.S. Embassy at the highest levels of the Costa Rican government. This country has the geologic potential for many more geothermal power plants, which translates into a large potential market for U.S. geothermal technology in the next several years.

Through industry trade groups, EE-10 will continue to inform the U.S. geothermal industry about upcoming Costa Rican requests for proposal and related initiatives, and about potential business opportunities in other overseas energy markets.

EE-10 will offer to provide technical assistance to U.S. companies in the preparation of their bids for the Costa Rican work.

EE-10 will work with others in the Department to identify as much as \$150,000 for travel and other promotional costs to acquaint Costa Rican officials with the superior geothermal technology of U.S. companies.

EE-10 will furnish technical support (e.g. chemistry, corrosion control, scale inhibition technology) to U.S. firms bidding on these projects, and will continue for the duration of the contracts of winners. This will require laboratory testing and on-site field support estimated to cost \$500,000.

Attachments

Attachment 1

COSTA RICA

Official Name: Republic of Costa Rica

Area: 51,022 sq. km. (19,700 sq. mi.)

Capital: San Jose

Population: 2.6 million (1985)

Electricity Generation:

Installed Capacity: 866 megawatts (MW) (1990)

Hydroelectric: 724 MW installed: 3,764 GWh/yr utilization

Fossil: 142 MW installed: 1,056 GWh/r utilization

Electrical Utility: Instituto Costarricense de Electricidad (ICE)

Geothermal Potential:

A preliminary inventory of geothermal prospects was made in 1959. No further action was taken until a 1974 prefeasibility study of geothermal resources was funded by the Interamerican Development Bank (IDB). At that time, the Miravalles and Rincon de la Vieja prospects were selected for further study. Geological, geochemical and geophysical methods were used to identify a major area of geothermal potential in the region of La Union-Las Hornillas-La Fortuna, located on the southern slopes of Miravalles volcano. Subsequent drilling revealed a reservoir having a temperature of 240 °C and a total dissolved salt content of 6,000 parts per million. Since that time, 9 sq. km. of geothermal reservoir have been proved out of a total prospective area of 54 sq. km. Two U.S. firms participated in the early exploration work. No environmental impacts are expected from development at Miravalles that can not be mitigated using available technology.

In 1987, a survey of Costa Rican geothermal potential was begun by the Italian consulting firm Electroconsult using funding from the United Nations Development Program (UNDP). Using the results of this survey and earlier work, at least nine highly prospective areas have been identified aligned roughly northwest-southeast along the central volcanic axis of the country. Seven active volcanoes exist along this axis. The U.S. National Geothermal Association has estimated the potential for geothermal development in Costa Rica at 3,500 MW, sufficient to meet all of this country's needs and to provide export potential as well.

Projects for the construction of two 55 MW power plants are being undertaken at Miravalles. For Miravalles I, the field development, reservoir testing, and power plant design were contracted to Electroconsult. Drilling was done by Nabours Drilling (Texas), cementing was by Halliburton Services (Oklahoma), and well heads and valve were supplied by Foster Valves (Texas). Separators, pipelines, and plant structures were supplied by a Mexican company, and the turbine and generator were supplied by Mitsubishi (Japan).

U.S. Geothermal Industry and International Markets

There are several types of geothermal power plants, as noted below. A geothermal developer will choose the most cost-effective type, depending on the characteristics of the geothermal resource at a particular site. The primary determining characteristic is temperature:

- o High Temperature - 350° F or higher: If the geothermal reservoir produces dry steam, it is passed directly to a large (50-100 megawatt) turbine-generator set. If the reservoir produces hot water, it is flashed to steam, then passed to the turbine, as above. To improve the efficiency of a steam plant, a geothermal developer can convert it to a hybrid plant by adding a binary cycle plant (see below) to operate on the waste heat from the steam plant.
- o Moderate Temperature - below 350°F: Because of the reduced effectiveness of the steam turbine at the lower temperatures, developers use so-called binary cycle equipment. In these systems, thermal energy from the geothermal fluid is transferred to a secondary working fluid with a relatively low boiling point. This fluid, usually a hydrocarbon, is heated, expanded through a turbine, condensed and recycled in a closed loop. Binary cycle plants usually are built in modules of a few megawatts each and ganged together to increase output. Typically, these plants are modular, moveable, manufactured offsite and trucked in,

U.S. steam turbine manufacturers abandoned the field several years ago, licensing their technology to the Japanese. At present there are three Japanese manufacturers of geothermal steam turbines (Mitsubishi, Fuji and Toshiba). They compete in U.S. and international markets against a lone Italian company, Ansaldo. U.S. firms, however, are leaders in the relatively new binary cycle technology. Their only competition is from Ormat, an Israeli company. U.S. geothermal firms supplying binary cycle technology include the Ben Holt Company (now a subsidiary of California Energy Company), Barber-Nichols Engineering, and Ormat Power Systems, a U.S. subsidiary of Ormat.

Except for steam turbine equipment supply, U.S. companies have geothermal technology second to none in all aspects of geothermal resource development. In most international markets they have won major turnkey contracts to develop geothermal resources for power generation. These successes include the Philippine Islands, where Unocal, Magma Power (controlled by Dow Chemical) and California Energy Company have developed or are developing high quality geothermal resources, already totalling nearly 1000 megawatts and soon to exceed that figure substantially. Indonesia is another success story. There, Unocal, Magma Power and the Geothermal Power Company have contracts to develop over 1000 megawatts. These are high quality resources, but only the large turbine-generator sets themselves represent Japanese technology; the rest will be American. Other U.S. firms are experiencing success in Central America. The capital cost of building a typical geothermal plant in the U.S. is around \$3000 per kilowatt. Thus, 1000 megawatts represents a \$3 billion investment.

Although the Japanese have developed an advanced geothermal technology for domestic use, they have had limited success exporting it so far, except for the turbine-generator sets. Each of these in the 100 megawatt range represents an investment of around \$100 million, or about one-third of the capital cost of the entire geothermal system, including permitting, exploration, drilling, site development and plant costs. Thus, even with Japanese or Italian turbines, there are substantial business opportunities for American companies in international geothermal markets.

U.S. firms cannot offer government-subsidized rates to compete with those of other countries, but they have often found ways to get the business. One of the more successful is called BOOT, which stands for Buy - Own - Operate - Transfer. This concept creates a win-win situation between the developer and the customer. The developer provides all or most of the investment capital, develops the geothermal resource and builds the plant. He owns the plant and sells power to the host country, at agreed-upon quantities and prices. This continues for a fixed period of time, at the end of which ownership of the plant reverts to the host. The developer makes a profit and repatriates his capital. The host avoids any up-front investment and ends up owning the plant.

For the past several years, the Department has worked to open up these emerging international markets to the U.S. geothermal industry, and to encourage the industry to move into them. Much of this work was done in the early days of the CORECT program. One especially helpful project was a reverse trade mission that introduced foreign government energy officials to the U.S. geothermal community. Other U.S. companies currently active in overseas geothermal projects include Morrison-Knudson, Stone and Webster, and Trans-Pacific Geothermal.

The Department's geothermal research and development program, working closely with the industry over the past 20 years, has provided much of the advanced technology in exploration, drilling, materials and energy conversion that gives U.S. companies their present edge in international competition. Current EE-10 work includes two projects to demonstrate innovative approaches to the conversion of moderate-temperature geothermal heat to electric power. The Douglas Energy plant will be in California; the Exergy project will be in Nevada. Both are cost-shared, with industry paying well over half of the bills.

INTER-AMERICAN DEVELOPMENT BANK
INF/ENE

Date: January 18, 1994
To: Marshall Reed, Geothermal Division
Subject: Boruca Hydroelectric Project, Costa Rica
From: Gustavo Calderón, Especialista Principal ENE
Telephone: 202-623-1978
Telefax: 202-623-1304

The Instituto Costarricense de Electricidad (ICE) is proposing to install a 1500 MW hydroelectric project to increase electricity exports from Costa Rica to the other countries of Central America and Mexico.

1. The IDB so far has not committed in the financing of this project, nor has Costa Rica presented to the Bank a loan request for the project.
2. The status of the project is at the advanced feasibility level, including bidding documents. The feasibility study has to be updated since it was completed some 12 years ago. We do not have a copy of the study at the Bank.
3. There is not a schedule for the implementation of the project. Costa Rica is just promoting the project at the regional level, including Mexico.
4. Regarding future geothermal projects in Costa Rica, ICE is conducting with IDB financing, the feasibility study of Units 3 & 4 at Miravalles as well as feasibility studies at Rincón de la Vieja geothermal field. In addition, ICE, with an Italian grant and the revolving fund of the United Nations, plans a study at the feasibility level of the Tenorio geothermal field, including the installation of well-head units. In accordance with the updated "least cost expansion plan" the next power development program will consist of the Miravalles III project plus some other minor subcomponents.

I hope that the above information clarifies the Costa Rican situation.



Department of Energy
Washington, DC 20585

December 30, 1993

Dr. Gustavo Calderon
Energy Division
Interamerican Development Bank
Washington, DC

Dear Gustavo:

I greatly appreciated your helpful response to my request of November 17, 1993, for information on the Miravalles geothermal field in Costa Rica. DOE may be able to help promote the activities of U.S. geothermal companies in Latin America in the future. I would appreciate your help in gaining information about a new hydroelectric project.

I have recently heard that the Instituto Costarricense de Electricidad (ICE) has proposed to build a 900 MW hydroelectric project to increase the electricity exports from Costa Rica to other parts of Central America. I am afraid that such a large electrical generation project will hurt the chances for geothermal development in Costa Rica and nearby countries. Since you have expertise in hydroelectric developments, I expect that you may have some information about this project.

1. Will IDB be the source of financing for this project?
2. What is the status of this project, and have you already received a feasibility study for the project?
3. What is the development schedule for the project and the estimated completion date?
4. Does ICE plan to continue with any geothermal developments after the hydroelectric project begins?

Thank you again for your any information you might have. Please contact me by:

Marshall Reed
DOE Geothermal Division, EE-122
Washington, DC 20585
Telephone: 202-586-8076
Telefax: 202-586-5124

Sincerely yours,

A handwritten signature in cursive script that reads "Marshall".

Marshall Reed, Program Manager
Geothermal Reservoir Technology
Geothermal Division, EE-122

IN RECOGNITION

RESPONSE BY
RECEIVED

**COSTA RICAN LAW AUTHORIZING
AUTONOMOUS OR PARALLEL
ELECTRICITY GENERATION**

(English Translation)

Law No. 7200

As Published in *La Gaceta*
October 18, 1990

Translation by IDEA Inc. for A.I.D. Office of Energy

**RENEWABLE ENERGY AND ENVIRONMENT PROGRAM
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- Article 2:** Plants of limited capacity are defined as hydroelectric plants, and those that are non-conventional, which do not surpass 20,000 KW.
- Article 3:** It is declared to be of public interest the purchase of electrical power by the I.C.E. from rural electric cooperatives, and those private enterprises in which at least 65% of the social capital belongs to Costa Rican citizens, that have established central electrical plants of limited capacity for the exploitation of hydraulic potential on a small scale, and also from non-conventional sources of energy as long as these have previously not been part of the national electrical system.
- Article 4:** Conventional sources of energy are defined as all those that utilize hydrocarbons, mineral coal, or water as their basic elements.
- Article 5:** The National Electricity Service (SNE) will reserve the right to grant concessions for the development of electric plants of limited capacity up to a maximum of 20,000 KW, and for a time period not exceeding 15 years. The SNE will reserve the right to make extensions, modifications, or transfers without requiring legislative authorization. However, legislative authorization is required when the operation surpasses the 20,000 KW limit, or when it is less than 20,000 KW and the party has other approved concessions which, with the additional capacity, surpasses said quantity.

What has been established in the preceding paragraph in reference to the limit of kilowatts will also be apply to concessions granted to fiscal or judicial parties not considered in Articles 1 and 2 of this law.

Article 6: To grant a concession to develop an electrical plant of limited capacity, the National Electricity Service, in addition to what has been stipulated in Law 258 of the 18th of August of 1941, should demand an account of eligibility granted by the Costa Rican Electricity Institute. Such account of eligibility must be provided within a time period not exceeding 120 days from the day of presentation.

Article 7: The L.C.E. is enabled to deem eligible a project for the development of an electrical plant of limited capacity as long as the potential for parallel generation does not exceed more than fifteen per cent of the combined power of the electric plants of the national electric system. Moreover, L.C.E. may refuse applications that will interfere with a project(s) or concession(s) which have already been granted or are being processed.

Article 8: In addition to an account of eligibility to which Article 6 refers, in regards to electrical plants of limited capacity larger or equal to 2,000 KW, the interested party should present to the National Electricity Service a certification of approval of an environmental impact assessment conducted by an expert in the field, which should be presented to MIRENEM for approval or refusal within a time period of sixty (60) days from the time of its presentation.

Article 9: The final decision made by the Department of L.C.E. in charge of the account of eligibility, and the Department of MIRENEM in charge of the environmental impact assessment, is appealable through the respective superior hierarchy within fifteen days after their notification.

Article 10: The environmental impact assessment, to which Article 8 of this law refers, will include at a minimum the following:

- a) Indication of the possible impact by the activity on the natural and human environment.
- b) The inevitable adverse effects if the activity is carried out.
- c) The sustained effects on the flora and on the fauna, pointing out the effects on the vegetation, the soil, animals, and the quality of the water and air.
- c.b) Determination of specific areas that will suffer deforestation, if that is the case.
- d) Quantity of possible waste material generated.
- e) Effects on population and human settlement.
- f) Programs for reforestation, control of soil erosion, control of water and air contamination, and plans for waste handling.
- g) Contingency plans to prevent, detect and control adverse effects on the ecosystem.

Article 11: To ensure the accomplishment of the programs of control and environmental recuperation, the grantee should submit, with the provisional contract, an unconditional guarantee of accomplishment in favor of MIRENEM, equivalent to four per cent of the project's value during the period of its construction and will be held in force for a period of one year from the time the project went into operation. Said guarantee will be reduced to an amount equivalent to one per cent of the project's value and will be held in force during the period of the concession. These percentages can be adjusted by MIRENEM in accordance with the quantification of potential damages which will be determined by the environmental impact assessment. This guarantee should be emitted by any of the banks of the National Banking System, or by The National Insurance Institute to MIRENEM's satisfaction, and this guarantee may be executed partially or totally by the above mentioned ministry, as soon as it is shown that a damage is done and that it has not been mitigated by the autonomous producer. MIRENEM can execute directly and officially or through contract, corrections to any environmental deterioration or damage that may

originate in relation to a granted electrical concession. If at the end of the concession the guarantee has not been executed, it will be returned partially or totally, whatever the case may be.

Article 12: It is MIRENEM's responsibility to establish the rules and conditions of any kind in order to protect the fulfillment of the program of environmental control and recuperation of the electrical plants of limited capacity. In case that the grantees do not adhere to the conditions established by MIRENEM, the National Electricity Service, by request of MIRENEM, may declare the expiration of the concession.

Article 13: The Costa Rican Electricity Institute will be authorized to subscribe contracts for the purchase of electric power, as part of its normal activities, which should be ratified by the S.N.E. in accordance with what has been set forth in Law No. 258 of the 18th of August, 1941.

Article 14: ~~The tariffs for the purchase of electric power by I.C.E. require establishment of a fixed price on the part of the National Electricity Service, which prior to~~ the issue of a final resolution will solicit the opinion of the affected concessions. I.C.E. will present requests for tariff changes on each occasion. These changes should be the most favorable to the public consumer, within the principle of avoided capital and operating costs of the interconnected National System using national economic criterion. Periodic adjustments of tariffs included in the buy and sale contract will take into account the usual factors of variation of costs, monetary devaluation, local inflation, and other contingencies, and these adjustments will be executed by an automatic formula established by The National Electricity Service. These adjustments and prices do not require the approval of the Executive Branch. The structure of prices will consider the characteristics of energy supply by electric plants of limited capacity.

Article 15: The electricity purchased will be the surplus that the producer has at a measured point after having supplied his own necessities.

Article 16: The Central Bank has the authority to exceed the maximum limit of credit in the case of loans granted by commercial banks for the development of industries that have been selected, and to those who are interested in fabricating the electromechanical equipment necessary for electricity plants of limited capacity. To this purpose, the related operations will be exempt from what is set forth in Article 61, Clause 5) of the Organic Law of the National Banking System, and Article 85, clause 1, literal b, of the Organic Law of the Central Bank of Costa Rica.

Article 17: Private enterprises and rural electrification cooperatives, producers of autonomous or parallel electrical power, will enjoy the same exonerations as the Costa Rican Electricity Institute on the importation of machinery and equipment for the conduction of water, and to turbinate, generate, control, regulate, transform and transmit electrical power.

Article 18: Private enterprises and rural electrification cooperatives that supply electricity to the Costa Rican Electricity Institute in accordance to what has been established in this law can protect themselves under Article 7, clause 2 of annex 3, Law of Industrial Production Incentives of Law 7017 of the 16th of December, 1985.

Article 19: Private enterprises and rural electric cooperatives that supply electricity to the Costa Rican Electricity Institute in accordance to what has been established in this law can deduct loses from gross revenues, in the same manner as industrial enterprises do in accordance with that established in clause g of Article 8 of Law 7092 of the 21st of April, 1988, Law of Taxable Revenue.

Article 20: For the effects of this law, private enterprises are defined as those to which Article 3 of this law refers.

Article 21: Repeal Article 22 of Law 7131 of the 16th of August, 1989 (Special Budget of May 1989) and Article 7, of Law 258, of August 18, 1941 (Law of the National Electricity Service).

Article 22: The Executive Branch will regulate the present law within three months of its publication. The lack of regulation will not obstruct the application of the law.

Article 23: To be effective from the date of publication.

Sole Transitory - Solicitations for electricity concessions pending legislative approval will be governed by that established in Article 5 of the present law.

PRESENTED IN THE HALL OF SESSIONS OF THE COMMISSION OF
GOVERNMENT AND ADMINISTRATION. San Jose, on the eight day of August, 1990.

Victor Evelio Castro Retana
PRESIDENT

Santana Esquivel Ramirez
SECRETARY

Reinaldo Maxwell Kennedy

Fernando Acevedo Hurtado

Alberto Esquivel Volio

Ovidio Pacheco Salazar

Sonia Rodriguez Quesada

Sigifredo Aiza Campos

Carlos L. Rodriguez Hernandez

DEPUTIES

ib.

Com. Gob. y Adm.

13 de agosto de 1990



NATIONAL GEOTHERMAL ASSOCIATION

P.O. Box 1350
Davis, California 95617-1350 USA
(916) 758-2360 Telex: 882410

DATE: NOVEMBER 29, 1989
TO: NGA MEMBERS
FROM: DAVID N. ANDERSON *DNA*
SUBJECT: ENCLOSURES

I have enclosed a copy of the Costa Rican Tender Document No. 5203 with and add on, a copy of the Federal Register Friday, November 24, 1989 announcing the application of the NGA to the Department of Commerce of a Certificate of Review (Export Trading Co., - ETC), and a copy of the U.S./ECRE Board of Directors minutes from November 17, 1989 (the NGA is a member of U.S./ECRE).

Because the Costa Rican tender document has come prior to the development of the NGA's ETC, the members are on their own to form whatever alliances they need to do business. In the future, we hope to help coordinate these efforts.

Please call if you have any questions.



NATIONAL GEOTHERMAL ASSOCIATION

P.O. Box 1350
Davis, California 95617-1350 USA
(916) 758-2360 Telex: 882410

November 28, 1989

REQUEST FOR BID ON EQUIPMENT AND MATERIALS FOR MIRAVALLS GEOTHERMAL FIELD, COSTA RICA

ICE TENDER 5203

1. The Costa Rican Institute of Electricity (ICE) invites local and foreign firms to participate in Public Tender No. 5203 for the acquisition of equipment and materials to be used in the drilling of the Miravalles Geothermal wells project located in the Guanacaste Province.
2. ICE requires the following equipment and materials:
 - A. 18 casing heads 540mm diameter, 140 kg/sq. centimeters, 2000 PSI, with lining bowl, expansion spools and other accessories; 2 casing heads 350mm diameter, 140 kg/sq. centimeters, 2000 PSI, with lining bowl, expansion spools and other accessories; 108 master and lateral gate valves and fittings; 30 weldable flanges and two equipment lubricating pumps.
 - B. 3,870,000 kilograms drilling muds (Wyoming Bentonite) and other industrial grade additives for the muds, such as Sodium Carbonate (Soda Ash) 46,363 kilograms; Sodium Chromate 20,000 kilograms; dispersants and emulsifiers (Bariod Carbonox) 40,000 kilograms; Sodium Bicarbonate 20,000 kilograms; Resin 26,363 kilograms; Benex Polymeric 6,363 kilograms; Caustic Soda 110,000 kilograms; and Mil-Temp 13,636 kilograms.
 - C. 2,647,272 kilograms cement Class H or B, highly resistant to Sulfates, 890,000 kilograms Silica Flour; 729,091 kilograms high resistance Microspheres (HSMS); and other additives, such as Calcium Chloride 33,636 kilograms, flo-checking sealing 12,166 liters, etc.
 - D. 42,000 meters geothermal well casing in different sizes with accessories, such as casing hangers, centralizers, cementing float shoes, etc.
 - E. 170 drill bits in 609, 444, 311, and 216 mm diameters with nozzle sets and reamers.

3. Tender documents and quotation forms can be obtained at the ICE Procurement Office for the price of 1,000 Colones (approx. US\$ 12.00) at the following address:

Instituto Costarricense de Electricidad (ICE)
Oficina de Licitaciones
Apartado 10032-1000
San Jose, Costa Rica
Telephone: 506/20-7630 to 20-7640
Telex: 303/CR-2965 ICE PRV
Facsimile: 506/31-6364

4. Deadline for this public tender is January 9, 1990 at 10:00 am at the ICE Procurement Office in San Jose. Participation bond is one percent of the offer value, and performance bond is five percent of the total award.
5. This tender is funded by the Inter-American Development Bank (IDB), under loan No. 200/IC-CR and is estimated at US\$ 15 million.

ANY FOREIGN FIRM WISHING TO PARTICIPATE IN A PUBLIC TENDER IN COSTA RICA MUST HAVE A COSTA RICAN REPRESENTATIVE.

NOTE: IN ADDITION TO THE \$12.00 FOR THE TENDER DOCUMENTS, IT IS RECOMMENDED TO INCLUDE ENOUGH MONEY TO PAY IN ADVANCE FOR A COURIER SERVICE TO DELIVER THEM FROM COSTA RICA TO YOUR OFFICE.

Add on to Public Tender No. 5203

1. Deadline: December 1, 1989 at 10:00 A.M.
2. Estimated value: US\$ 220,000
3. Address, telephone, fax, telex, bonding, funding source, representation etc. remain the same as for Tender 5203.
4. ICE invites local and foreign firms to participate in Public Tender NO. 5262 for the acquisition of 360 panels-mechanic molding with accessories; 190 extension steel beams; 240 extension steel piles; and 150 steel sectioned frames for scaffoldings with assembling accessories.

accompanied by a new Decision Notice, and will be reviewable under applicable Forest Service regulations.

Copies of this notice are being sent to all persons, groups, and agencies on the mailing list for the Harriet Lou Timber Sale Environmental Assessment and the above named appellants.

Dated: December 7, 1988.

Ed Levert,

District Ranger, Wise River District.

Dated: November 2, 1989.

Gerald W. Alcock,

Acting Forest Supervisor, Beaverhead National Forest.

[FR Doc. 89-27562 Filed 11-22-89; 8:45 am]

BILLING CODE 3410-11-M

ARCTIC RESEARCH COMMISSION

Meetings

Notice is hereby given that the United States Arctic Research Commission will hold its 20th Meeting in Seattle, Washington, on December 11-12, 1989. On December 11, the morning session will start at 8:30 a.m. in Room 2104, Building 3, Pacific Marine Environmental Lab, NOAA, located at 7600 Sand Point Way NE, Seattle, Washington.

On Monday, December 11th, at 1:30 p.m. in Room 310C of the Atmospheric Sciences Building at the University of Washington, the Commission will hold a Public Meeting on Arctic Research Priorities. At 5:30 p.m. the Commission will host a reception for arctic scientists at the Meany Towers Hotel in Seattle.

On Tuesday, December 12th, the Commission will meet in Room 2104 at the Pacific Marine Environmental Lab at NOAA. The Commission will meet in Executive Session following the conclusion of regular business.

Agenda items include: (1) Chairman's Report; (2) Comments from the Interagency Arctic Research Policy Committee; (3) Comments from the Alaska Congressional Delegation; (4) Comments from the Alaska Governor's Office; (5) Consideration of a Statement on Arctic Engineering Research; (6) Consideration of a Health Initiative; (7) National Bipolar Research Plan; (8) International Arctic Research Cooperation; (9) Items emerging from Public Meeting, and (10) Status of Annual Report.

Contact Person for More Information: Philip L. Johnson, Executive Director.

U.S. Arctic Research Commission, (202) 371-9631.

Philip L. Johnson,

Executive Director, U.S. Arctic Research Commission.

[FR Doc. 89-27517 Filed 11-22-89; 8:45 am]

BILLING CODE 7555-01-M

DEPARTMENT OF COMMERCE

International Trade Administration

Export Trade Certificate of Review; Application

AGENCY: International Trade Administration, Commerce.

ACTION: Notice of application.

SUMMARY: The Office of Export Trading Company Affairs, International Trade Administration, Department of Commerce, has received an application for an Export Trade Certificate of Review. This notice summarizes the conduct for which certification is sought and requests comments relevant to whether the Certificate should be issued.

FOR FURTHER INFORMATION CONTACT: Douglas J. Aller, Director, Office of Export Trading Company Affairs, International Trade Administration, 202/377-5131. This is not a toll-free number.

SUPPLEMENTARY INFORMATION: Title III of the Export Trading Company Act of 1982 (Pub. L. 97-290) authorizes the Secretary of Commerce to issue Export Trade Certificates of Review. A Certificate of Review protects the holder and the members identified in the Certificate from state and federal government antitrust actions and from private, treble damage antitrust actions for the export conduct specified in the Certificate and carried out in compliance with its terms and conditions. Section 302(b)(1) of the Act and 15 CFR 325.6(a) require the Secretary to publish a notice in the Federal Register identifying the applicant and summarizing its proposed export conduct.

Request for Public Comments

Interested parties may submit written comments relevant to the determination whether a Certificate should be issued. An original and five (5) copies should be submitted not later than 20 days after the date of this notice to: Office of Export Trading Company Affairs, International Trade Administration, Department of Commerce, Room 1223, Washington, DC 20230. Information submitted by any person is exempt from disclosure under the Freedom of

Information Act (5 U.S.C. 552). Comments should refer to this application as "Export Trade Certificate of Review, application number 89-00016." A summary of the application follows.

Summary of the Application

Applicant: National Geothermal Association (NGA), P.O. Box 1350, Davis, California 95617. Contact: Arthur John Armstrong, Counsel, Telephone: (202) 625-8731.

Application No.: 89-00016.

Date Deemed Submitted: November 7, 1989.

Members (in addition to applicant): Air Drilling Services, Inc., Englewood, CO; American Line Builders, Inc., Dayton, WA; Barber-Nichols Engineering Co., Arvada, CO; The Ben Holt Company, Pasadena, CA; Bridwell Controls, Martinez, CA; Dames & Moore, Los Angeles, CA; Eastman Christensen, Santa Rosa, CA, and its controlling entity Norton Company, Worcester, MA; EnergyLog Corporation, Sacramento, CA; Foster Oilfield Equipment Company, Houston, TX, and its controlling entity Masco Industries, Inc., Taylor, MI; Geothermal Management Company, Inc., Evergreen, CO; Geothermal Power Company, Inc., Elmira, NY; GeothermEx, Inc., Richmond, CA; Grace Drilling Company, Dallas, TX; H & H Oil Tool Company, Inc., Santa Paula, CA; Halliburton Services, Houston, TX; Kern Steel Fabrication, Inc., Bakersfield, CA; Loffland Brothers Company, Tulsa, OK; Mesquite Group, Inc., Fullerton, CA; Ormat Energy Systems, Inc.; Sparks, NV; Oxhew Power Corporation, Dedham, MA; Petrorentas Internacionales, Inc., Houston, TX; Pruett Industries, Inc., Bakersfield, CA; Technology Export Company, Houston, TX, and its controlling entity Masco Industries, Inc., Taylor, MI; Trans-Pacific Geothermal Corporation, Oakland, CA; University of Utah Research Institute, Salt Lake City, UT; and Unocal Geothermal Division, Los Angeles, CA, and its controlling entity Unocal Corporation, Los Angeles, CA.

Export Trade:

Products

Equipment, instrumentation, and supplies for (1) exploration (including geological, geophysical geochemical, and software); (2) drilling and completion; (3) reservoir assessment; (4) environmental monitoring; (5) production and power generation including pumps, separators and condensers; power generation systems,

and miscellaneous equipment and supplies; (6) non-electric direct-use (including downhole pumps, heat exchangers, and miscellaneous equipment and software); (7) general and technical geothermal information and publications; and (8) all other products related to geothermal exploration, development, and production (including heavy duty transportation equipment and stress relief equipment and supplies).

Services

Engineering, design, and other services related to (1) exploration (including geophysical photography and remote sensing, geologic field studies, subsurface studies, geochemical and hydrological analysis and interpretation, aquifer assessment, thermal studies, magnetic surveys, gravity surveys and interpretations, seismic studies, electrical studies, and geodata synthesis and numerical simulation); (2) drilling and completion; (3) reservoir assessment (including geological and geophysical well-logging, reservoir engineering, and well testing); (4) field development (including environmental systems evaluation and monitoring and environmental problems mitigation); (5) project analysis for electric and non-electric direct-use projects; (6) engineering studies and design; (7) plant management and operations; (8) financing; and (9) servicing, training, and other services related to the sale, use, or maintenance of Products or to projects that substantially incorporate Products; and all other Services related to geothermal exploration, development, and production.

Export Trade Facilitation Services (as they relate to the export of Products)

Consulting; international market research, marketing, and trade promotion; trade show participation; trade missions and reverse trade missions; insurance; legal assistance; accounting assistance; services related to compliance with customs requirements; transportation; trade documentation and freight forwarding; communication and processing of sales leads and export orders; warehousing; foreign exchange; financing; taking title to goods; and liaison with foreign government and multinational agencies, trade associations, and banking institutions.

Technology Rights

Patents; trademarks; service marks; trade names; copyrights (including neighboring rights); trade secrets; know-how; semiconductor mask works; utility models (including petty patents);

industrial designs; and *sui generis* forms of computer software protection associated with Products, Services, or Export Trade Facilitation Services.

Export Markets: The Export Markets include all parts of the world except the United States (the fifty states of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, and the Trust Territory of the Pacific Islands).

Export Trade Activities and Methods of Operation: NGA and/or one or more of its Members may:

1. Engage in joint selling arrangements for Products and/or Services in Export Markets, including, but not limited to, joint marketing negotiation, offering, bidding and financing, and allocating sales resulting from such arrangements;
2. Establish export prices for sales of Products and/or Services by the Members in Export Markets;
3. Discuss and reach agreements relating to the interface specifications and engineering requirements demanded by specific potential customers in Export Markets;
4. Refuse to quote prices for, or to market or sell in Export Markets, Products and/or Services;
5. Solicit non-Member Suppliers to sell their Products and/or Services or offer their Export Trade Facilitation Services through NGA and/or its Members;
6. Coordinate the development of projects in Export Markets in which Products and/or Services shall be exported, including, but not limited to, exploration, scientific and/or technical assessment, transportation and/or delivery, installation, construction, ownership (including, but not limited to, transfer of ownership) operations, servicing, and establishing joint warranty; service, parts warehousing, and training centers in such markets;
7. License associated Technology Rights in conjunction with the sale of Products and/or Services, but in all instances the terms of such licenses shall be determined solely by negotiations between the licensor Member and the export customer without coordination with NGA or any other Member;
8. Engage in joint promotional activities aimed at developing existing or new Export Markets, including, but not limited to, advertising and trade missions, demonstrations, field trips, and trade shows;
9. Bring together, from time to time, groups of Members to plan and discuss how to fulfill the technical Product and/or Service requirements of specific

export customers or particular Export Markets;

10. Establish and operate joint ventures and jointly owned entities, including, but not limited to, corporations or other joint venture entities, owned exclusively by Members, to export Products and/or Services to Export Markets;

11. Jointly provide and/or jointly negotiate with non-Member and Member Suppliers to provide Export Trade Facilitation Services to Member and/or non-Member Suppliers;

12. Jointly establish, or arrange to have NGA and/or one or more of its Members and/or non-Members to act as exclusive or non-exclusive Export Intermediaries on the Members' behalf in Export Markets. Any such exclusive Export Intermediary may agree not to represent any other Supplier of Products and/or Services in the relevant Export Market, and the Members may agree that they will not export independently, either directly or through any other Export Intermediary or other party;

13. Agree that any information obtained pursuant to this Certificate shall not be provided to any non-Member;

14. Act as a shippers' association to negotiate favorable transportation rates and other terms with individual ocean common carriers and individual conferences;

15. On a country-by-country basis for the Export Markets, jointly establish and/or negotiate with purchasers regarding specifications for Products;

16. Enter into agreements wherein:

- a. One or more Members or a jointly owned entity may agree to act in certain Export Markets as the Member's exclusive or non-exclusive Export Intermediary for Products and/or Services in that Export Market. In such agreements, (i) the Member(s) acting as exclusive Export Intermediary may agree not to represent any other Supplier for sale in the relevant Export Market, and (ii) Members may agree that they will export for sale in the relevant Export Market only through the Member(s) acting as exclusive Export Intermediary, and that they will not export independently to the relevant Export Market either directly or through any other Export Intermediary. NGA and/or any Member(s) and/or a jointly owned entity when acting as an exclusive Export Intermediary shall supply its services on a non-discriminatory basis to those Members that are parties to the exclusive arrangement, and which request such servicing, and shall not unreasonably refuse to supply such services;

b. A non-Member Supplier may agree to act in certain Export Markets as the Member's exclusive or non-exclusive Export Intermediary for Products and/or Services in that Export Market;

c. One or more Members or a jointly owned entity may agree to purchase for export to the Export Markets Products and/or Services from Suppliers on such terms as the parties to the agreement may determine;

d. NGA and/or one or more Members or a jointly owned entity may enter into exclusive or non-exclusive agreements with persons, including Members and non-Members, whereby consulting and professional services may be procured and provided to Members;

e. One or more Members or a jointly owned entity may enter into contracts which provide for transportation services to Members, including, but not limited to, the chartering and space chartering of vessels, the negotiation and utilization of through intermodal rates with common and contract carriers for inland freight transportation for export shipments to a United States export terminal, port, or gateway; and

f. Members may agree to export for sale in one or more Export Markets only directly through other Members, and/or through designated Export Intermediaries;

17. Exchange and discuss the following types of information about Export Trade, Export Markets, Export Trade Activities and Methods of Operation, and the agreements related thereto:

a. Information (other than information about the costs, output, capacity, inventories, domestic prices, domestic sales, domestic orders, and terms of domestic marketing or sale of United States business plans, strategies or methods) that is already generally available to the trade or public;

b. Information about sales and marketing efforts in Export Markets, activities and opportunities for sales of Products and/or Services in Export Markets, pricing in Export Markets, projected demands (quality and quantity) in Export Markets, customary terms of sale in Export Markets, the types of Products and/or Services available from competitors for sale in particular Export Markets, market strengths and economic and business conditions in Export Markets, and the prices for Products and/or Services in Export Markets;

c. Information about the export prices, quality, quantity, source, available capacity to produce, and delivery dates of Products available from Members for export; provided, however, that exchanges of information and

discussions as to Product quantity, source, available capacity to produce, and delivery dates must be on a transaction-by-transaction basis only and involve only those Members who are participating or have a genuine interest in participating in such transactions;

d. Information about terms and conditions of contracts for sales in Export Markets to be considered and/or bid on by Members;

e. Information about joint bidding, selling, or servicing arrangements for Export Markets and allocation of sales resulting from such arrangements among the Members;

f. Information about expenses specific to exporting to Export Markets, including, but not limited to, transportation, intermodal shipments, insurance, inland freight to port, port storage, commissions, export sales, documentation, financing, customs, duties, and taxes;

g. Information about U.S. and foreign legislation, regulations, and executive actions affecting the sales of Products and/or Services in Export Markets, including, but not limited to: U.S. Federal and State programs affecting sales to and in Export Markets;

h. Information about Members' export operations, including, but not limited to, sales and distribution networks established by the Members in Export Markets, and prior export sales by Members including, but not limited to, export price information;

i. Information relevant to the conduct of Export Trade and Export Trade Activities and Methods of Operation in the Export Markets; and

j. Information on the organization, governance, financial condition, and membership of NGA;

18. Forward to the appropriate individual Member requests for information received from a foreign government or its agent (including, but not limited to, private pre-shipment inspection firms) concerning that Member's domestic or export activities (including, but not limited to, prices and/or costs), and if such individual Member elects to respond, it shall respond directly to the requesting foreign government or its agent with respect to such information;

19. License and sub-license Technology Rights in Export Markets to non-Members, but in all instances the terms of such licenses shall be determined solely by negotiations between the licensor Member and such non-Member without coordination with NGA or any other Member. Such licenses and sub-licenses may convey exclusive or non-exclusive rights in

Export Markets; impose restrictions as to the prices at which Products and/or Services incorporating, or manufactured or produced using, Technology Rights may be sold or leased in Export Markets; impose requirements as to pricing and other terms and conditions of sub-licenses of Technology Rights in Export Markets; restrict licenses and sub-licenses as to fields of use, or maximum sales, or operations in Export Markets; impose territorial restrictions relating to any Export Market on foreign licensees and sub-licensees; require the assignment back or exclusive or non-exclusive grantback to the licensor Member of rights in Export Markets to all improvements in Technology Rights, whether or not such improvements fall within the field of use authorized in such license; require package licensing of Technology Rights; and require products or services (including, but not limited to, Products and/or Services) to be used, sold, or leased as a condition of the license of Technology Rights;

20. Refuse to provide Export Trade Facilitation Services or participation in the other activities described herein to non-Members;

21. Provide its Members or other Suppliers the benefit of any Export Trade Facilitation Service to facilitate the export of Products and/or Services to Export Markets. This may be accomplished by NGA (itself, or by agreement with one or more Members or other parties; and

22. Meet to engage in the activities described herein.

Definitions: 1. "Export Intermediary" means a person who acts as a distributor, sales representative, sales or marketing agent, consultant, provider of professional services, or broker, or who performs similar functions, including providing or arranging for the provision of Export Trade Facilitation Services.

2. "Supplier" means a person who produces, provides, or sells a Product, Service, Technology Right, and/or Export Trade Facilitation Service, whether a Member or non-Member.

3. "Member" means a person who has membership in the NGA and who has been certified as a "Member" within the meaning of § 325.2 (1) of the Regulations.

4. "Non-Member" means a person other than a Member.

Dated: November 17, 1989.

Douglas J. Allen,
Director, Office of Export Trading Company
Affairs.

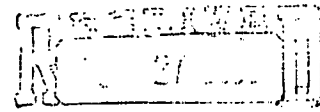
[FR Doc. 27513 Filed 11-22-89; 8:45 am]

BILLING CODE 3510-DR-M



US/ECRE

UNITED STATES EXPORT COUNCIL FOR RENEWABLE ENERGY P.O. BOX 10095 ARLINGTON, VA 22210-9998 703 524 6104



MINUTES
US/ECRE BOARD OF DIRECTORS MEETING
FRIDAY, NOVEMBER 17, 1989
ARLINGTON, VIRGINIA

*American Wind
Energy Association*

*Cogeneration & Independent
Power Coalition of America*

*National Geothermal
Association*

*National Hydropower
Association*

*National Wood Energy
Association*

*Passive Solar
Industries Council*

*Renewable Fuels
Association*

*Solar Energy
Industries Association*

*Volunteers
in Technical Assistance*

Wood Heating Alliance

Attendees: BOARD: David Anderson (NGA), Elaine Evans (NHA), Linda Ladas (SEIA), David Rinebolt (NWEA), Ken Sheinkopf (US/ECRE), Joe Sedlak (VITA), Scott Sklar (US/ECRE), Randy Swisher (AWEA). GUESTS: Tom Gray (CREE), Jim Hanson (NGA), Deepak Kenkeremath (NGA), Mark Murray (CREE).

The Board meeting was called to order at 9:05 AM by US/ECRE Executive Director Scott Sklar. Upon a motion duly made and seconded, the agenda was approved.

US/ECRE Executive Director Sklar distributed a review of US/ECRE 1989 finances whose fiscal year ends on September 30th. Sklar informed the Board that the 1989 finances are being reviewed by our new CPA Barclay Greene, and US/ECRE's 1990 books will be kept by our new bookkeeper Linda Greene. US/ECRE's Sklar also reviewed US/ECRE grants and funding for 1990 which includes funding from: the U.S. Department of Commerce (DOC) to fund industry visits to Indonesia and The Phillipnes; U.S. Agency for International Development (AID) for training; U.S. Department of Energy (DOE) for CORECT support and publication of REXPORT, and extension of the DOC grant on Private Power. Income for 1990 should exceed that of 1989. Sklar advised that the Massachussetts PV Center will continue to provide international development databank searches and that US/ECRE will reprint our multilingual brochure for dissemination worldwide.

US/ECRE's Sklar advised the Board that questions were raised about the need for US/ECRE to build staff to meet increased contract and program demand. Sklar stated that he believes US/ECRE should be a conduit of funds for US/ECRE member associations and should draw expertise where possible from the member groups, CREE, as well as ECRE staff which now consists of Scott Sklar, Ken Sheinkopf, and Erica Eppler. There were no objections.

US/ECRE Executive Director Sklar asked Board approval to establish a US/ECRE Renewable Energy Training Institute (RETI) with a management board of the US/ECRE Board as well as individuals from US/AID and the national laboratories. After discussion, upon a motion duly made and seconded, the Board approved the establishment of RETI. The Board unanimously approved a request for a letter to be sent to US/AID to support the US/ECRE effort in the Pacific Rim.

Contract managers gave reports as follows:

a) US/ECRE's Ken Sheinkopf reported that the booklet under US/AID contract is nearly finished and should be ready for final submission in December.

b) CREE's Mark Murray handed out an outline of the DOE contracted statistical outlook of the U.S. renewable energy industries. He requested assistance from each of the trade associations on 1989 sales and enduse data to be included for publication.

c) NHA's Elaine Evans reported on the DOC-funded Private Power contract where she concluded that US/ECRE must have overseas offices to maintain liaison with governments and development banks in key regions such as the Caribbean Basin and the Pacific Rim. Ms. Evans also recommended that US/ECRE establish an Export Trading and Service Company. After lengthy discussion, on a motion duly made and seconded, US/ECRE supports the development of US/ECRE regional offices through CORECT and that US/ECRE should pursue the establishment of these regional "bridgeheads", was passed unanimously. US/ECRE's Sklar asked the Board permission to spend money and time for a legal decision memo as to whether US/ECRE should establish an Export Trading and Service Company, which upon a motion duly made and seconded, was approved by the Board.

d) US/ECRE's Ken Sheinkopf reported the the US/DOE-funded renewable energy curricula was nearly completed and available to be sold by US/ECRE and member associations. SEIA's Linda Ladas reported that she is still trying to finalize a video to accompany the curricula and needs some assistance for primary footage from the member associations. Ms. Ladas also advised the Board on the EESI Earth Day celebration and after discussion the Board suggested that US/ECRE's Sklar formally ask that US/DOE channel its support of the event through US/ECRE so that it can formally participate.

US/ECRE's Sklar outlined the 1989 legislative agenda which included a \$3.5 million CORECT authorization in the Fowler/Sharp confernence; a targetted-increase of the US/AID energy office from \$10 to \$20 million with the extra \$10 million for renewable energy activities; a directive of 5 percent of last year's energy funding for the Export/Import Bank to fund renewable energy projects; meetings with Senate Governmental Affairs staff on federal agency support-contractor ethics, and meetings with US/DOE on the Integrated Utility Project plans.

Page three
November 20, 1989

After much Board discussion, the Board directed US/ECRE's Sklar to inform US/DOE that the IEUP is a low priority in an appropriate way and time. Finally US/ECRE Sklar advised the Board of his meetings with the EPA Global Climate Change Division and requested that the Board allow US/ECRE to legally establish a consortium modelled after an EPA-approved model so that US/ECRE can serve as a conduit for EPA support. After a motion duly made and seconded, the Board unanimously approved US/ECRE to form a consortium on the EPA model (but which also should serve as a model for State Department and other agencies) where the US/ECRE Board serves as the consortium board.

US/ECRE's Sklar advised the Board of the Africa 1000 project whose goal is to have 1000 African villages on renewable energy by the year 1995 and 5000 villages by the year 2000. Sklar advised the Board of his meetings with Dr. Kashkari and passed out draft legislation to finance the African 1000 project which is now supported by the Congressional Black Caucus and Congressional leadership. He also distributed his implementation strategy letter to the Global Energy Society including the connection of the villages to the VITA PACSAT satellite/packet radio. After much discussion, upon a motion duly made and seconded, the Board approved US/ECRE's participation in the Africa 1000 project and directed Sklar to pursue the program and legislative agenda. US/ECRE's Sklar asked for Board comments on the legislation and implementation strategy after reviewing the materials in debth.

US/ECRE's Sklar reviewed the opportunities to add the Africa 1000 and the US/ECRE regional offices to the FY'90 Energy & Water Supplemental Appropriations Bill. Upon a motion duly made and seconded, the Board approved the strategy and requested that they be solicited to assist the legislative effort.

CREE's Executive Director Thomas Gray advised the Board of his activities in developing CREE and his trips to the NARUC and Global Tomorrow conferences. Regarding funding, US/ECRE's Sklar advised the Board the US/ECRE will continue to subsidize CREE till they get on their feet but he has approached SERI, US/DOE and EPA for CREE support contracts, all which seem likely.

Thre being no new business, the US/ECRE Board meeting was adjourned at 11:50 AM.

Respectfully submitted,

Date: 11/20/89


Scott Sklar, Executive Director



NATIONAL GEOTHERMAL ASSOCIATION

P.O. Box 1350
Davis, California 95617-1350 USA
(916) 758-2360 Telex: 882410

DATE: JANUARY 7, 1991
TO: NGA MEMBERS
FROM: DAVID N. ANDERSON, EXECUTIVE DIRECTOR
SUBJECT: OPPORTUNITIES IN COSTA RICA AND GRENADA

Costa Rica

The Costa Rica Electrical Institute (ICE) recently invited consulting firms interested in providing engineering and supervision services at the Miravalles Geothermal Project to provide qualification letters. Geothermal consultants at also needed for assistance in drilling engineering, geoscientific studies, reservoir engineering and other disciplines at new geothermal areas scheduled for development. The formal qualification letters are due by February 15, 1991. The projects are partly funded by the Inter-American Development Bank. Letters should be sent to:

Instituto Costarricense de Electricidad
Dept. de Proveedurfa
Apartado 10032, Zona Postal 1000
San Jose, Costa Rica

If you would like to contact someone directly, the head of the ICE Geothermal Section is:

Ing. Alfredo Mainieri
Telephone: 506/207-533
Fax: 506/314-737

Grenada

The Latin American Energy Organization (OLADE) is being asked by the Grenada government to fund several energy projects, including a prefeasibility study on the development of local geothermal energy resources. Mr. Anthony Auguste is the Grenada Energy Officer associated with this effort. This may provide an opportunity for NGA members to get involved and help develop the prefeasibility study. If anyone is interested, you may get further details from Mr. Auguste. The only phone number I have is for the Ministry of Works in St. Gorges, Grenada. They should be able to refer you to Mr. Auguste. The number is 809/440-3976 and the fax is 809/440-4122.

ADDENDUM NOTICE

The following is an addendum to the enclosed memo.

Just prior to the typing completion of the enclosed memo, a fax was received from Costa Rica in Spanish that outlined more specifically the work needed to be done. Following is a list of the major components of the program translated into English.

- Services required for the Assessment of Geoscience studies.
- Services required for the Assessment of Engineering and Well Completion.
- Services required for the Assessment of Problems related to the Utilization of Geothermal Fluids.
- Services required for Reservoir Engineering for the control and monitoring of the Resource including the Simulated Model.

Also enclosed is a model response letter that was included by the Costa Ricans.

TELEX/FAX NO _____

(DATE)

(ADDRESS)

THE COSTA RICAN ELECTRIC POWER INSTITUTE (INSTITUTO COSTARRICENSE DE ELECTRICIDAD) IS CARRYING OUT NECESSARY STEPS FOR THE CONTRACTING OF CONSULTING SERVICES IN 1) ENGINEERING AND SUPERVISION FOR MIRAVALLES GEOTHERMAL PROJECT 2ND UNIT, AND 2) FIELD ENGINEERING FOR MIRAVALLES GEOTHERMAL PROJECT 2ND UNIT AND NEW GEOTHERMAL FIELDS (DRILLING ENGINEERING, GEOSCIENTIFIC STUDIES, RESERVOIR ENGINEERING AND SPECIFIC TECHNICAL MATTERS). CONSULTING SERVICES WILL BE FINANCED BY LOAN AGREEMENT 572/OC-CR GRANTED BY THE INTER-AMERICAN DEVELOPMENT BANK (IDB).

IN ORDER TO DETERMINE THE CAPABILITY AND EXPERIENCE OF THE CONSULTING FIRMS (BONA FIDE NATIONALS OF IDB MEMBER COUNTRIES) THAT WISH TO BE TAKEN INTO ACCOUNT IN THE CONTRACTING PROCESS, WRITTEN NOTES WILL BE RECEIVED WHICH SHOULD CONTAIN (BUT NOT BE LIMITED TO) THE FOLLOWING INFORMATION:

- A) ORGANIZATION OF THE COMPANY.
- B) FINANCIAL REPORTS FOR THE LAST THREE PERIODS.
- C) PRESENT CLIENT LISTING, WITH DESCRIPTION OF SERVICES BEING RENDERED, DATE OF INITIATION AND EXPECTED DATE OF CONCLUSION.

THOSE FIRMS THAT WISH TO BE CONSIDERED FOR THE AREA OF "ENGINEERING AND SUPERVISION FOR MIRAVALLES GEOTHERMAL PROJECT 2ND UNIT" ALSO OUGHT TO SUBMIT THE FOLLOWING INFORMATION:

- D) INDICATE SIZE OF THE STAFF OF THE EXPERTS GROUP, ESPECIALITY IN SIMILAR WORKS (ELECTROMECHANICAL WORKS FOR GEOTHERMAL PROJECTS).

INDICATE THOSE PROJECTS IN WHICH THE EXPERTS HAVE PARTICIPATED AND THEIR CORRESPONDING TASKS CARRIED OUT.

INDICATE THE EXPERIENCE OF THE SPECIALISTS IN LATIN AMERICA IN ELECTROMECHANICAL WORKS FOR GEOTHERMAL PROJECTS AND WHO COMMAND OF THE SPANISH LANGUAGE.

- E) EXPERIENCE OF THE COMPANY IN LATIN AMERICA, PARTICULARLY IN CENTRAL AMERICA.

THOSE FIRMS THAT WISH TO BE CONSIDERED FOR THE AREA OF "FIELD ENGINEERING FOR MIRAVALLES GEOTHERMAL PROJECT 2ND UNIT AND NEW GEOTHERMAL FIELDS" ALSO OUGHT TO SUBMIT THE FOLLOWING INFORMATION:

- F) INDICATE SIZE OF THE STAFF OF THE EXPERTS GROUP, ESPECIALITY OF EACH EXPERT, AND YEARS OF EXPERIENCE IN GEOTHERMAL FIELDS.

INDICATE THOSE PROJECTS IN WHICH THE EXPERTS HAVE PARTICIPATED AND THEIR CORRESPONDING TASKS CARRIED OUT.

INDICATE THOSE SPECIALISTS WHO COMMAND THE SPANISH LANGUAGE, AND THOSE WHO CAN TEACH TRAINING COURSES AND IMPART LECTURES.

- G) EXPERIENCE OF THE COMPANY IN WATER DOMINANT GEOTHERMAL FIELD STUDIES.

THE WRITTEN NOTES (ORIGINAL AND 2 COPIES) WILL BE ACCEPTED UNTIL 10:00 HOURS ON FEBRUARY 15, 1991 AT THE FOLLOWING ADDRESS:

INSTITUTO COSTARRICENSE DE ELECTRICIDAD
DEPARTAMENTO DE PROVEEDURIA
APARTADO 10032, ZONA POSTAL 1000
SAN JOSE, COSTA RICA

FURTHER INFORMATION IS ALSO AVAILABLE AT THE ABOVE ADDRESS.

CORDIALLY YOURS,

JUAN DE DIOS RAABE
PROCUREMENT DEPARTMENT

PRE-EXPLOITATION STATE OF THE AHUACHAPÁN GEOTHERMAL FIELD, EL SALVADOR

Z. AUNZO,* C. LAKY,* B. STEINGRIMSSON,* G. S. BODVARSSON,*
M. J. LIPPMANN,* A. H. TRUESDELL,† C. ESCOBAR,‡
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(Received August 1989; accepted for publication September 1990)

Abstract—The lithology and structural features of the Ahuachapán geothermal area and their impact on the movement of cold and hot fluids within the system are described, as well as the development and evaluation of the natural state model of the field. Four major lithologic units are present in Ahuachapán and three major aquifers have been identified; flow patterns and zones of fluid mixing were located on the basis of temperature and geochemical data from wells and surface manifestations. Geologic structures control the heat and fluid recharge and the flow within the reservoir. Modeling studies suggest, in agreement with field data, an overall average transmissivity of 25–35 darcy-meters, and indicate that the system is recharged by waters with temperatures greater than 250°C. The total thermal throughflow for the Ahuachapán reservoir in the unexploited state is estimated to be about 250 MW_e.

INTRODUCTION

The Ahuachapán geothermal field in El Salvador (Fig. 1) has been producing electrical power since 1975. The power plant has two 30 MW_e units and one 35 MW_e unit for a total installed capacity of 95 MW_e. However, the plant has never operated at capacity because of declining reservoir pressures and limited drilling of make-up wells. Currently, about 45 MW_e are being generated.

As the need to increase the electrical output at Ahuachapán became evident, it was recognized that a properly designed reinjection scheme and further drilling were needed to help improve the productivity of the reservoir.

The ultimate goal of this multidisciplinary study is to develop a detailed numerical model of the Ahuachapán field that can be used to guide the reservoir management program. This paper describes the work done in the development of the geologic and conceptual models and the natural state modeling of the field. An accompanying paper (Steingrimsson *et al.*, 1991) describes the field's response to production and injection.

GEOLOGIC SETTING OF AHUACHAPÁN

El Salvador is almost entirely underlain by Tertiary to Holocene volcanic rocks. The country can be morphologically divided into five regions: the Coastal Plains, the Coastal Ranges, the Pacific Volcanic Chain, the Great Interior Valley (or Central Graben), and the Northern Mountain Ranges. Of interest here is the Pacific Volcanic Chain, which is a line of young volcanoes that extends across El Salvador parallel to the Pacific Coast. The high-temperature geothermal fields are closely associated with this chain.

1 kg/s @ 250°C = 1 MW_e

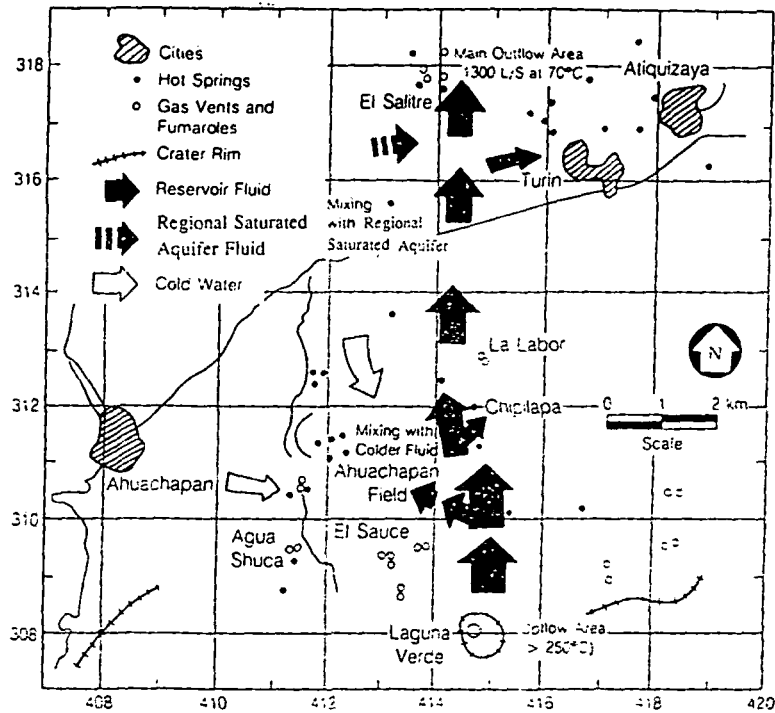


Fig. 1. Fluid flow in the Ahuachapán/Chipilapa geothermal system under natural (pre-exploitation) conditions.

The complex geologic structure of El Salvador is strongly influenced by the regional tectonics of Central America, where several lithospheric plates interact with one another (Weyl, 1980). Consequently, El Salvador is one of the world's most seismically active areas. Wiesemann (1975) identified seven fault trends listed as: WNW–ESE, NW–SE, NE–SW, NNE–SSW, N–S, E–W and NNW–SSE. The Ahuachapán field is located in the northwestern sector of the Laguna Verde volcanic complex, on the southern flank of the Central Salvadorean Graben. It is about 5 km northwest of Laguna Verde, an extinct andesitic stratovolcano that reaches approximately 1800 m a.s.l. elevation.

THE AHUACHAPÁN GEOTHERMAL SYSTEM

In the vicinity of Ahuachapán, geothermal surface manifestations are spread over an area of more than 100 km² (Fig. 1). These manifestations can be divided into high-temperature fumaroles and steaming grounds located on the northern slopes of the volcanoes in the southern part of the area, and hot springs (40–100°C) on the plain north of Ahuachapán.

The major fumaroles are: Cuyanausul on the northern slopes of Cerro Cuyanausul, east of the Laguna Verde volcano (outside the area shown in Fig. 1); El Sauce on the northern slopes of Laguna Verde; Agua Shuca and Playón de Ahuachapán near the wellfield; and La Labor in the Chipilapa region. Chemical analysis of gas samples from Ahuachapán and the nearby Chipilapa area show similar gas compositions, suggesting a common source fluid (Sigvaldason and Cuellar, 1970). A marked increase in the hydrogen content in fumarole steam toward the southeast suggests that the geothermal upflow zone is located in the area of nearby volcanoes, probably near the Laguna Verde volcano. Data from Ahuachapán and Chipilapa wells suggest

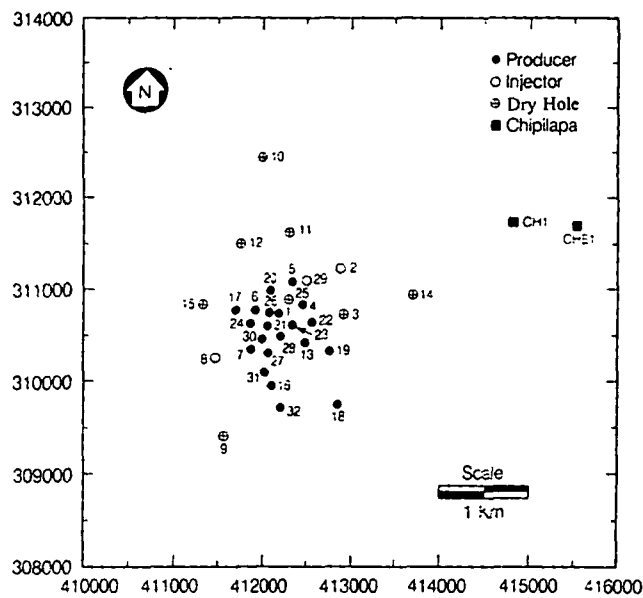


Fig. 2. Location map of Ahuachapán wells (distance in meters).

that the source fluid is highly saline (more than 8000 ppm Chloride) and that the upflow temperatures are above 250°C.

Hot springs are found north of Ahuachapán, the biggest of which is the El Salitre group, located about 7 km north of the present wellfield, where about 1300 l/s of 68–70°C water was originally discharged (Sigvaldason and Cuellar, 1970). The original chemistry of El Salitre springs has been attributed to the mixing of fluids from an overlying aquifer (called the Regional Saturated Aquifer) with 10–20% of geothermal fluids (Glover, 1970; Sigvaldason and Cuellar, 1970). There is pressure communication between the Ahuachapán geothermal reservoir and El Salitre springs. The flow-rates of the hot springs have decreased greatly (perhaps by a factor of 3–5) during the last decade and the salinity of the fluid has been reduced to one fifth of its original value as a result of the exploitation of the field.

The first production well in Ahuachapán was drilled in 1968 and presently a total of 32 wells are distributed over a 6 km² area (Fig. 2). However, the productive wellfield extends over less than 1 km² (Vides-Ramos, 1985).

LITHOLOGY

The known lithologic column at Ahuachapán consists mostly of the San Salvador Formation (Table 1) with the Bálsamo Formation for basement rock. The column has previously been divided into the following units: upper brown tuff, gray ignimbrite, pink ignimbrite, lower brown tuff, gray agglomerate, blue ignimbrite, old andesitic lavas, and ancient agglomerate (Jonsson, 1970). For this study four major units have been defined which are similar to those of Aumento *et al.* (1982). These are: Surficial Material (SM), Young Agglomerates (YA), Ahuachapán Andesites (AA), and Older Agglomerates (OA).

The Surficial Material occurs in the top 100–150 m and contains the 'Shallow Aquifer' (see next section for discussion on the different aquifers). Beneath this unit there is a 300–800 m thick sequence of young pyroclastics and andesites. These are the Young Agglomerates where losses in circulation during drilling are attributed to the 'Regional Saturated Aquifer'. Below these

Table 1. Lithologic units and aquifers identified at Ahuachapán

Formation	Rock type	Designation	Aquifer
San Salvador (Quaternary)	Colluvium, altered pyroclastics and lavas (Holocene) Pyroclastics, andesites (Pleistocene)	Surficial Material Young Agglomerates	Shallow Aquifer Regional Saturated Aquifer
Bálsamo (Pliocene)	Andesites (Plio-Pleistocene) Breccias, agglomerates andesites	Ahuachapán Andesites Older Agglomerates	Saline Aquifer (reservoir)

rocks one finds the Ahuachapán Andesites, a highly fractured 200–600 m thick unit that hosts the 'Saline Aquifer', which corresponds to the main geothermal reservoir. The permeability of this unit is enhanced by columnar jointing and contact surfaces. The lower part of the Young Agglomerates is highly hydrothermally altered, forming an impermeable barrier between the Regional Saturated Aquifer and the Saline Aquifer. The Older Agglomerates (basement rocks) consist of dense breccias, agglomerates, and andesites with little matrix permeability, but some fracturing.

THE AQUIFERS

Three aquifers had been identified at Ahuachapán: the Shallow Aquifer, the Regional Saturated Aquifer, and the Saline Aquifer. This classification is based on the fluid chemistry and the pressure response of the aquifers to seasonal rainfall variations. The three aquifers correspond with the different lithologic units discussed above (Table 1).

The Shallow Aquifer is unconfined and shows very rapid response to precipitation. The waters are generally of the calcium carbonate type, locally sulfatic with residues below 0.5 g/l (Romagnoli *et al.*, 1976). In the wellfield, the temperature in this aquifer ranges from 40 to 100°C, with the temperature decreasing toward the north.

The Regional Saturated Aquifer is recharged by direct infiltration but its response to variations in rainfall is much slower than that of the Shallow Aquifer. The water is of calcium-sodium carbonate type, with residues generally below 0.4 g/l (Romagnoli *et al.*, 1976). In the wellfield, Regional Saturated Aquifer temperatures range from 110 to 130°C, decreasing toward the north where a temperature of 46°C was recorded in M-1, an exploratory hole about 3 km north of well AH-10.

The Saline Aquifer (geothermal reservoir) is thought to be recharged from the volcanic belt of Laguna de las Ninfas, Laguna Verde and Cerro de las Ranas, southeast of the wellfield. In this belt, deep water infiltration is facilitated by the presence of highly permeable volcanic chimneys. Waters of the Saline Aquifer are of the sodium chloride type and of high salinity (residues of up to about 22 g/l, Romagnoli *et al.*, 1976). The measured reservoir fluid temperatures range from 214 to 240°C, with inferred minimum recharge temperatures of 245–250°C, based on discharge fluid geothermometry.

GEOLOGIC STRUCTURE

The geologic structure of the Ahuachapán field appears to be dominated by seven major and five minor faults (Fig. 3). These faults have been identified on the basis of lithological logs, aerial photographs and existing structural maps.

The Surficial Material is rarely displaced by the faults, suggesting that no recent faulting has

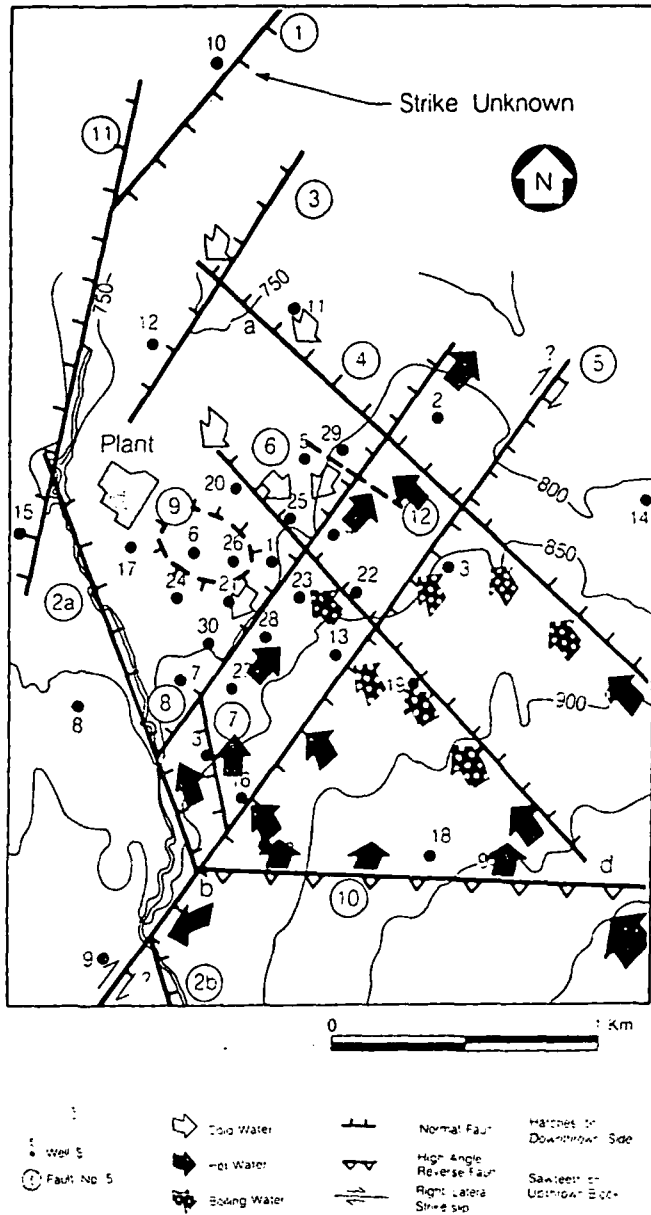


Fig. 3. Structural map and fluid flow paths.

occurred. The Young Agglomerates are of fairly uniform thickness except in wells AH-18 and AH-32, which is believed to be due to a high-angle reverse fault (Fault 10), and in AH-14 on the outskirts of the field. Within the wellfield, the Ahuachapán Andesites are fairly uniform in thickness with small displacements due to recent faulting. In wells AH-2, AH-11, AH-12, AH-14, AH-18, AH-19, and AH-32, the Ahuachapán Andesites are found at a lower elevation than in the center of the wellfield. The Older Agglomerates are not penetrated by most of the wells so that their extent is largely inferred. However, near the NW, W and SW boundaries of the field (e.g. in wells AH-8, AH-9 and AH-10) these agglomerates are found at the elevation usually

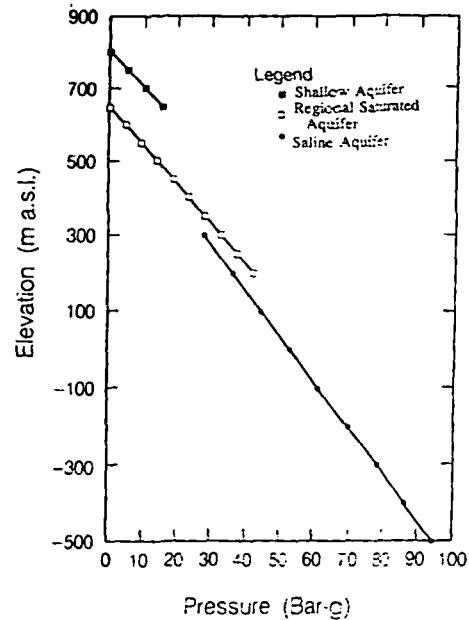


Fig. 4. Plots of fluid pressure vs elevation for the different aquifers.

occupied by the Ahuachapán Andesites, while the andesites are not found at all. This suggests an unconformity.

INITIAL TEMPERATURE AND PRESSURE DISTRIBUTION

The initial pressures in the different aquifers at Ahuachapán are indicative of limited vertical hydraulic communication since their hydraulic potentials are different (Fig. 4). The hydraulic potential is lowest in the Saline Aquifer and therefore there is a tendency for cooler water influx into the reservoir from the overlying Regional Saturated Aquifer.

Within the geothermal reservoir (Saline Aquifer) initially there was no significant areal variation in hydraulic potential (Fig. 5), and at the reference level of 200 m a.s.l. the pressure was about 36 bar-g. Some of the peripheral wells (e.g. AH-10, AH-12, AH-15), which are not in hydraulic communication with the geothermal reservoir, had pressures exceeding 40 bar-g at the 200 m a.s.l. level.

Figure 6 shows the initial temperature distribution, determined from individual temperature logs, for mean sea-level elevation. It generally reflects the temperatures in the Ahuachapán Andesites and shows increasing temperatures towards the southeast indicating maximum temperatures in the 240–245°C range. This clearly suggests that the upflow zone is southeast of the present wellfield, probably beneath the Laguna Verde volcanic complex. This conclusion is further supported by the temperature increase in well AH-18 during exploitation (Steingrims-son *et al.*, 1991).

GEOCHEMISTRY

Chemical analyses of produced Ahuachapán fluids have been used to infer natural state salinity and temperature conditions in the reservoir, and to monitor changes due to exploitation (Truesdell *et al.*, 1989). Geothermometer reactions are temperature-sensitive and produce

solute concentrations and concentration ratios characteristic of the temperature of equilibration. Some geothermometers (e.g. silica, K-Mg) re-equilibrate rapidly and indicate the temperature close to well intakes. These temperatures are comparable to measured downhole temperatures. Other geothermometers (Na-K-Ca, sulfate isotope) re-equilibrate more slowly and may indicate temperatures earlier in time or, for flowing fluids, at a distance from the well intakes. These latter geothermometers are the ones most useful for indicating original temperatures.

At Ahuachapán, well tests were carried out from 1968 to 1975, during which time 24 million metric tons (Mton) of fluid were produced (Steingrímsson *et al.*, 1989). This is equivalent to 1.5–2 years of the later mass production. The first systematic chemical monitoring started in 1976 at the start of electrical generation. Pressures in 1976 were lower than original natural state pressures and processes related to drawdown, such as boiling and entry of cooler water, had already begun.

Na-K-Ca geothermometer temperatures of early production fluids showed a gradient from above 260°C in the west to below 235°C in the east (Table 2, Fig. 7). These temperatures are, in most cases, higher than those measured downhole and about 10°C higher than silica temperatures of the same samples. During the period of production (8–12 years), Na-K-Ca temperatures showed (for most wells) only small declines ($\leq 5^\circ\text{C}$) even though silica and measured downhole temperatures decreased greatly (20–30°C).

These observations strongly suggest that Na-K-Ca temperatures reflect natural conditions before well-drilling and exploitation started and have not re-equilibrated significantly during exploitation-induced cooling. Silica geothermometers indicate the present well bottom temperatures and, for cases of cooling by dilution in flowing wells, they generally agree with temperatures calculated from total fluid enthalpy measurements. However, where mixing occurs in the well, silica does not have time to equilibrate with the new temperature. As a result, silica temperatures may be higher than those indicated by the enthalpy. Downhole temperatures measured under static or low flow conditions usually agree with silica and enthalpy-derived

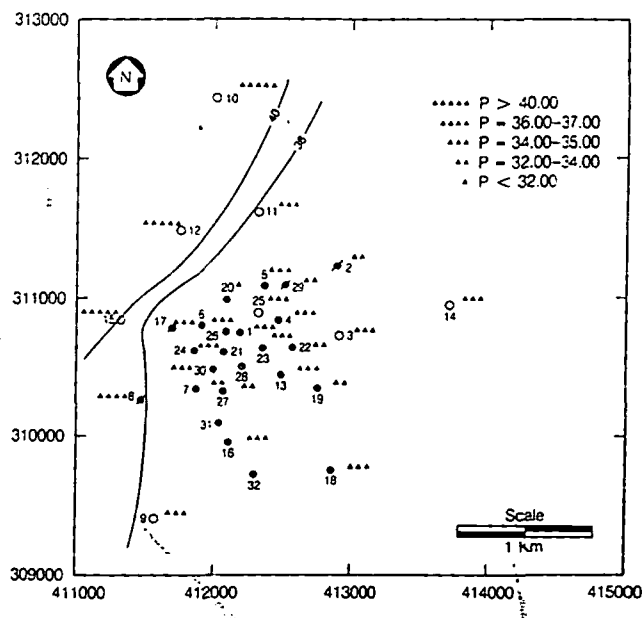


Fig. 5. 1974–1975 pressure distribution at 200 m a.s.l. (in bar-g).

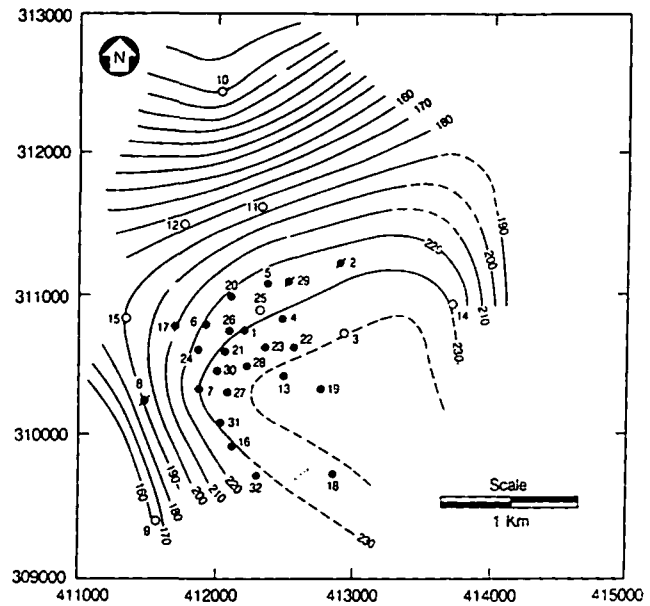


Fig. 6. Initial temperature distribution (in °C) at mean sea-level elevation.

temperatures unless conditions in the well are affected by flow-rate (e.g. flashing in formation, mixing with high-enthalpy upper feed fluids).

Natural state chloride concentrations may also be indicated by early fluid measurements, provided they did not change significantly during the period of development and test. Calculated aquifer chloride concentrations based on early production showed a gradient decreasing from more than 8500 ppm in the west to less than 6500 ppm in the east (Fig. 8). Natural state temperature (converted to liquid enthalpy) and chloride data were reason-

Table 2. Early geothermometer temperatures for Ahuachapán well discharges (°C) and chloride concentration (mg/kg)

Well	Date	T_{NK}	T_{SIL}	$T_{NK(1)}^*$	$T_{NK(2)}^\dagger$	Chloride
AH-1	07/74	256	251	247	263	7700
AH-4	06/75	246	237	237	256	7200
AH-5	02/72	248	—	242	259	8100
AH-6	07/74	257	246	252	266	8200
AH-7	04/75	262	256	260	272	8600
AH-16	03/87	240	238	231	251	—
AH-19	03/85	233	228	218	241	6100
AH-20	07/76	255	234	250	268	7900
AH-21	04/75	256	248	250	265	8500
AH-22	07/76	239	237	226	247	6900
AH-23	09/80	249	233	243	260	7100
AH-24	09/78	262	252	260	273	8500
AH-26	09/76	253	229	246	262	8000
AH-27	10/80	263	246	262	274	8000
AH-28	07/80	254	239	249	264	7400
AH-31	04/85	260	250	257	270	8700

* $T_{NK(1)}$ is the Ellis-White Na-K geothermometer from Truesdell (1976). This usually indicates minimum temperatures.

† $T_{NK(2)}$ is the Na-K geothermometer from Fournier (1979), which usually indicates maximum temperatures.

linear suggesting mixing of hot saline water with cooler, lower-chloride waters. This line did not extrapolate to local cold waters but instead to a low chloride (steam-heated?) water at about 160°C, which may correspond to waters of the Regional Saturated Aquifer.

During exploitation, some wells responded to a pressure decrease by boiling and some by mixing with cooler waters from outside the geothermal reservoir. The zone of maximum cooling by production-induced dilution is in the center and southeast regions of the field, approximately corresponding to the location of Fault 8 (and possibly Fault 7). The diluting water may have

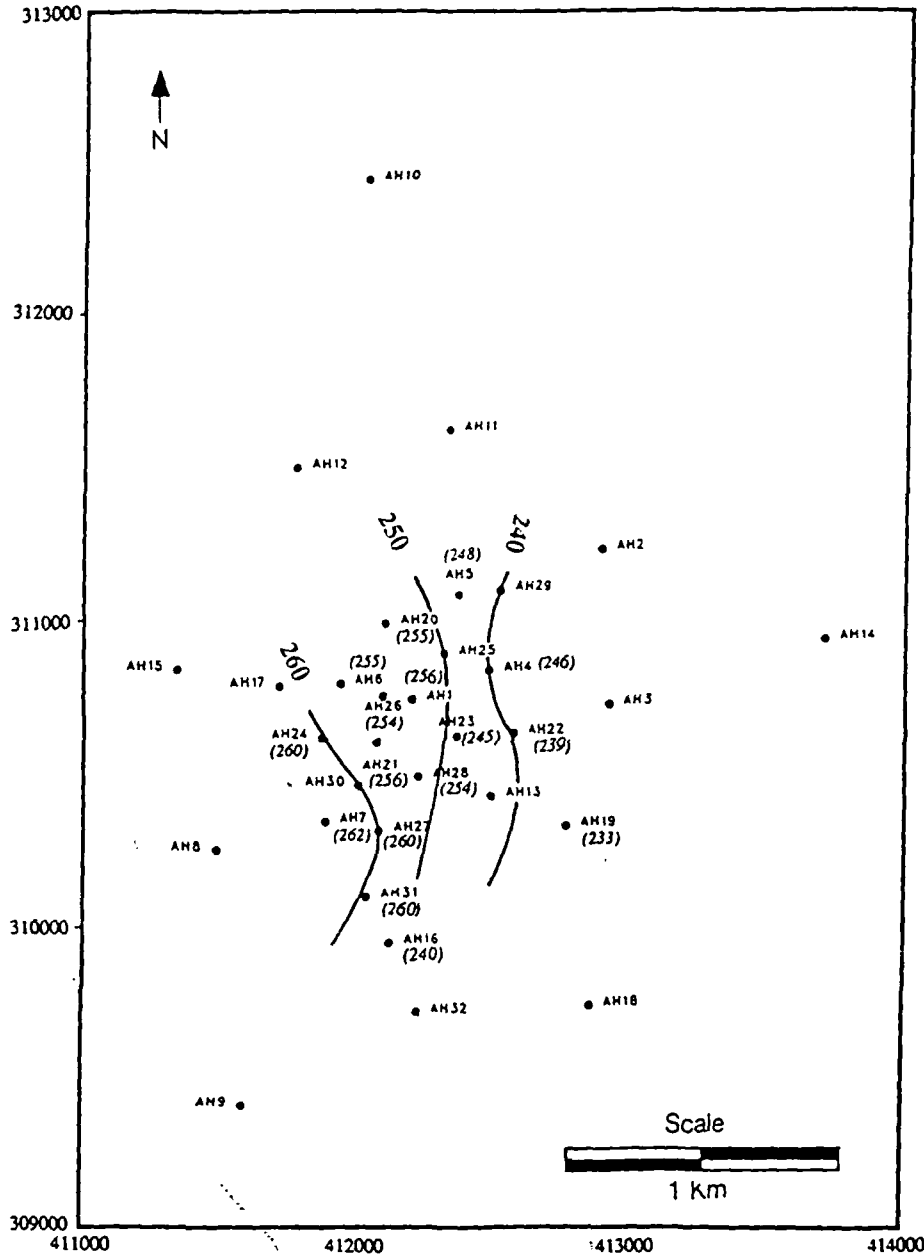


Fig. 7. Initial reservoir (saline aquifer) temperature (based on Na-K-Ca geothermometer) in °C.

descended from the Regional Saturated Aquifer along these faults. Cooling due to mixing with cooler waters entering the reservoir from above is supported by downhole fluid collections made by the Los Alamos National Laboratory (Adams *et al.*, 1989). These data show that wells AH-1, AH-22 and AH-27 had a salinity gradient in the well with shallow fluids less concentrated than deep fluids (for AH-1, 550 m fluid had 6770 ppm chloride and 1100 m fluid had 8590 ppm chloride). Comparisons with produced fluids indicate that shallow fluids dominate production suggesting lower permeability at deeper levels.

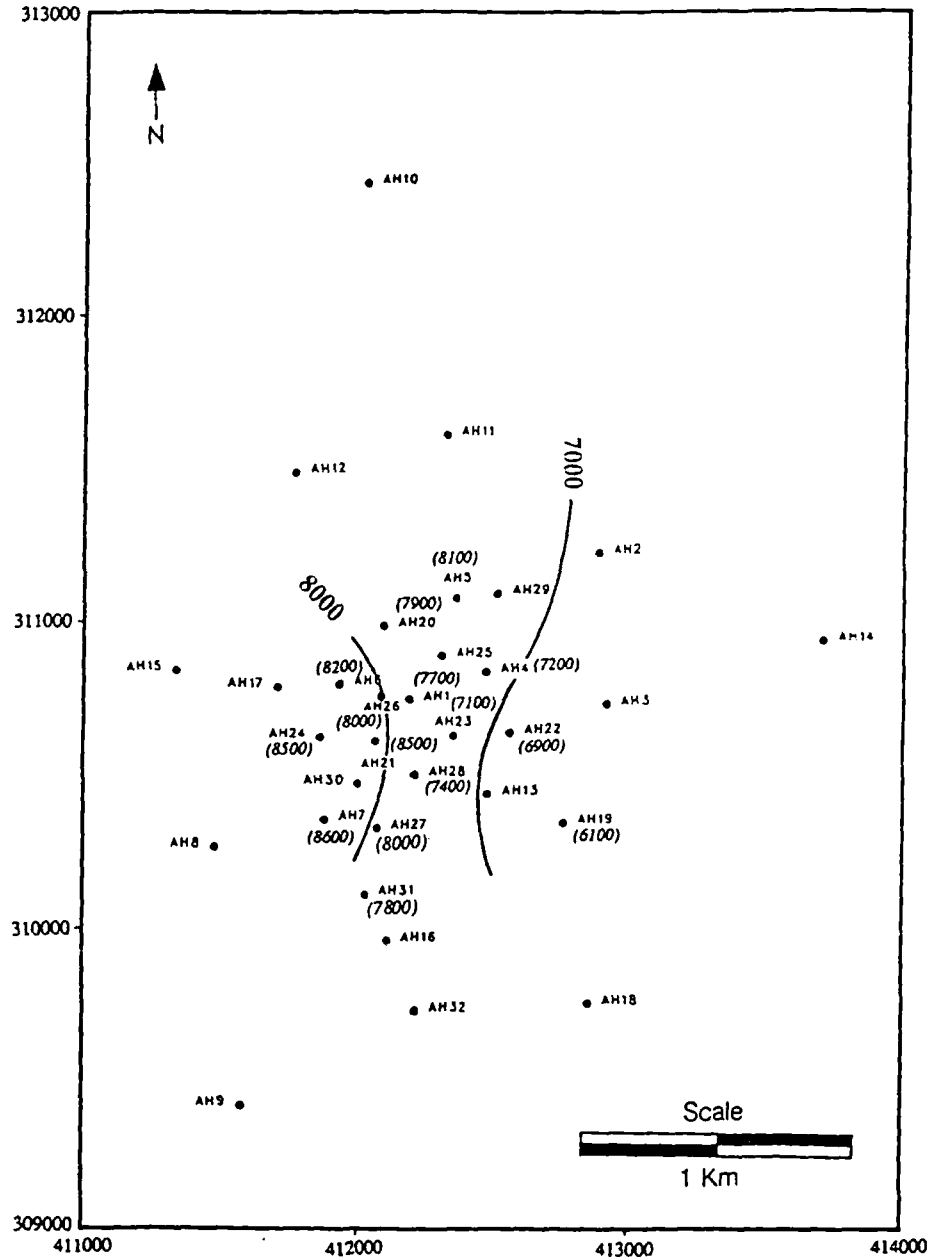


Fig. 8. Initial reservoir (saline aquifer) chloride concentrations (in ppm).

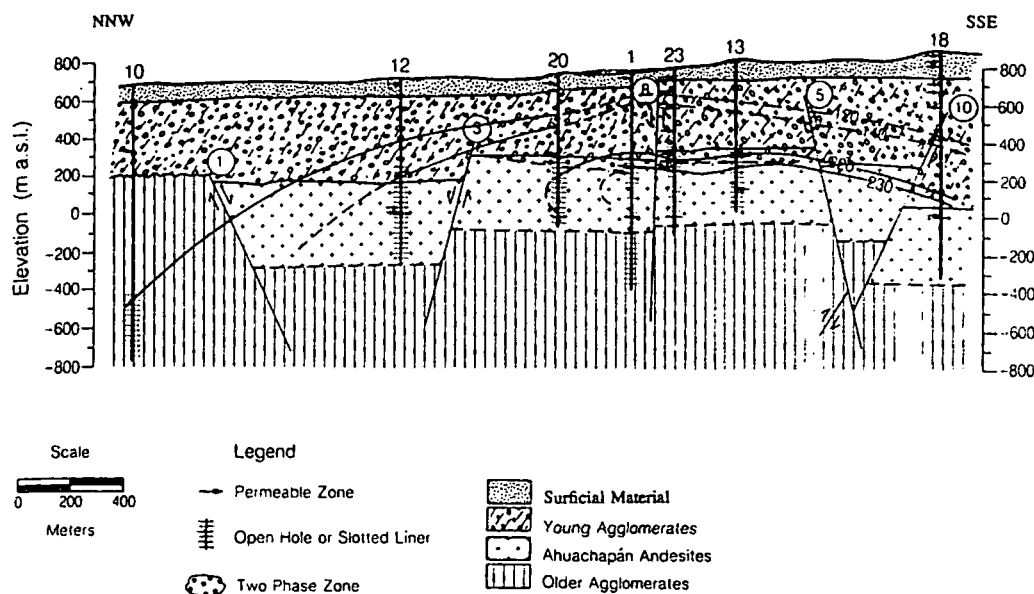


Fig. 9. Approximately north-south cross-section through wells AH-10 to AH-18 showing lithology, faults and isotherms.

Generally, the geochemical data shown in Figs 7 and 8 would imply inflow of the geothermal fluid from the west, which is inconsistent with all other relevant data. It is believed that these chemical gradients are due to dilution within the wellfield area. The geothermal source fluid enters Ahuachapán from the southeast. Most of the recharge undergoes dilution as it sweeps through the field, but some of it flows undiluted south of the main wellfield and into the western part of the field. The high Na-K-Ca temperatures (260°C) and chloride concentrations (8600 ppm) in this region indicate, therefore, the geothermal source temperatures and salinity, although the recharge area is at considerable distance from this part of the field.

CONCEPTUAL MODEL

The hydrologic model is summarized in Fig. 1. An upflow of saline, high temperature (above 250°C) fluid occurs underneath the volcanoes (probably Laguna Verde), southeast of Ahuachapán. From the upflow zone, fluid flows toward the north. A fraction of it flows toward the northwest and enters the Ahuachapán reservoir near the southeast corner of the wellfield, as suggested by the shape of isotherms. A small amount of the fluid upflow flows toward the east to nearby Chipilapá; however, the main stream mixes with fluids from the Regional Saturated Aquifer and is discharged through several hot springs at the El Salitre area. The hydrological connection between the Ahuachapán reservoir and the hot springs at El Salitre is very likely because of the drastic decline in spring flow-rates and chloride content since exploitation at Ahuachapán started.

Several geologic cross-sections have been developed to illustrate the lithology, faulting and temperature distribution in the field (Aunzo *et al.*, 1989). These cross-sections clearly show the fluid movement in the wellfield and indicate good correlation between temperature contours and lithology. This confirms that the highly permeable Ahuachapán Andesites serve as the main reservoir unit. Two of these cross-sections are shown in Figs 9 and 10.

In the wellfield, the groundwater flow in the Shallow Aquifer is not significantly affected by the faults since they have not been active recently enough to displace the Surficial Material. In the Regional Saturated Aquifer, flow tends to be influenced by the fault pattern. The role of Faults 4, 5, and 6 seems to be especially important (Fig. 3) as indicated by the lost circulation zones observed during drilling.

The flow in the geothermal reservoir is also controlled by the faults. Most notably to the north and west, where Faults 3 and 11 act as barriers and limit the extent of the reservoir. Fault 4 is seen to act as a barrier to hot fluid flow to the northeast. This is strongly supported by the temperature distributions in the reservoir (Fig. 6). Other faults act primarily as conduits to flow rather than flow barriers.

Also in the natural state, mixing of the geothermal fluids with cooler, less-saline fluids occurs in the eastern part of the wellfield. These cooler fluids probably come from the north via Fault 11; another possibility is downward recharge from the overlying Regional Saturated Aquifer, which has a higher hydraulic potential than the main reservoir (Laky *et al.*, 1989). This mixing explains the observed gradients in geothermometer temperatures and chloride concentrations across the field.

NATURAL STATE MODEL

The reservoir model employed in this study was based on the conceptual model discussed above. A porous medium model was used and the simulation work was carried out using the numerical code MULKOM (Pruess, 1983). The objectives of the study were: (1) to verify the conceptual model of the system; (2) to quantify the natural mass and heat flow in the reservoir; (3) to better understand the hydrology of the field; (4) to obtain a coarse estimate of the

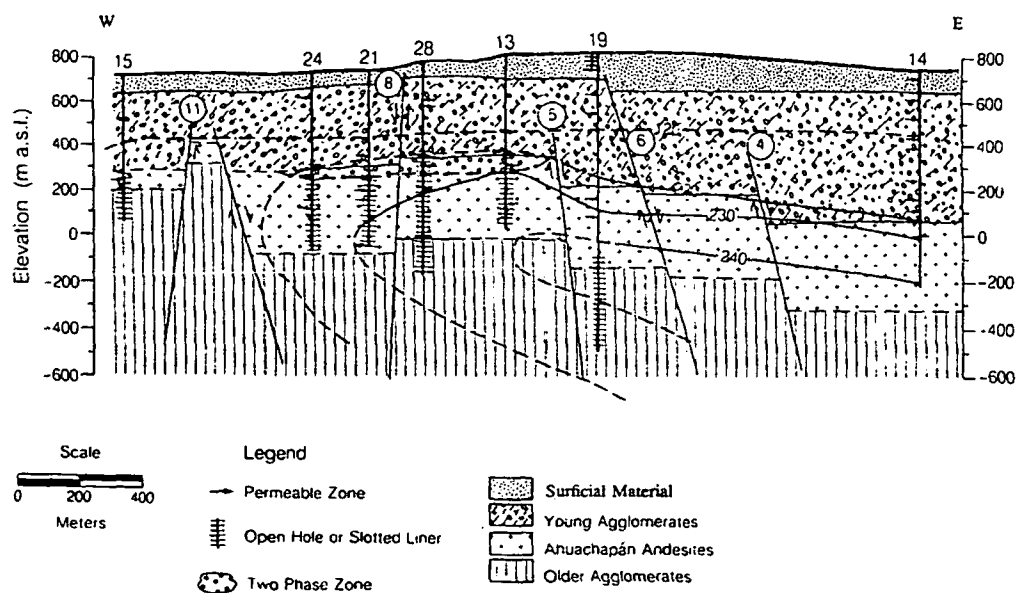


Fig. 10. West-east cross-section through wells AH-15 to AH-14 showing lithology, faults and isotherms.

permeability structure of the field, and (5) to obtain proper initial conditions for future exploitation modeling.

APPROACH

The natural state model should represent the following important features of the conceptual model of the Ahuachapán system: (1) hot fluid recharge into the wellfield occurs southeast of well AH-18. The temperature of the recharge fluids must exceed 250°C; (2) the bulk of the hot fluids flows towards the north, with only small fractions of the total flow recharging the Ahuachapán and the nearby Chipilapa reservoirs. The main outflow for the system is at El Salitre, some 7 km north of the Ahuachapán field; (3) the Ahuachapán Andesites unit is highly permeable and serves as the main conduit for lateral fluid flow; (4) the reservoir is bounded by low permeability barriers in the west (close to well AH-15) and in the north (towards well AH-10); (5) relatively cold, low-salinity waters from the north (at shallow depth) recharge the system in the eastern part of the field near well AH-2; and (6) some reservoir fluids are discharged at various surface manifestations in the Ahuachapán/Chipilapa area.

The three-dimensional computational mesh used in this modeling study consists of three layers, with 46 elements per layer, covering an area of some 50 km². The grid includes the inferred upflow zone, Ahuachapán, Chipilapa, and the outflow area of El Salitre. The thickness of the layers was determined on the basis of lithological and circulation loss data. The top of the model is at 350 m a.s.l., which approximately coincides with the top of the Ahuachapán Andesites. The model extends down to -600 m a.s.l. A plan view of the grid is shown in Fig. 11.

Few data are available regarding the fluid and heat flow at the surface manifestations, except for the El Salitre area, which had an estimated flow of 1300 l/s (approx. 1300 kg/s) at 70°C, with an unknown amount of mixing between geothermal and colder waters (Sigvaldason and Cuellar, 1970). The total energy output from the other surface manifestations was coarsely estimated from visual observations.

In the model, the surface springs are represented by pressure-dependent sinks that were designed so that spring flow-rates would be simulated accurately when the correct pressure distribution was obtained. This feature of the model will be useful in the exploitation simulations to evaluate the spring outputs as a function of reservoir pressure. The conductive heat losses to the surface are computed using an analytical algorithm developed by Vinsome and Westerfield (1980). Temperature reversals observed in some wells were matched using small heat sinks (representing colder aquifers) at the appropriate grid blocks. This approach is reasonable, as the temperature reversals occur in the relatively low permeability Older Agglomerate unit. A more rigorous, detailed effort at modeling the movement of cooler fluids underlying the main thermal anomaly would not yield any additional information regarding the field behavior. In our model the heat sinks were specified as conductive heat losses.

In the simulations, we used a procedure similar to that employed for the Krafla geothermal field (Bodvarsson *et al.*, 1984). The adjustable parameters during the modeling iterations were the flow-rate and temperature of the upflow zone, spring flow-rates and the global permeability distribution. The measured temperatures and pressures in the field were the main constraining parameters. A process of trial and error simulations was carried out until a set of parameters was found that gave reasonable matches with the three-dimensional temperature and pressure distribution. The procedure employed was as follows: (1) assign sources and sinks to the appropriate nodes; (2) assign thermodynamic conditions to the cold and hot recharge fluids; (3) assign rock properties and the permeability distribution; (4) perform simulation until steady-state thermodynamic conditions are reached; and (5) evaluate the results and return to step 1 if computed temperature and pressure distributions do not fit those observed.

another way to calculate
natural recharge -- match
natural state and P conditions --
natural state model determination

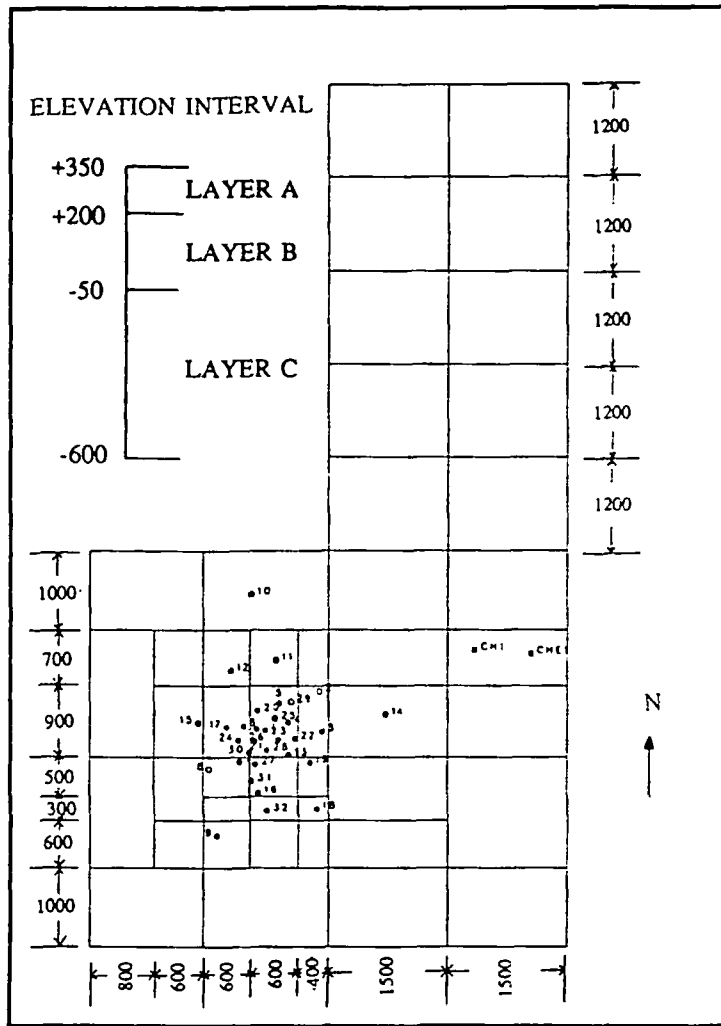


Fig. 11. Grid-blocks and well locations (dimensions in meters).

BEST MODEL

After a lengthy process of trial and error, a natural state model was developed that reproduce the pre-exploitation temperature and pressure distribution in the field. The matches between observed and simulated temperatures and pressures are shown in Figs 12–16. The model however, did not reproduce the temperatures observed in CH-1 very well, especially in the lower layers (Fig. 16). The temperature profile used for comparison with the simulated result, was obtained in 1969. This is the only log available that penetrates to this depth, and may not show the stabilized temperature conditions in the well.

The simulation results show somewhat colder temperatures than those observed for well AH-15 (Fig. 14), which is due to the fact that the well is not in the center of the grid-block, but farther to the east. As temperatures are believed to decrease rapidly west of well AH-15, the temperature profile of this grid-block seems reasonable. Other matches show good agreement between the simulated and observed temperatures.

The slight difference between simulated and observed pressures (simulated pressures are slightly higher; Fig. 12) is due to the drawdown caused by well testing during the field development phase (1972–1973). A considerable pressure decline was observed during that period. The pressure recovered during the last one-and-a-half years prior to exploitation (when well testing was stopped); the 1974–1975 data (assumed initial pressures) indicate about 1–2 bar lower pressures than in 1968.

The results from the best model indicate that near the Laguna Verde volcanic complex a total flow of 225 kg/s of about 250°C fluid recharges the area. The total thermal throughflow for the entire system is estimated to be 250 MW_t. About 60 MW_t are lost through the surface manifestations in the Ahuachapán and Chipilapa areas. Conductive heat losses to the surface are estimated to be about 20 MW_t with the remainder exiting the system by fluid discharge at El Salitre springs.

LITHOLOGY AND PERMEABILITY DISTRIBUTION

Four rock types are used in the best model (Fig. 17) to represent the different lithologic units defined for the Ahuachapán area. The material properties used are given in Table 3 and are partly based on data from Larios (1985). A description of these rock types is given below:

Rock Type 1 corresponds to the Young Agglomerates, the caprock of the geothermal system. The Regional Saturated Aquifer is found in this unit.

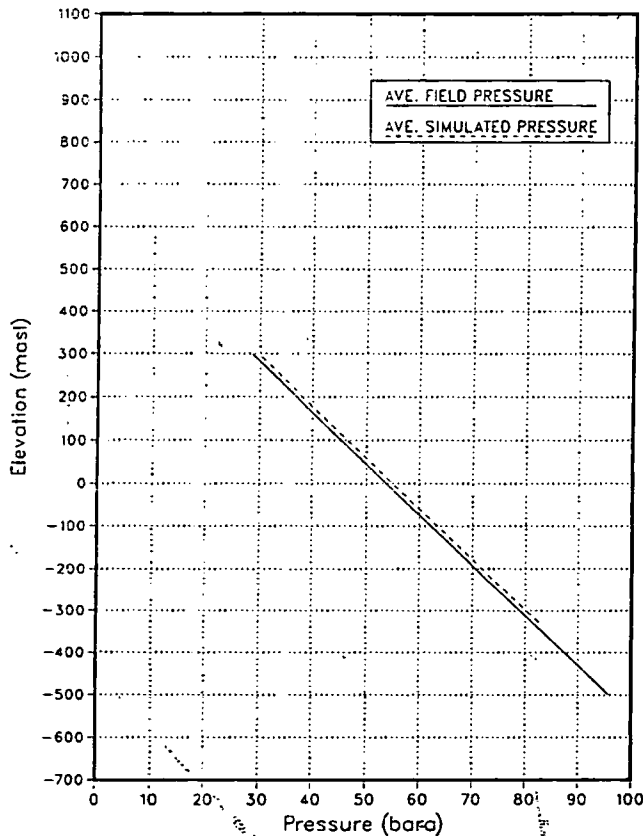


Fig. 12. Match between observed and computed pressures for the best model.

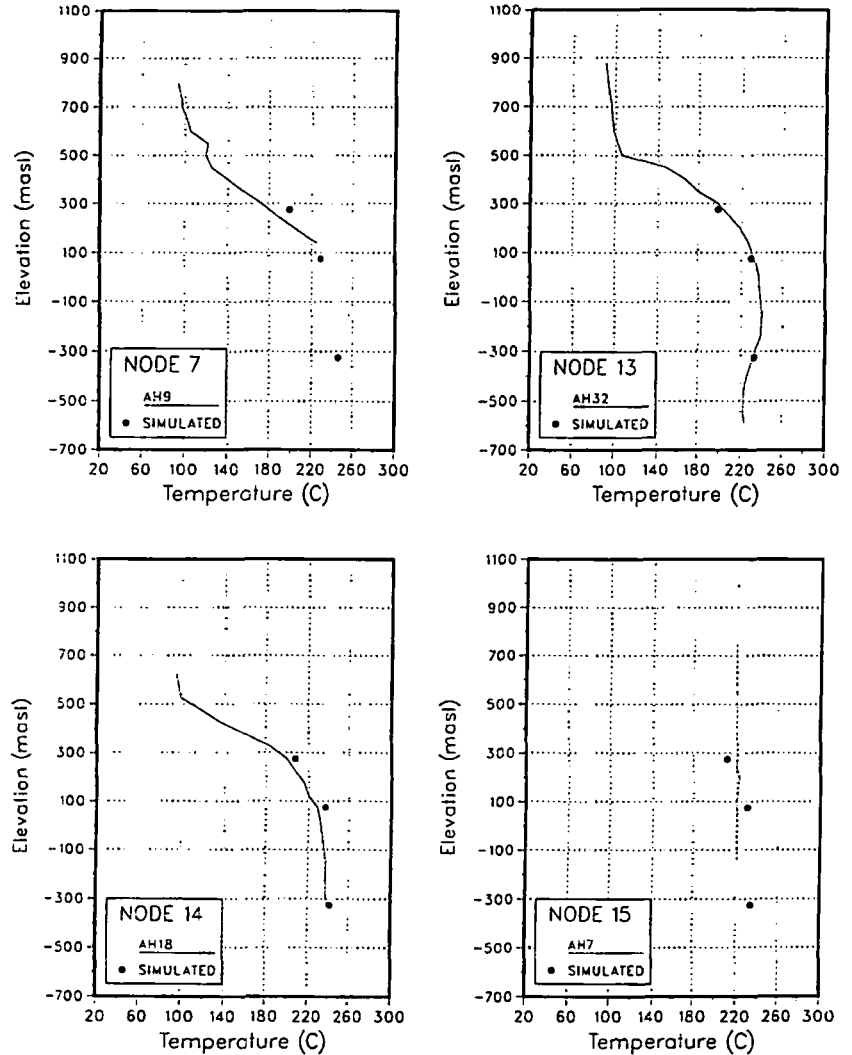


Fig. 13. Match between observed and computed temperature profiles for the best model.

Rock Type 2 represents the Ahuachapán Andesites, the main geothermal reservoir.

Rock Type 3 corresponds to the Older Agglomerates. In previous studies, this unit was considered impermeable, but we believe that it has significant permeability, although much lower than the overlying Ahuachapán Andesites. Several wells (e.g. AH-28 and 29) encountered permeable zones in this unit.

Rock Type 4 was assigned to Layer C (Fig. 17) and corresponds to a unit similar to the Young Agglomerates, but with higher permeability. This rock type was necessary to simulate the inferred high fluid flow from the upflow zone toward the El Salitre springs.

Permeability was used as one of the adjustable parameters in the iteration procedure discussed earlier. Table 3 shows the final permeability values used in the best model along with other assumed rock properties. The model results indicate a horizontal permeability for the Ahuachapán Andesites (Rock Type 2) of 80 millidarcy. Given an average thickness of this unit of between 300–400 m, a transmissivity of 24–32 darcy-meter is obtained, which agrees well with

values of 25 darcy-meter obtained from interference test analysis (Aunzo *et al.*, 1989) and 35 darcy-meter estimated from the production history (Steingrímsson *et al.*, 1991). The low vertical permeability of the Young Agglomerates (0.2 millidarcy) agrees with the assumption that this unit acts as a caprock to the system. The low permeability barriers to the north and west were modeled using very low interface permeabilities between appropriate grid-blocks.

SOURCES AND SINKS

The locations of sources and sinks in the computational mesh are shown in Fig. 18. The surface manifestation flow-rates, estimated on the basis of the model, are given in Table 4. The computed flow-rate feeding the El Salitre springs (170 kg/s) does not consider any mixing with local groundwater. Assuming that local mixing occurs with 40°C water at shallow depth, the total flow-rate of a 70°C fluid to that area would be approximately 1290 kg/s, which agrees well with the estimate by Sigvaldason and Cuellar (1970).

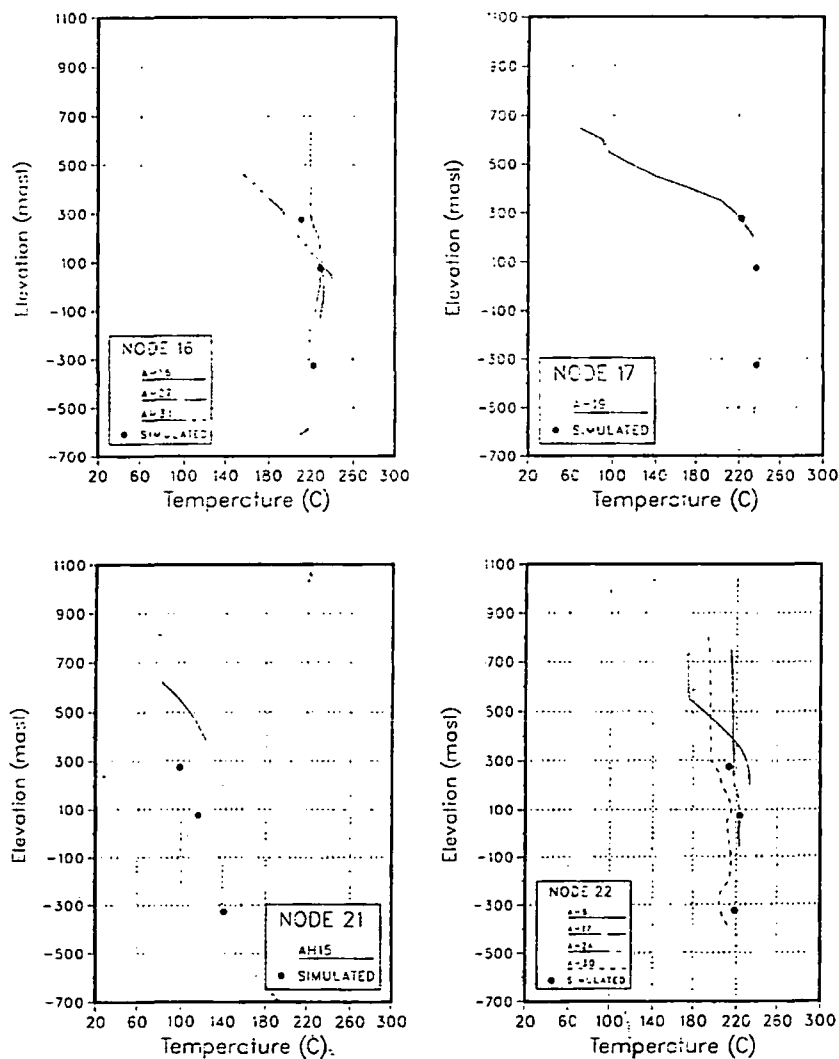


Fig. 14. Match between observed and computed temperature profiles for the best model.

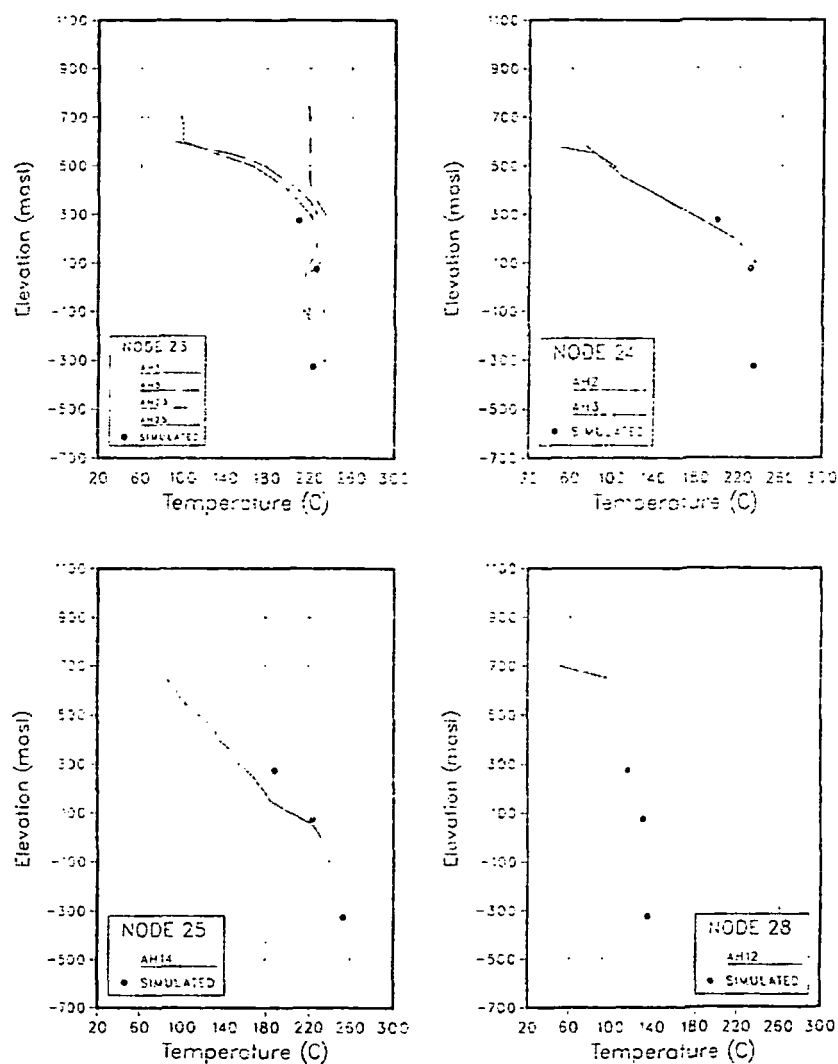


Fig. 15. Match between observed and computed temperature profiles for the best model.

Small constant heat sinks were specified in the blocks with wells AH-32, AH-18, AH-31, AH-19 (Fig. 11) in order to match the observed temperature inversions. The strengths of the sinks were 3, 6, 1.5 and 3.75 W/m², respectively.

A source of 60°C fluid was specified north of AH-10. This was found necessary to match temperature profile of this well. The cold recharge was modeled using a constant pre-boundary of 41 bar-g in the uppermost layer (see Fig. 18). The pressure at the boundary was specified so that the pressures in the adjacent blocks would be about 5 bars higher than in the of the wellfield, which is the pressure difference observed in the field.

SUMMARY AND CONCLUSIONS

Our present understanding of the Ahuachapán geothermal field suggests that it is an outcrop of a deeper and much larger system and that the reservoir extends much farther to the east

southeast. The main characteristics of that system are: (1) the Ahuachapán-Chipilapa system is recharged through an upflow zone southeast of the Ahuachapán wellfield, probably beneath the Laguna Verde volcanic complex. The temperature of this upwelling fluid is believed to be 250°C or higher, as suggested by geochemical geothermometers; (2) most of the upwelling fluids flow to the north, with the main discharge occurring in the El Salitre springs area, located about 7 km north of the wellfield. The discharge is a mixture of geothermal and Regional Saturated Aquifer fluids and the mixing occurs in the vicinity of the springs; (3) colder fluids recharge the Ahuachapán reservoir as evidenced by areal variations in chloride concentration (Fig. 8). The cold water inflows from the north from the Regional Saturated Aquifer, which overlies the main reservoir and has a higher hydraulic potential; (4) the main reservoir rocks are the Ahuachapán Andesites and the underlying Older Agglomerates. Most of the produced fluids come from the andesites, although the permeability of the Older Agglomerates is significant, as evidenced by several feed zones encountered in wells penetrating this unit; (5) faults limit the extent of the

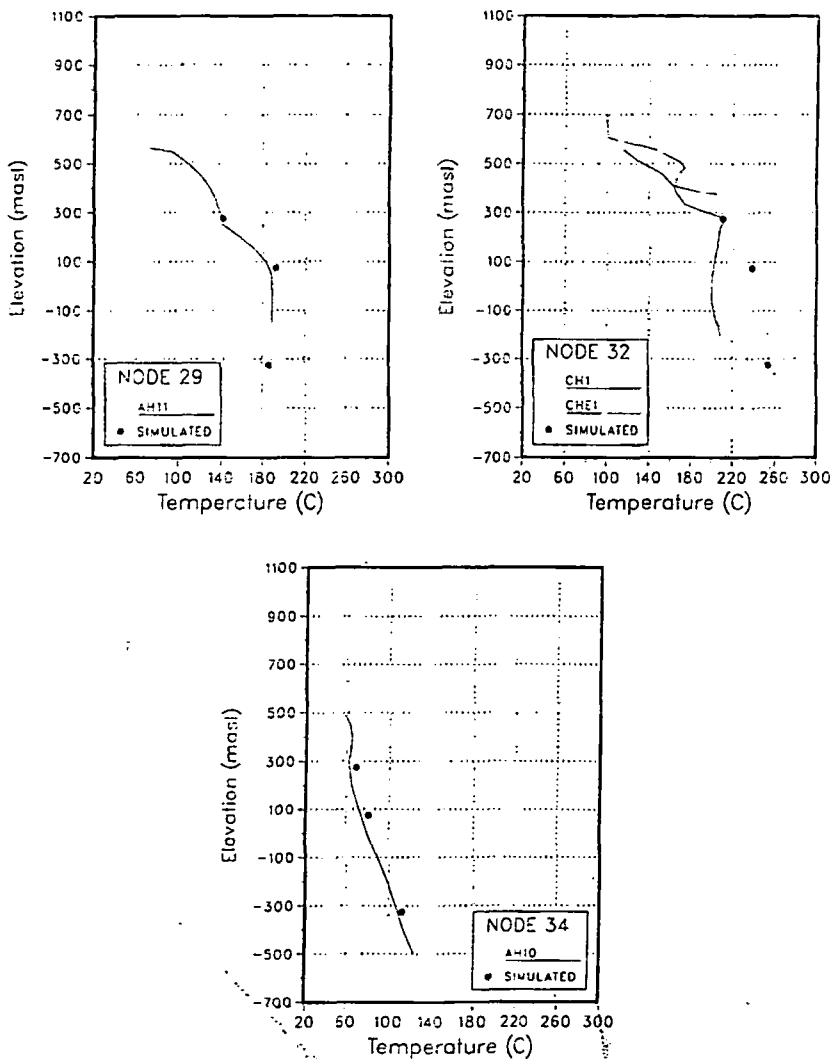


Fig. 16. Match between observed and computed temperature profiles for the best model.

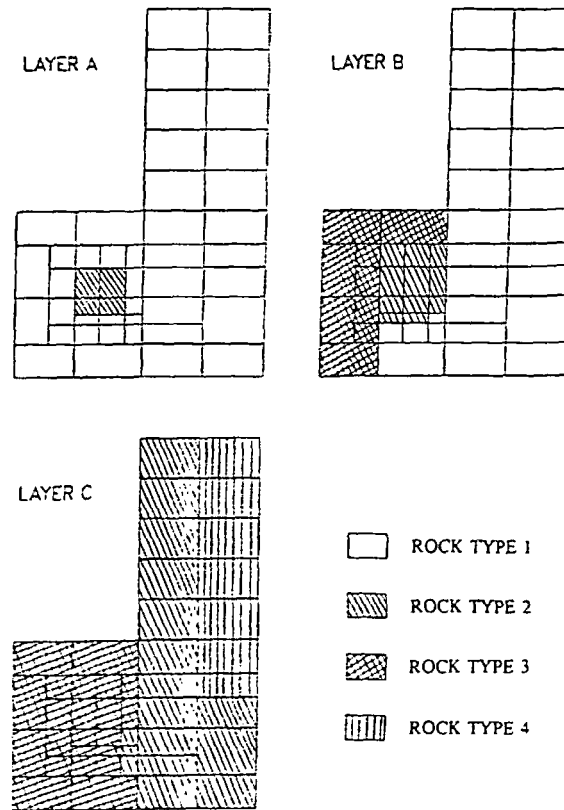


Fig. 17. Distribution of rock types in the natural state model (see Fig. 11).

Ahuachapán reservoir towards the north and the west. Other faults act primarily as conduits for fluid flow in the geothermal reservoir.

Various modeling studies conducted on the Ahuachapán field data yield valuable information on the heat and fluid movement in the area. The analysis of interference test data, and of a pressure drawdown history, and the natural state model indicate: (1) the horizontal permeability of the Ahuachapán Andesites is about 80 millidarcy, yielding a transmissivity of about 30 darcy-meters for this unit. This value is consistent with the results of the interference test analysis and the analysis of the pressure drawdown history. The vertical permeability of the andesites is estimated to be about 16 millidarcy; (2) the permeability of the Older Agglomerates is estimated to be 20 millidarcy horizontally and 4 vertically; (3) in the natural state, the to

Table 3. Rock properties used in the natural state model

	Rock type 1	Rock type 2	Rock type 3	Rock type 4
Density (kg/m ³)	2680	2890	2800	2650
Porosity	0.10	0.10	0.05	0.10
Thermal conductivity (W/m/°C)	2.30	2.30	2.30	2.30
Permeability (millidarcy)				
horizontal	10	80	20	20
vertical	0.2	16	4	2
Heat capacity (J/kg/°C)	1000	1000	1000	1000

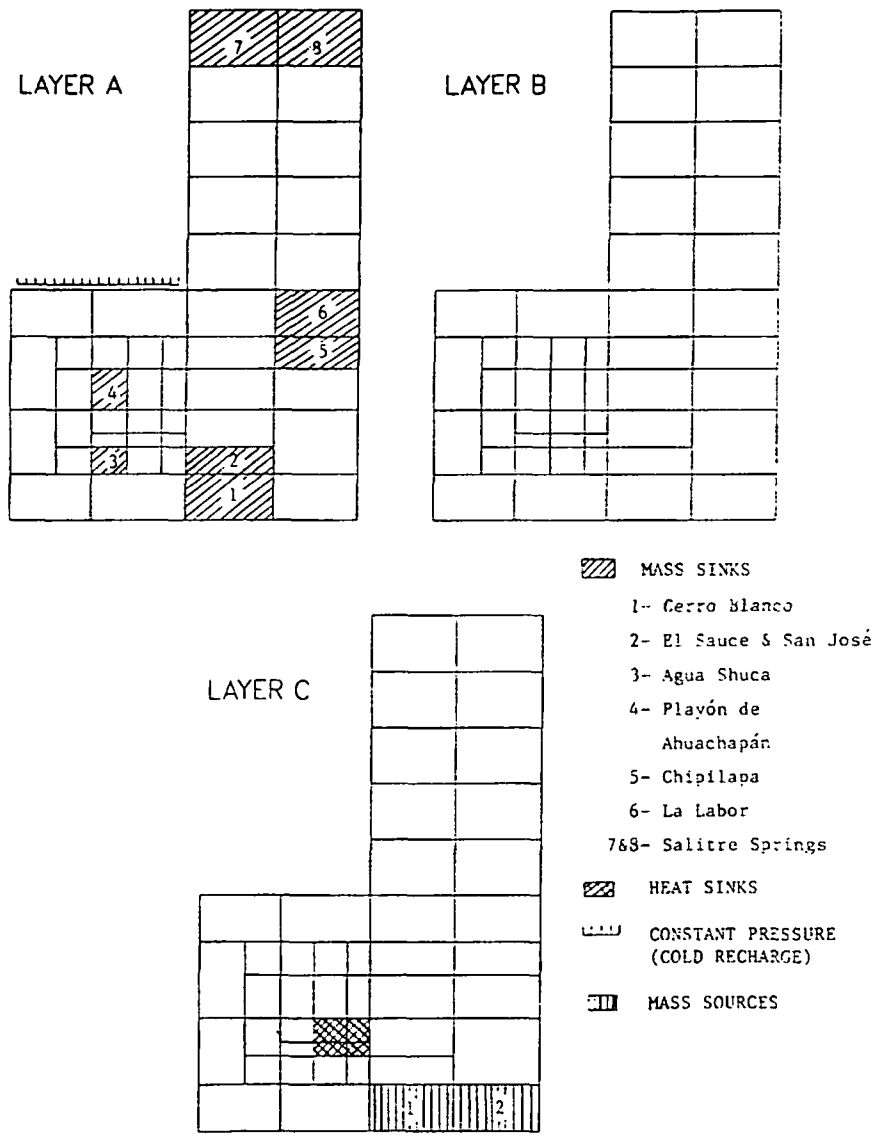


Fig. 18. Location of specified sources and sinks in the natural state model (see Fig. 11).

Table 4. Computed flow-rates and heat outputs of the different surface manifestations

	Flow (kg/s)	MW _t
Cerro Blanco	5.0	5.1
El Sauce and San José	3.4	3.4
Playón de Ahuachapán	20	19
Agua Shuca	2.2	1.9
Chipilapa	3.5	3.2
La Labor	29	28
El Salitre	170	169

Only the outputs associated with discharge of geothermal fluids are given (see text).

recharge to the geothermal system is estimated to be 225 kg/s of approximately 250°C water yielding a total thermal throughflow of 250 MW. Most of these fluids discharge in the El Salitrero springs area (170 kg/s), but significant energy is also lost through surface manifestations in the Ahuachapán and Chipitapa areas (60 MW_e) and through conduction to the ground surface (20 MW_e).

Acknowledgements—The authors appreciate the technical review of this paper by S. Gaulke and C. Doughty. This work was conducted as part of a cooperative effort of the Earth Sciences Division of the Lawrence Berkeley Laboratory (LBL) with the Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL), the Los Alamos National Laboratory (LANL), and the U.S. Geological Survey (USGS). This work was sponsored through a contract from the Los Alamos National Laboratory and supported by the Geothermal Division, U.S. Department of Energy, under Contract No. DE-AC03-76SF00098.

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**DEPARTMENT OF ENERGY
WASHINGTON, DC 20585**

FACSIMILE TRANSMISSION

DATE: June 1, 1994

**TO: Dr. Phillip M. Wright
University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, UT 84108**

TELEFAX: 801-584-4453

1 PAGE FOLLOWS.

This is the note I prepared for Gary Ward. Would you like to send it to Bill White? It is on FTS 2000 for you.

**Marshall Reed
Geothermal Division
EE-122**

202-586-8076

Telefax: 202-586-5124

Geothermal - El Salvador (May 23, 1994)

The Salvadorian electrical utility, the *Comision Hidroelectrica del Rio Lempá (CEL)*, called for proposals to perform a feasibility study of the San Vicente geothermal area (for about \$3M) some months ago. Several firms answered the request (*Geothermex & Westex (US-Japanese)*, *Instituto de Investigaciones Electricas (Mexico)*, and two Italian firms (*Geotermica Italiana* and *Electroconsult*).

A group within CEL made the technical evaluation of these proposals, which were ranked: Highest, *Geotermica Italiana* and *Geothermex&Westex* (very close to each other); a distant third, *Electroconsult*. The results of the evaluation team were sent to the Board of Directors (*Junta Directiva*) of CEL, but the evaluation was returned with the instructions that *Electroconsult* should be put on top. As one would expect, the evaluators were unhappy with that request.

It seems that the Board was influenced by the president of *Electroconsult* who "happened to be visiting" San Salvador at that time. His name is *Paolo Statorini*, one of the people indicted in Italy for influencing government agencies (the on-going scandal one reads in the newspapers). By the way, *Dr. Andrea Merla* one of the directors of *Geotermica Italiana* has travelled to San Salvador to make contacts before a final decision is made about the San Vicente contract.

Geothermex of Richmond, California, is well aware of the situation and has contacted the commercial attache in the U.S. Embassy in San Salvador last week. The idea was to have the Embassy personnel meet the president of CEL to discuss the situation and try to stop the award of the contract to *Electroconsult*.

If nothing else happens, the contract will be signed soon (before the new president of the country, *Calderon Sol*, takes power on June 1). The president of CEL, *Sol Bang*, is *Calderon's* uncle. Once *Electroconsult* gets the San Vicente contract, it will have a very good chance to get the next big CEL geothermal contract to increase the energy output of the *Ahuachapan* and *Berlin* fields, a contract of about \$40M.



MINISTRO DE LA PRESIDENCIA

Nicaragua

March, 29, 1993
MP-053-93

Dr. Tovi Meidav, President
National Geothermal Association
1901 Harrison St., Suite 1500
Oakland, California, 97612
Fax 001-510-763-2504

Dear Dr. Meidav:

I was pleased to have had the opportunity to exchange ideas with you regarding the geothermal energy resources of Nicaragua and ways of accelerating their development, during our meeting on Thursday, December 17th. I share with you the conviction that Nicaragua possesses a vast potential of geothermal energy.

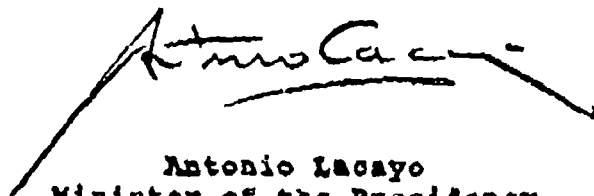
The government of Nicaragua wishes to develop its geothermal energy in an accelerated manner, with the hope that it can export substantial amounts of it to other countries in the foreseeable future. To achieve that goal, the government of Nicaragua wishes to attract the international investment community, and especially U.S. firms, to invest in the development of geothermal energy in our country.

We are aware of the importance of creating investment and tax laws that would attract natural resource companies to invest in the development of geothermal energy in Nicaragua.

Based upon my discussion with you, I wish to invite you or other bodies with which you are affiliated to review our investment and tax laws, and offer your recommendations, which will be carefully considered by the government of Nicaragua.

I thank you for your interest, and look forward to a fruitful dialogue in the future.

Sincerely yours,


Antonio Lacayo
Minister of the Presidency
Republic of Nicaragua

Copies went to: Kessler } want to find us & to
Sklar } do this.

International Science Foundation

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CONFERENCE ORGANIZER SIGNATURE _____

DATE OF APPLICATION _____

Please mail application to: ISF ♦ 455 First Avenue ♦ NYC ♦ 10016 ♦ Tel: 212/576-8450 ♦ Fax: 212/576-8457

INTERNATIONAL SCIENCE FOUNDATION

TRAVEL GRANT PROGRAM

The International Science Foundation announces a program which will award travel grants to enable a limited number of scientists from the former Soviet Union and the Baltic States to travel abroad to attend international scientific conferences. Travel Grants will include round-trip airfare from the former Soviet Union to the conference site and reimbursement to conference organizers for subsistence expenses on a per diem basis or another form. Applications will be accepted at the Foundation's New York office from conference organizers. Applications will not be accepted from scientists wishing to travel.

Eligibility Criteria

Scientists who will travel on this program should be actively pursuing basic research in the natural sciences at a scientific institution in the FSU or the Baltic states and should be attending an international professional conference in their scientific discipline. Applications for bilateral meetings will not be considered. Scientists working in the areas of applied science (e.g. computer science, healthcare, environmental clean-up), military research, conversion, or the humanities will not be supported by this program. Scientists must be formally invited by the conference organizers to present papers or poster communication at the conference. Conference organizers must waive the registration fee for scientists traveling on this program. The number of scientists traveling on this program to attend a single conference cannot exceed 2% of all registered conference participants.

Application Procedure

Applications submitted on a standard application form will be accepted at the Foundation's New York office from conference organizers. Information required on the application form must include:

- a brief description of the planned conference;
- the name of the invited scientist with all information needed to contact him or her (place of work, address, tel., fax, E-mail, etc.)
- a formal statement of invitation and the topic to be presented by the invited scientist;
- a statement that the registration fee has been waived;
- a subsistence request and its justification;
- the exact dates of travel;
- the number of registered participants if more than one individual is invited.

It is the responsibility of the conference organizers to ensure that all eligibility criteria listed above has been met. All applications will be reviewed for compliance with these criteria and the overall mandate of the Foundation. The decision of the reviewers will be final.

Award Procedure

If an application is accepted, the Foundation will notify both the conference organizers and the traveling scientist. Travel arrangements will be made by the foundation from various points in the FSU and the Baltic States. The Foundation will instruct the scientist about how to receive the airline ticket and inform the organizers about flight information.

Conditions

Applications must be received **six weeks prior to the conference date**. The Foundation is not responsible for making contact between the conference organizers and the traveling scientist other than about information directly connected to the purchase of the airline ticket. All information about ground transportation, hotels, conference dates, etc. must be directly exchanged between the conference organizers and the traveling scientist. It is the responsibility of the traveling scientists to acquire visas (transit, exit, etc.) which may be required in connection with the travel route. All problems which may arise during travel (missed connections, overnight accommodations, ground transportation, etc.) are the responsibility of the traveling scientist and the conference organizers. The Foundation will not purchase health insurance and bears no legal or financial responsibility for the travelling scientist.

Applications and inquiries should be forwarded to
The International Science Foundation
Travel Grant Program
455 First Avenue
New York, NY 10016
Fax: (212) 576-8457

FOCUS ON

DRAFT

EL SALVADOR

A GEOTHERMAL INTERNATIONAL SERIES

SPONSORED BY:

**U.S. DEPARTMENT OF ENERGY
GEOTHERMAL TECHNOLOGY DIVISION (GTD)**

PREPARED FOR:

**LOS ALAMOS NATIONAL LABORATORY
UNDER CONTRACT No. 9-X36-3652C**

PREPARED BY:

**MERIDIAN CORPORATION
4300 KING STREET, SUITE 400
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PREFACE

The *Focus on Series* is prepared to give the U.S. Geothermal Industry a quick profile of several foreign countries. The countries depicted were chosen for both their promising geothermal resources and for their various stages of geothermal development, which can translate into opportunities for the U.S. geothermal industry. The series presents condensed statistics and information regarding each country's population, economic growth and energy balance with special emphasis on the country's geothermal resources, stage of geothermal development and most recent activities or key players in geothermal development. The series also offers an extensive list of references and key contacts, both in the U.S. and in the target country, which can be used to obtain detailed information.

The series is available for the following countries:
Argentina, Azores (Portugal), China, Costa Rica, Ecuador, El Salvador, Ethiopia, Guatemala, Honduras, Indonesia, Jordan, Mexico, St. Lucia, Thailand.

Additional countries might be available in the future.

The series is to be used in conjunction with four other publications specifically designed to assist the U.S. geothermal industry in identifying and taking advantage of geothermal activities and opportunities abroad, namely:

- The "*Review of International Geothermal Activities and Assessment of U.S. Industry Opportunities.*" Final Report, August 1987. Prepared for Los Alamos National Laboratory.
- The "*Summary Report*" of the above publication.
- "*Equipment and Services for Worldwide Applications,*" U.S. Department of Energy.
- The "*Listing of U.S. Companies that Supply Goods and Services for Geothermal Explorers, Developers and Producers Internationally,*" August 1987, prepared by GRC.

Copies of these publications can be obtained from the Geothermal Technology Division of the U.S. Department of Energy. Correspondence should be addressed to:

Dr. John E. Mock
Geothermal Technology Division (GTD)
1000 Independence Avenue
U.S. Department of Energy
Washington, DC 20585
(202) 586-5340

NOTE

Data presented in this document are based on several U.S. government official publications as well as international organizations, namely:

- Background Notes (U.S. Department of State)
- Foreign Economic Trends (U.S. Department of Commerce)
- World Development Report 1987 (World Bank)
- International Data Base for the U.S. Renewable Energy Industry, May 1986 (U.S. Department of Energy)

The country's geothermal resources write-up is a revision and update of the Appendix in the "Review of International Geothermal Activities and Assessment of U.S. Industry Opportunities." LANL, August 1987.

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FOCUS ON

EL SALVADOR

Official Name: Republic of El Salvador

Area: 21,476 sq. km. (8,260 sq. mi.)

Capital: San Salvador

Population (1985): 4.8 million

Population Growth Rate: 2.9%

Languages: Spanish; some Nahuatl

Economic Indicators:

Real GDP (1985): \$3.82 billion

GDP Avg. Growth Rate (1980-85): -1.8%

Per Capita Income (1985): \$820

Avg. Inflation Rate (1984): 13%

Trade and Balance of Payments:

(1985) Exports: \$705 million; Major Markets: CACM, U.S., E.E.C., Canada, Japan

(1985) Imports: \$999 million; Major Suppliers: U.S., Central America Common Market (CACM), E.E.C., Japan

(1984) Official Exchange Rate: 2.5 colones = US \$1

Energy Profile: (Based on 1982 data unless otherwise indicated)

- Commercial Fuel Energy Consumption:

Total: 0.954 million ton of oil equivalent (mtoe)

1-Yr. Growth: -2.3%

- Commercial Fuel Breakdown:

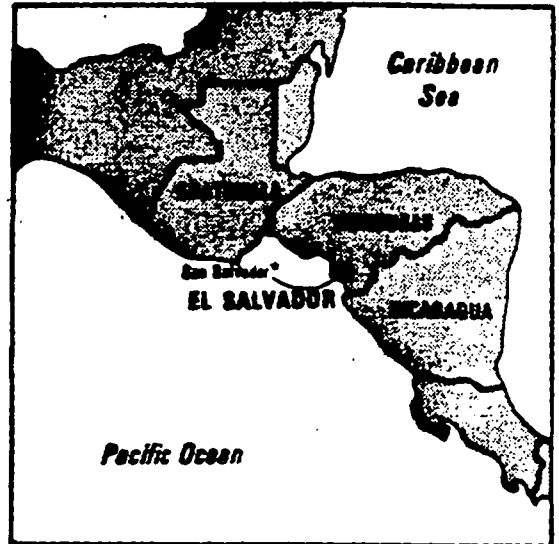
Liquid Fuels Pct: 69%

Solid Fuel Pct: Negligible

Natural Gas Pct: Negligible

Electric Pct: 31%

Commercial Fuel Consumption Growth Rate (1970-1980): 7.6%



- Electricity Generation Capacity:
 - (1982) Total Installed Elec. Capacity: 500 MW
 - Hydro: 54%
 - Hydro Potential: 1,377 MW
 - Steam: 14%
 - Gas Turbine: 13%
 - Diesel: 0%
 - Geothermal: 19%

- Electricity Sales:
 - Total: 1272 GWh
 - Residential: 31%
 - Commercial: 17%
 - Industrial: 42%
 - Government: 10%
 - Other: *
 - Average Electricity Price: *

- Geothermal Power Generation:
 - Reservoir Potential (MW): Considered to be high, estimated between a minimum of 270 MW to a maximum of 4,140 MW
 - Temperature Range: 200^o-300^oC according to regions

- Geographic Locations: Western and Southern Regions
- Development Status: Various stages, including 95 MWe of on-line power
- Countries Actively Involved: Japan, U.S.
- General Need for Assistance: Additional studies, exploratory drilling and commercial power generation

* Not available

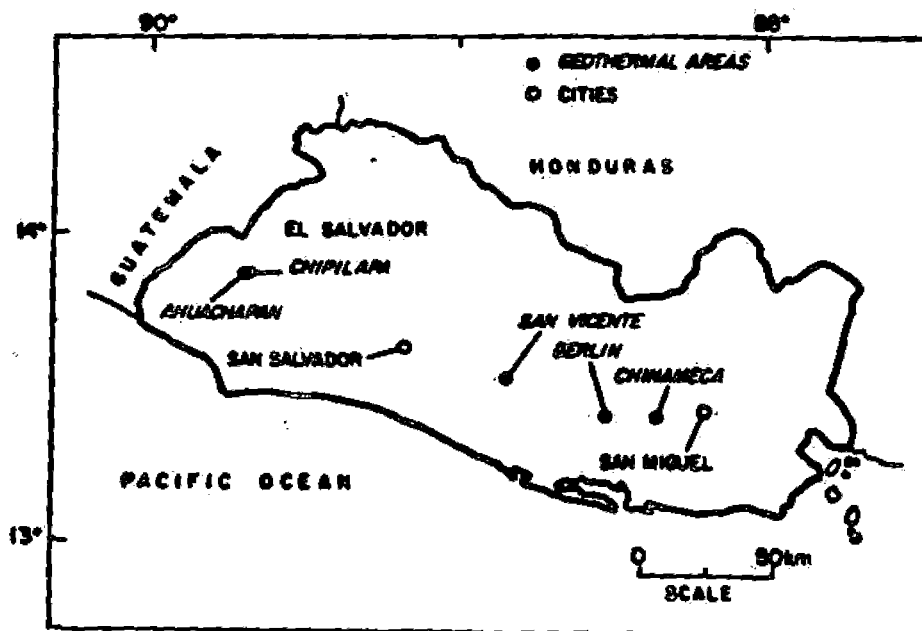
GEOTHERMAL RESOURCES

El Salvador is located in a volcanically active zone containing numerous hot springs. The country lies just northeast of the Middle America Trench.

Geothermal studies in El Salvador began in 1953 by the Geological Survey of El Salvador and the Lempa River Executive Hydroelectric Commission (CEL). The studies, which began at Ahuachapan, included geoscience surveys and shallow temperature gradient drilling. CEL continued geothermal studies with support from the El Salvadorean government and the United Nations Development Program. The results of the regional investigations showed that five areas had geothermal development potential. In order of priority, potential areas for further studies include: Ahuachapan, Berlin, San Vicente, Chinameca, and Chipilapa. Other promising areas have also been noted from preliminary studies.

Continued efforts by CEL, with UN assistance, eventually led to the completion of four production wells at Ahuachapan by 1970. The results of testing led to the decision to develop the Ahuachapan geothermal field.

The Ahuachapan geothermal field is located in western El Salvador, approximately 18 km east of the Rio Paz. Within the region occur many fumaroles, hot-springs, and other thermal manifestations. To date, nearly 30 wells have been completed in the field. A typical well is completed to a depth of approximately 800 m in the fractured Ahuachapan site. Geofluid from the reservoir is produced at temperatures of approximately 230°C and provided to two single-flash steam generating units of 30 MWe capacity, and one dual-flash unit with a rated capacity of 35 MWe. The third unit came on-line in 1980, after installation by the CEL. The power plant units were installed by Mitsubishi Heavy Industries, Ltd.



Geothermal areas in El Salvador

SOURCE: R. DiPippo, 1986, "Geothermal Energy Development in Central America."

The Berlin geothermal area is situated in eastern El Salvador approximately 90 km from the capital city of San Salvador. A deep test well was drilled in 1968 to a depth of 1,424 m where a temperature of 240°C was encountered within rocks of low permeability. No further work was conducted until 1978, when a 3 year program began, resulting in the drilling of 5 wells. These wells were drilled to depths ranging from 1,900 to 2,375 m and encountered a shallow reservoir at 800 m and a deeper hydrothermal system at 1,800 m. The temperatures in the systems have been measured up to 300°C. Additional geophysical studies will be necessary to better define the limits of the two systems.

Geoscience surveys and exploratory drilling have been performed at Chinameca located near Berlin. A total of six wells have been drilled with five of them showing promising results. The reservoir temperature is around 300°C. Three wells that are spontaneous wells have a potential of 30 MW. The other two wells could add over 18 MW. CEL plans to install two 5 MW well head units and build a 55 MW central station.

The San Vicente geothermal area is situated approximately 50 km southeast of San Salvador on the slopes of the Chichontepeque Volcano. One 1300 m deep well has been drilled with a maximum recorded temperature of 230°C. The civil conflict in El Salvador has prevented any additional work in this area.

The Chipilapa geothermal fields, located adjacent to the Ahuachapan field, may be an expression of the same heat source. Early geoscience investigations in the area between 1965 and 1968 led to the siting of a deep exploratory test well that yielded a maximum temperature of 200°C. Later geophysical studies led to the drilling of two gradient test holes (400 m) that yielded maximum temperatures of 220°C. In 1984, interest was expressed in requesting IDB cooperation for development of Chipilapa geothermal field.

El Salvador, the first country in Central America to exploit geothermal energy, currently maintains 95 MWe geothermal capacity entirely from the Ahuachapan field, which provides 19% of the country's electrical power. Geothermal resource potential is high and continued development is likely if political and economic climates allow. CEL aims for the installation of 200 MW of geothermal electricity capacity by the year 2000.

Bibliography:

Ramos, A.V., 1983, "The Current Development of Geothermal Energy in El Salvador." Latin American Seminar on Geothermal Exploration, OLADE.

DiPippo, R., 1987, "Geothermal Energy Development in Central America." Electric Power Research Institute, Proceedings: Tenth Annual Conference and Workshop. Portland, Oregon, June 24-26, 1986. pp 21-49.

Los Alamos National Laboratory, 1987, The Energy Situation in Five Central American Countries, Central American Energy and Resource Project, LA-10988-MS, June 1987. pp 153-154.

**REFERENCES
AND
KEY CONTACTS**

A. Business Climate Sources of Information

The following references are suggested for timely information on the business climate in El Salvador.

U.S. GOVERNMENT PUBLICATIONS

U.S. Department of Commerce

- Foreign Economic Trends (FET) and their Implications for the U.S.
- Overseas Business Reports (OBR)

U.S. Department of State

- Background Notes

NON-GOVERNMENT PUBLICATIONS

- International Series, published by Ernst and Whinney
- Businessman's Guide to....., published by Price Waterhouse and Co.
- Information Guide: Doing Business in, published by Price Waterhouse and Co.
- Task and Trade Guide, published by Arthur Andersen
- Task and Investment Profile, published by Touche Ross and Co.

B. Geothermal-Related Sources of Information

The following reports and documents are suggested for further information regarding geothermal energy and export opportunities overseas:

Los Alamos National Laboratory:

- **Review of International Geothermal Activities and Assessment of U.S. Industry Opportunities**

U.S. Department of Energy

- **Equipment and Services for Worldwide Applications**
- **Guide to the International Development and Funding Institutions for the U.S. Renewable Energy Industry**
- **Federal Export Assistance Programs Applicable to the U.S. Renewable Energy Industry**
- **International Data Base for the U.S. Renewable Energy Industry**
- **Committee on Renewable Energy Commerce and Trade: CORECT's Second Year - October 1985-November 1986**

California Energy Commission (CEC)

- **Foreign Geothermal Energy Market Analysis**
- **Small Scale Electric Systems Using Geothermal Energy: A Guide to Development**

U.S. Department of Commerce - International Trade Administration

- **A Competitive Assessment of the U.S. Renewable Energy Equipment Industry**

U.S. Export Council for Renewable Energy

- **International Renewable Energy Industry Trade Policy**

C. KEY CONTACTS

El Salvador

U.S. Embassy
25 Avenida Norte No. 1230
San Salvador, El Salvador
Tel: 26-7100
Attn: Robin Gomez
Officer in Charge
USAID Mission
Tel: 251730/267100

Chamber of Commerce
Nueva Avenida Norte
Y 5 C.P.
San Salvador, El Salvador

Comision Ejecutiva Hidroelectrica
Centro de Gobierno
San Salvador, El Salvador

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- Bureau for Science and Technology

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- Office of Trade Promotion

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- Export Development

Ms. Laverne Branch
Latin America, Middle East and Africa
U.S. and Foreign Commercial Service (USECS)
U.S. Department of Commerce
Washington, DC 20230
(202) 377-4756

- Minority Business Development Centers

Minority Business Development Agency
U.S. Department of Commerce
Washington, DC 20230
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or contact:

Regional Offices:

Atlanta, GA (404) 881-4091
Chicago, IL (312) 353-0182
San Francisco, CA (415) 556-7234
Dallas, TX (214) 767-8001
New York, NY (212) 264-3262
Washington, DC (202) 377-8275 or 8267

- DOC Marketing Periodicals

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
(202) 783-3238

U.S. Department of Energy

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International Trade Commission

Office of Publications
International Trade Commission
701 E Street, NW
Washington, DC 20436
(202) 523-5178

Office of the U.S. Trade Representative

Mr. Fred Ryan
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Overseas Private Investment Corporation

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- Publications

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VIEW GRAPHS PRESENTED
BY THE
EL SALVADORIANS
AT THE
NATIONAL GEOTHERMAL ANNUAL MEETING
OCTOBER 5, 1992
SAN DIEGO, CALIFORNIA

PROYECTOS GEOTERMÓELÉCTRICOS
 acuerdo con el desarrollo de Plan de Expansión a Noviembre de 1991.

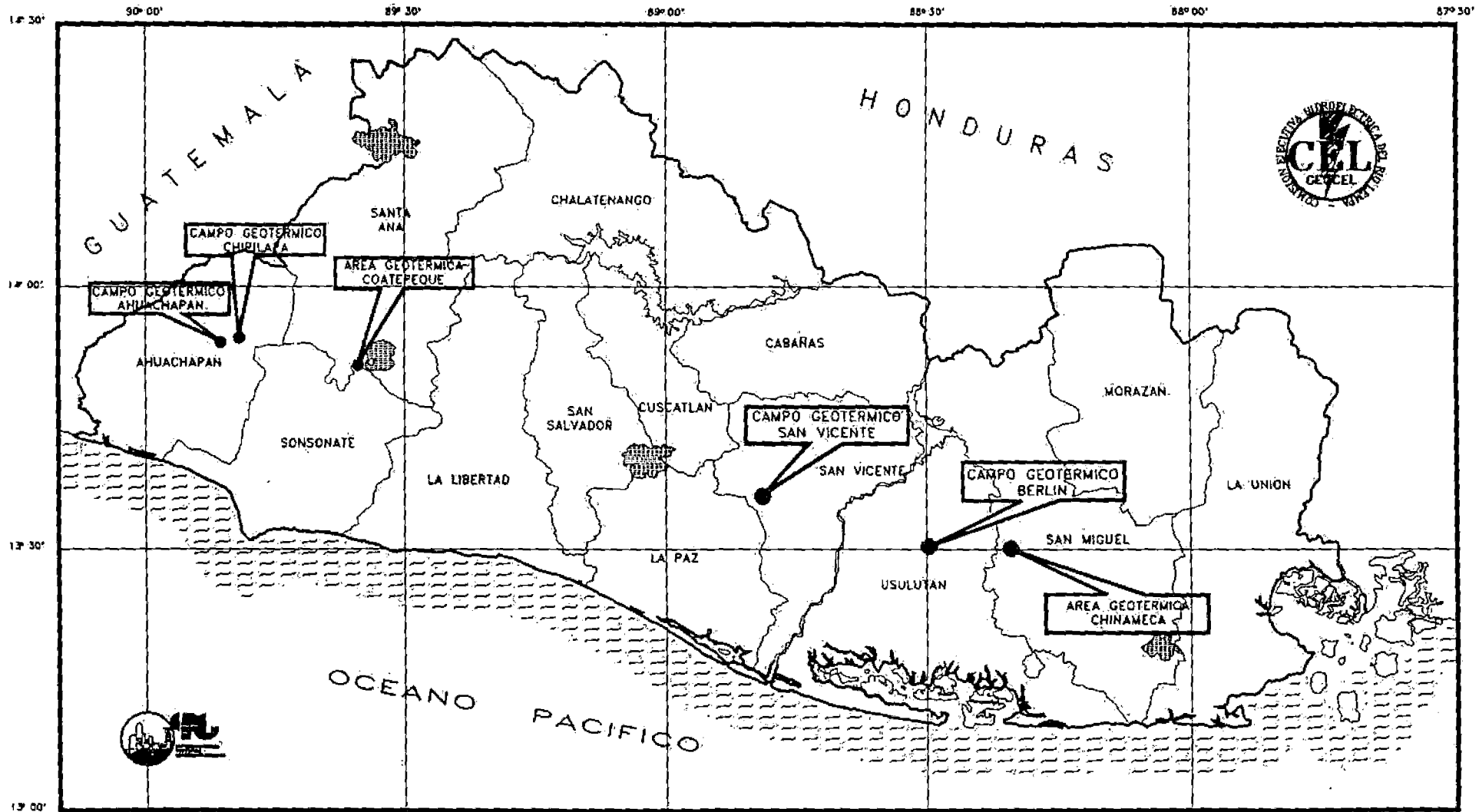
ETAPA GEOTERMICA	NOMBRE DEL PROYECTO	ETA TUS		COSTO PRESUPUESTO			TOTAL	DURACIONES		POTENCIA ELECTRICA ESPERADA	Objetivo principal	Observaciones Importantes
		Fisico	FINANC	TOTAL M.us\$	DESGLOSE ML (ca)	MONEDA ME		E.ECUCION PREVIWER	E.ECUCION INVERSION			
DESARROLLO Y EXPLOTACION GEOTERMICA	1. Establecimiento Campo Aluschapán - Programa Integral BID (Fase I BCE incluida).	Ejecución de la preparación de Preinversión (Concurso)	BID/FOSEP (Preinversión BID (Principales) BCE (Principales))	0.58 34 12	(*) 7 M\$ 3.1 M\$	0.58 M\$ 27 M\$ 6.0 M\$	4.5 años	Abri/92 a Septiembre/92 No hay	Julio/93 a Junio/96 Octubre/92 a Octubre/94	28 Mw. (Gradualmente desde Ag/96) 5 Mw. (desde Oct/94)	Recuperar 30 Mw de potencia operable por 10 años adicionales	La inclusión de BCE como parte del programa Integral con BID aún en estudio (*) ignorados
	2. 1er Desarrollo Geotermológico y Condensación Bafin.	Ejecución de la preparación de Preinversión (Concurso)	BID/FOSEP (Preinversión BID (Principales))	1.1 85	(*) 16.5 M\$	1.1 M\$ 66.8 M\$	4.5 años	Abri/92 Diciemb/92	Octubre/93 Mayo/96	2 x 20 Mw	Instalar los primeros 40 Mw. Aislamiento y condensación.	El potencial total instalable del campo sigue estimado en 160 Mw. Haber un 2do. desarrollo.
	3. 3a. Unidad Bocapozo Bafin.	Documento "Geoc" del Proyecto a revisión por GeothermEx	CEL (Preinversión) CEL (Principales)	7 6.2	(GhmEx) 3.2	7 2 M\$	1.7 años	Diciemb/91 a Febrero/92 (GeothermEx).	Marzo/92 Diciemb/93	1 x 5 MW	Instalar 5 Mw. Contrapeso en el pórtico TR5 Bafin.	Con el equipo principal de una unidad adquirida de Francia en el proyecto No. 5
	4. Bocapozo I Bafin.	España para reinyector para prueba en Operación	BELGICA (Gobierno y Bafin)			3.42 M\$	4 años	No hay	Junio/88 Julio/92 (7)	2 x 5 MW	Instalar 10MW. Contrapeso en TR2 y TR9.	(1) Probable incremento de costos por sustitución de TR9.
	5. Desarrollo Acelerado C.G. Chiriquipa.	España final de la investigación en sísmica y reinyector Bafin.	FRANCIA (Gobierno y Banca Com)	20.54 1.98	6.11 M\$ 0.216 M\$ (OC2)	80.6 MFF (16.43 M\$) 8.4 MFF (1.46 M\$) (OC2)	3.7 años	No hay	Junio/88 Marzo/92	-	Completar explotación geotérmica y experimentación reinyección.	La instalación de 2 x 5 MW tendiente a los proyectos Nos 3 y 6. La OC2 aún en trámite.
	6. Bocapozo I Chiriquipa	España para productor (CHA o CHB) del proyecto No.9	FRANCIA (Parte de la preinversión)		2497 MC	0.5 MFF	1.7 años	No hay.	Febrero/92 Sept/93	1 x 5 Mw.	Instalar 5 Mw. contrapeso en CHA o CHB.	La programación de explotación de 4 meses por cada pozo que no resulte productivo.
	7. Estudios de Potencial Bafin.	Pararar a Licitación	B M (Principales)		9.084 M\$	2.06 M\$	1 año	No hay	Marzo/92 Marzo/93	-	Implantar monitores de la explotación bocapozo del campo.	Completar estudios geofísicos de Facilitación Geotérmica.
	8. Bafin Fase I.	A ejecución por Geocel en el 1er. semestre 1992	CEL				6 meses	No hay	Enero/92 Julio/92	-	Completar estudios geofísicos de Facilitación Geotérmica.	La mayor parte del proyecto original para el proyecto No. 8
FACTIBILIDAD GEOTERMICA	9. Factibilidad Chiriquipa.	A ejecución de perforaciones exploratorias profundas	B C I E (Principales)				4.8 años	No hay	Abri/89 Junio/93	-	Pasar a la etapa de explotación comercial del área.	Evaluación de avance en febrero/92 por el Grupo Consultivo BID CEL.
	10. Factibilidad San Vicente	A formulación de Dato. de Factibilidad de Proyecto	A Gestión: BID/FOSEP (Preinversión BID (Principales))	0.8 12		0.6 M\$ 8 M\$	2.8 años	Enero/93 Junio/93	Julio/93 Diciemb/95	-	Realizar la Factibilidad Geotérmica para 20 MW con licitación.	Evaluación de inicio de proyecto en Feb/92 por GC BID.
DADA	11. Prefactibilidad San Vicente. Conclusión.	A aprobación por CEL y ejecución inmediata	CEL				4 meses	No hay	Enero/92 Abri/92	-	Presentar el final de la Prefact. Geot. realizada en 70 B.I.	Evaluación en Feb/92 por Grupo Consultivo BID CEL p/decisión Fact. Geot.
	12. Prefactibilidad Cotopeque. Finalización.	A ejecución de las perforaciones exploratorias profundas	ITALIA (Conclusión) BID/BCE (Perforación)	8.55	2.36 M\$	154.2 ML (1.186 M\$) 6.0 M\$	4.7 años	No hay	Julio/89 1er. Trimestre 1994.	-	Pasar a la etapa de Factibilidad Geotérmica.	Evaluación de avance a mejorar en Feb/92 por GC Consultivo.
	Reconocimiento Zona Occidental.	España del Informe final del Consultor Italiano	ITALIA (Conclusión)			86.8 ML	2.8 años.	No hay	Julio/89 Diciembre/9	-	Identificar áreas de desarrollo de interés.	Evaluación en Feb/92 por Grupo Consultivo BID CEL.
				TOTAL	CEL	EXTERNO						
Intención Zona del país, hidro, u. según naturales Nos 2,0.		IDEA	Identificación preliminar de posibilidades (no detallada).	Costos según tipo de proyecto y potencia a instalar. Referencia de costos: Prefact. Geot. 1 a 2 M\$; Prefact. Geot. 4 a 9 M\$; Planta Condens. vapor: 1760 \$/Kw; Planta Condens. vapor: 1600 \$/Kw; Planta 3 Mw: 2600 \$/Kw.			Duraciones según el tipo de proyecto a instalar. Referencia de tiempo: Reconocim. Prefact. Geot. 1 año; Prefact. Geot. 1.5 años; Fact. Geot. 2.5 años; Planta 20 a 30 Mw, vapor (BP) vapor: 3 años; Planta 5 Mw: 2 años; Planta 3 Mw: 1.5 años.		Otras 110 Mw (en los 6 días totalmente desarrolladas)		Explotar todo el potencial geotérmico nacional	Avances según los resultados en cada etapa y área del país.

PLAN DE EQUIPAMIENTO DEL SISTEMA DE GENERACION
 PRONOSTICO INTERMEDIO DE DEMANDA
 CONSIDERANDO RETIRO DE PLANTAS TERMICAS

<u>Año</u>	<u>Cant.</u>	<u>Proyecto</u>	<u>Pot.</u>	<u>Pot. Acum. (MW)</u>
				566.6
1992	1	Bocapozo Berlin	<u>5</u>	571.6
1993	1	Bocapozo Berlin Turbina a Gas (37.5MW)	<u>5</u> 66	642.6
1994	1	Bocapozo Berlin	<u>5</u>	652.6
	1	Bocapozo Chipilapa	<u>5</u>	
1995				
1996	1	Vapor para Ciclo Combinado	29	681.6
1997	1	Geotérmica Berlin	<u>18.5</u>	700.1
		Estabilización Ahuachapán	<u>21</u>	
	-1	Soyapango (TGI)	-13	
1998	2	Geotérmica Berlin	<u>37</u>	750.6
	1	Geotérmica Chipilapa	<u>18.5</u>	
	-1	Soyapango (TG2)	-13	
1999	1	Expansión C.H. 5 de Nov. Soyapango (TG3)	120 -16	854.6
2000	1	Geotérmica San Vicente	<u>18.5</u>	925.1
	-1	Acajutla (TV1)	-28	
	2	Unidad San Marcos Lempa	80	
2001	1	Térmica a Vapor (75MW) Acajutla (TV2)	69 -30	964.1
2002	1	Térmica a Vapor (75MW)	69	1021.1
	-3	Unidades de Miravalle	-12	
2003	1	Térmica a Vapor (75MW)	69	1090.1
2004	1	Térmica a Vapor (75MW)	69	1159.1
	1	Unidad San Marcos Lempa	40	
2005	1	Térmica a Vapor (75MW)	69	1250.1
	-1	Turbo Gas San Miguel	-18	

EL SALVADOR

LOCALIZACION DE PROYECTOS GEOTERMICOS





**Foreign Economic Trends
and Their Implications
for the United States**

EL SALVADOR

APRIL, 1994

PREPARED BY
AMERICAN EMBASSY SAN SALVADOR

FET

HIGHLIGHTS

The Salvadoran economy continues to reap the benefits of sound economic programs, a commitment to a free economy and careful fiscal management. The service and construction sectors led El Salvador's economy to a real growth rate of five percent of GDP in 1993. Inflation was 12 percent in 1993, down from 20 percent the year before. The economic outlook for 1994 is for growth of 5.5 percent with inflation dropping to 10 percent.

In 1993, El Salvador's total exports were 731.7 million dollars while imports were 1.9 billion dollars. This billion dollar plus trade deficit was offset by family remittances of almost 800 million dollars plus generous amounts of bilateral aid as well as loans from multilateral lending organizations. A breakdown of Salvador's imports reveals that 25 percent were machinery and equipment destined to upgrade the nation's productive sectors.

At the end of 1993 the nation had net international reserves of 667 million dollars, equal to roughly four months of imports. This compares to 506.6 million dollars at the end of 1992. The exchange rate is about 8.7 colones per dollar. The nation has a conservative debt posture, and most of the roughly 1.8 billion dollars of debt is to multilateral lending institutions.

Visitors to El Salvador are often surprised by the amount of new construction in and around San Salvador as well as in other parts of the country. Much of this construction is housing for the nation's burgeoning middle class. Industries tied to construction, such as non-metallic minerals, are operating at very high rates of capacity.

Urban unemployment in 1993 was about 8.1 percent while the minimum wage in urban areas was 935 colones, roughly 107 dollars per month. According to a study done in mid-1993, even the least skilled workers in urban areas generally earn twenty percent more than the minimum wage. In 1993, based on statistics from the Salvadoran Social Security system, the formal sector created 36,800 new jobs. After reviewing the number of new businesses starting up plus the plans of business leaders to expand their operations, the Embassy believes the formal sector will create even more jobs in 1994.

Section 2. CURRENT ECONOMIC SITUATION AND TRENDS

A. ECONOMIC GROWTH FROM FREE MARKET INITIATIVES

In 1994 the target for the Salvadoran economy is real growth of 5.5 percent of GDP, compared to 5 percent in 1993 and 5.1 percent in 1992. These impressive growth statistics are directly related to the reform program launched by President Cristiani in July, 1989. The President and his advisors, mostly laissez-faire enthusiasts, applied free market medicine to El Salvador's war-ravaged economy. Important elements of the economic program that were quickly implemented in 1989-1990 include: 1. Elimination of price controls on 240 consumer products; 2. The break-up of government and government-sponsored monopolies in the export of coffee and sugar;

3. Reduction of import tariff duties from a range of 0-240 percent to 5-35 percent; 4. Elimination of non-tariff barriers such as quotas, import prohibitions, import licenses, and prior deposit requirements; 5. Adoption of a free market exchange rate system; 6. Legalization of foreign exchange houses; 7. Maintenance of positive real interest rates; 8. Reduction of the fiscal deficit by cutting real expenditure levels and raising key public utility rates; 9. Initiation of a program to overhaul the tax system based on the supply-side notion of lower tax rates/broader tax base; 10. Implementation of disciplined monetary policies and, 11. Plans to privatize the banking system.

During 1991 and 1992 the Government of El Salvador (GOES) consolidated the economic program and adopted follow-up measures. Among the more important actions taken in 1991 were:

- Established interest rate bands allowing banks greater flexibility to set loan and deposit rates.
- Closed the once powerful state-run grain board
- Initiated a share offering for the sale of two banks to the private sector.
- Passed tax reform legislation that lowered the top marginal rates on corporate and personal income taxes.

The GOES took the following important actions in 1992 that increased GOES revenues and improved the nation's economy:

- Introduced the ten percent value added tax (IVA) that replaced the decades-old stamp tax.
- Raised utility rates.
- Raised bus fares.
- Sold the Hotel Presidente to private investors.
- Deregulated interest rates.

In 1993, the GOES moved forward with the sale of banks and the savings and loans to private investors. At the time of this report, April 1994, all commercial banks except for one are in private hands as well as important savings and loan associations.

The vast majority of Salvadoran tariffs are in the 5-20 percent range. There are a few exceptions at 25 and 30 percent.

The five percent growth in real terms in 1993 was spread throughout the economy, although the service and construction sectors were leaders. A sector by sector breakdown is as follows:

Table 1
GDP Growth by Sector in 1993

Agriculture	2.8 (Figure may be revised downward)
Mining	10.8
Manufacturing	7.6
Construction	9.7 (Figure may be revised upward)
Electricity and Water	16.8
Transport and Communications	8.1
Commerce	6.2
Finance	8.0
Housing	5.3
Government	- 4.0 (Figure may be revised upward)
Services	6.4
Overall Growth for 1993	5.0.

B. AGRICULTURE

In 1993, this sector had a growth of 2.8 percent (figure may be revised downward), down from 7.8 percent in 1992. This drop was due primarily to a contraction of 48,000 manzanas (83,180 acres) in the area planted in basic grains. The outlook for 1994 is modest growth in this sector.

In 1994, coffee production, which accounts for about a third of El Salvador's agricultural output, is forecast to drop. Reasons for this smaller crop include: conversion of prime coffee land into subdivisions; farmers have cut back on fertilizers, maintenance, and new planting after years of low coffee prices; and a small, but growing scarcity of workers for the coffee industry during peak periods. In early 1994, the Central Bank announced a refinancing program to roll over debt of coffee farmers. In 1993, El Salvador joined with other nations in a coffee retention scheme that, according to advocates, has helped raise coffee prices. In 1993, coffee exports totaled 226 million dollars.

Sugar is El Salvador's second most important agricultural product after coffee and a bright spot in the agricultural sector. El Salvador's sugar harvest in the 1993/94 season should reach about 7.7 million quintals, which would be about 9 percent more than the previous season. The harvest at almost all of the sugar refineries began on December 15 and is proceeding on schedule. El Salvador's sugar quota for the United States has declined, forcing exporters to increase sales to other markets. Sugar exports in 1993 were 31 million dollars. In 1992, the sugar refineries revised their buying practices to take into account quality as well as weight of the sugar cane, a move that has increased efficiency among sugar cane producers. The privately owned Izalco sugar refinery is in the midst of a twenty million dollar modernization program. In 1994 the GOES plan to privatize some of the government owned sugar refineries.

Sugar production is somewhat like a double edged sword. It is produced at a cost well below the U.S. quota price, more or less equal to the domestic sugar price, but slightly above the present world price. Therefore, as production increases, more sales are made to the world market and, at the present world price, there are economic losses from this increased production.

Cotton production continues to decline in El Salvador. In 1994 cotton farmers will plant less than 5,000 manzanas or 8,650 acres of this crop compared to 120,000 manzanas or 207,600 acres in the late 1970s. Seventy percent of the traditional cotton production area is located in the Eastern region of the country, where the effects of the conflict were the most severe. In 1994, El Salvador's textile industry will need more than 80,000 bales of cotton, while the domestic production will probably only reach 5,000 bales. (Note: Each bale of cotton weighs 480 pounds.)

Production of Salvadoran corn and beans declined in the 1993/94 season compared to the previous year. Corn production dropped a steep 10.6 percent to one million quintals as both the area planted and the yields per acre declined. One discouraging point is that the use of hybrid corn seeds has steadily declined since the 1987/88 harvest. Many corn producers, with modest financial resources, are unable to access improved technologies and techniques to improve the output of their lands.

In 1993, the price of beans in El Salvador climbed from about 2.5 colones per pound in February to over 7 colones a pound in August before declining when the harvest began at the end of November. The 1993/94 bean harvest is estimated at 1,350,000 quintals, a slight drop from the 1.4 million quintals of the previous season. The production decline is attributed to less area planted (6,900 manzanas) and lower yields from the excessive rainfalls in September and early October 1993.

Recognizing the need to diversify the agricultural economy, development planners have focused on non-traditional agricultural exports. FUSADES, the private enterprise development organization, is working with private investors to produce different non-traditional crops. Recent examples of non-traditional exports include melons to Holland, Jalapeno peppers and marigold flowers to the United States, and organic coffee to various markets. One cooperative was going to export onions, however, a pizza chain purchased the cooperative's entire output for its rapidly growing network of pizza outlets.

During the 1994 Presidential campaign, one candidate raised the issue of idle lands. According to the Minister of Agriculture there are idle lands, but incorporating these lands is not an easy task. Some areas suffer from serious erosion while other areas are slowly recovering from excessive pesticide use, including DDT. He sees the reincorporation of these lands to productive status as a slow process. An agricultural cooperative won an ecology award in 1993 for its restoration of agricultural lands that had been affected by severe erosion and another won for producing and marketing organic coffee.

C. MANUFACTURING

In 1993, the manufacturing sector had real growth of 7.6 percent, and the forecast for 1994 is real

growth of 7.1 percent. Key factors behind this growth are expanded sales to the Central American market and increased factory utilization. The impressive investments by firms in new equipment in 1993 will help maintain the impressive growth rate in the manufacturing sector. In 1993, this sector accounted for 18.8 percent of El Salvador's GDP, produced 50.8 percent of the exports, and employed about 15 percent of the workforce. Most of the manufacturing sector is located in and around the capital city of San Salvador. The sector includes firms whose production goes to the domestic market and neighboring Central American nations as well as companies, often located in export processing zones, whose markets are the United States and other industrialized nations. In the 1970s El Salvador was the most industrialized nation in Central America, although 12 years of civil war eroded that position.

This sector has greatly changed since 1989, when the Cristiani Administration dismantled the protectionist trade policies that had allowed inefficient, import substitution industries to prosper. El Salvador's industrial sector now faces strong import competition. A key phrase is industrial reconversion, which includes installing new equipment and modernizing the ways of doing business. The improved productivity has come naturally; many believe the nation's most important resource is its abundant and energetic work force. The Salvadoran work ethic is often cited by foreign investors as the primary reason they chose to locate manufacturing facilities in this nation.

Apparel assembly is the fastest growing segment of the manufacturing sector. Firms located in export processing zones are expanding their operations. The Embassy estimates that around 50,000 workers are now employed in textile firms, up from 32,500 at the beginning of 1992. While all of the space is now rented in the San Bartolo Export Processing Zone and the El Progreso Zone has limited space available, the San Marcos and El Pedregal zones are expanding. The San Marcos zone, located near San Salvador on the road to the airport, has 38,500 square meters and is building another 7,000 square meters. The El Pedregal zone, located near the airport, has a total of 50,720 square meters, 45,320 square meters just completed, of which 24,600 square meters is available. Not all maquila companies are in export processing zones as Salvadoran law allows maquila operations in other areas. For instance, one maquila firm is located in a converted warehouse facility about a mile from the US Embassy.

The factory utilization index for the last quarter of 1993 was 73 percent. Standout sectors were the paper and printing industry, which operated at 85 percent of capacity, while non-metallic minerals, whose output goes to the construction industry, registered a 79 percent utilization level. These two sectors were also leaders in attracting new investment in 1993.

D. COMMERCE AND FOREIGN TRADE

Commercial Activity has been a dynamic growth sector in the past decade in El Salvador. It increased its share of GDP (measured in current prices) from 22.9 percent in 1980 to 36 percent in 1993. The pace of commerce in El Salvador is linked to the crop and holiday cycles: commerce peaks during the November-March harvest season (which includes the Christmas retail period) and tends to decline throughout the rest of the year. In 1993 imports were 1.9 billion dollars, a 12.6 percent growth compared to 1992. The following table provides a breakdown of El Salvador's imports by category and reveals an economy upgrading its productive capabilities:

Table 2.
Imports in 1993
(In thousands of dollars)

Category	1992	1993	Percentage Variation
A. Consumer Goods	489,071	522,005	6.7 percent
-- durables	71,242	81,226	14.0 percent
-- non durables	417,829	440,779	5.5 percent
B. Intermediate Goods	778,389	825,362	6.0 percent
-- manufacturing sector (of which petroleum was)	606,387	630,087	3.9 percent
	128,152	122,978	- 4.0 percent
-- agricultural	70,848	70,204	- 0.9 percent
-- construction	90,579	110,971	22.5 percent
-- other	10,581	14,100	33.3 percent
Capital Goods	431,038	564,863	31.0 percent
-- Manufacturing industry	121,394	170,514	45.5 percent
-- transportation	205,537	257,365	25.2 percent
-- agriculture	11,822	10,948	- 7.4 percent
-- construction	15,357	29,658	93.1 percent
-- other	76,928	98,378	25.3 percent

In 1993, according to the Central Bank, El Salvador's exports were 731.7 million dollars, an increase of 134.1 million dollars compared to 1992. Much of the increase was in coffee exports and non-traditional exports destined to the Central American market. The composition of the exports is as follows:

Table 3.
Exports of El Salvador in 1992 and 1993

Category	1992 (in Millions of Dollars)	1993	Percentage Variation
Coffee	151.2	226.3	30.5 percent
Cotton	1.5	0.2	86.7 percent
Sugar	44.7	31.1	-31.3 percent

Shrimp	19.8	25.8	30.3 percent
Non-trad. Central America	257.3	309.2	20.1 percent
Non-trad. to other nations	123.0	139.1	13.1 percent
Totals	597.5	731.7	22.4 percent

Note: These figures do not include the value added (71 million dollars) from drawback operations

The big story in El Salvador's exports is the resurgence of non-traditional exports to Central America. This was a strong area in the 1970s, but by 1986, after years of political turmoil had taken their toll, non-traditional exports to Central America had dropped to under 100 million dollars for the year. Since 1986 these exports have been rebounding, and in 1993 reached over 300 million dollars. Salvadoran businessmen continue to expand their export efforts to Central American nations. The GOES has been a leader in pushing for increased regional integration in trade negotiations. The Embassy predicts further growth in this area in 1994.

Subtracting export income from imports, El Salvador has a billion dollar plus merchandise trade deficit. This deficit is covered by family remittances, estimated at almost 800 million dollars in 1993, plus generous donations from foreign governments and loans from multilateral international organizations.

Two additional important sources of foreign exchange in El Salvador are tourism and ANTEL, the telephone company. Much of El Salvador's tourism is termed "ethnic tourism," the visits of Salvadorans living overseas to El Salvador to see family and friends. There is also an increasing number of business visitors to El Salvador. In addition, a small but growing number of visitors are drawn to this nation by a special event, such as the Central American games or a surfing championship, or a particular site, such as the Museum of the Revolution in Perquin. The economic section estimates tourism brings in about 50 million dollars a year. In 1993, ANTEL probably had net foreign exchange earnings of about 25 million dollars. ANTEL is upgrading its switching facilities, so this figure should go up in 1994 as ANTEL's ability to handle international calls increases.

E. CONSTRUCTION

In 1993, the construction sector turned in a stellar performance with a 9.7 percent growth rate. This impressive figure might be revised upward as new information becomes available. The outlook is for another great year in 1994. Many visitors to El Salvador are astounded at the amount of construction around San Salvador. Construction of new commercial areas, gasoline stations, fast food establishments and upgrades of existing facilities is taking place throughout the city. Construction of housing, especially for El Salvador's burgeoning middle class, is strong. Some housing developers are booked solid for the next 12-15 months. A common sight on weekends is to see a family inspecting the construction of their future home in one of the many housing projects that surround San Salvador. Cement consumption jumped 14.1 percent in 1993 compared to 1992, another indication of construction sector growth. Public sector spending a

helped the construction sector in 1993. The GOES refurbished sports facilities for the Central American Games held in San Salvador in January 1994. One positive point was the construction of a badly needed two level bypass on Autopista Sur in just two months.

F. FINANCE

A cornerstone of El Salvador's economic program has been implementation of orthodox monetary policy. Comparing 1993 to 1992, M1 (currency plus demand deposits) grew by 12.5 percent while M2 (M1 plus quasi money) grew by 28.3 percent. The principal sources of money expansion continue to be the inflow of foreign exchange through family remittances, donations, loans and capital repatriation plus increased loans to the private sector. One important note is that the public sector needed little financing in 1993 and did not represent pressures to expand the monetary base.

Since 1990 El Salvador has had a free market exchange rate and legalized non-bank foreign exchange houses. Buoyed by family remittances of almost 800 million dollars in 1993, and generous amounts of bilateral aid, the colon trades freely at a rate of about 8.7 colones to one dollar.

In 1992 and 1993 the GOES sold five banks: Banco Cuscatlan, Banco de Comercio, Banco Agrícola Comercial, Banco de Desarrollo, and Banco Salvadoreño. At the time of this report Banco Hipotecario is being prepared for sale. The privatization of the savings and loans is also progressing. An important factor in present and future economic growth is this more dynamic banking sector as compared to the situation when the banks were held by the government.

Looking at government income, in 1993 tax revenues were 6,681 million colones (768 million dollars), a 22.3 percent increase compared to 1992. The majority of GOES income comes from three taxes: the value added tax or VAT, income taxes, and customs duties. Government expenditures in 1993 were 8,681 million colones (997 million dollars), an increase of 7.4 percent compared to 1992. The deficit was 1,980 million colones (227 million dollars), smaller by 622 million colones compared to the 1992 deficit. External resources, including loans and donations, covered most of the deficit.

The GOES and IMF have signed a new stand-by agreement that goes until the end of May 1994, the term of office of the Cristiani Government. In addition the GOES and the IMF have established "illustrative" targets for the new government. These targets will serve as a starting point for negotiations with the new government. The Inter-American Development Bank is disbursing about 225 million dollars of loans over a three to four year period to increase electricity production and provide support to private sector investment.

El Salvador has a rapidly growing stock exchange. The vast majority of the issues traded are government and parastatal debt instruments, although some private companies are now taking advantage of the exchange to list equity and debt instruments.

G. LABOR AND WAGES

The largest share (34 percent) of El Salvador's labor force of approximately 1.5 million workers is in the agricultural sector. This is followed by services (21 percent), commerce (18 percent) and manufacturing (15 percent). The government raised the minimum wage in early 1993. The minimum wage in the industrial and commerce sectors is 935 colones (roughly 107 dollars) a month. A study done in mid-1993 found that urban employees with minimal skills generally earned at least 20 percent more than the minimum wage. In agriculture the minimum wage is 17 colones per day (\$1.75) plus another three colones per day for food. Coffee plantation owners reported they often paid above the minimum wage to attract sufficient workers during the harvest. In March, 1994, ANEP, the umbrella organization whose membership includes almost all private sector organizations in El Salvador, called for increasing the minimum wage.

Urban^{un}employment in 1993 was 8.1 percent. Visible underemployment, depending on the study, would add 3 to 7 percent to the unemployment figure. However, it should be pointed out that some contractors in the construction business are encountering problems finding sufficient skilled workers for the amount of construction now underway in El Salvador. According to social security enrollment statistics, the formal sector created 36,800 new jobs in 1993. Based on the number of new businesses starting operations and the plans of business leaders to increase their operations, the Embassy believes the formal sector will create more jobs in 1994 than in 1993.

H. INFLATION

In 1993 the inflation was 12.1 percent, a drop from 19.9 percent in 1992. The goal for 1994 is inflation in the 8-10 percent range.

The Salvadoran consumer price index concentrates on four areas: food, clothing, housing, and miscellaneous. During 1993, price increases of beans, tomatoes, onions, and potatoes were important factors in the food component of the index. For instance, the price of red beans was at about 2.5 colones per pound in February 1993 and reached 7 colones per pound in August 1993. Once the second and largest bean harvest started to reach market in late November, the price of beans began to fall.

Colon interest rates for borrowers start at about 19 percent, a high figure considering the inflation outlook. Depositors of fixed deposits for five-six month periods earn 14 percent, although lower rates are paid for shorter time periods.

I. FOREIGN ASSISTANCE

Foreign assistance plays an important role in the Salvadoran economy, helping to finance the balance of payments gap and providing funds to the capital budget for public sector infrastructure development projects. In 1993, USG assistance to El Salvador was approximately 228 million dollars, including 30 million dollars of PL-480. In March 1993, the international community at meeting in Paris pledged 800 million dollars in loans and donations for reconstruction in El Salvador. This includes 225 million dollar in loans of the Inter-American Development Bank for

electricity generation and private sector investment. USG aid levels to El Salvador are forecast to decline starting with FY95.

J. ECONOMIC OUTLOOK BEYOND 1993.

El Salvador appears headed for real economic growth of about 5.5 percent in 1994. The key event will be the transition to the new government in June, 1994. The two parties in the run-off election have both pledged to implement the FUSADES study on steps to improve economic growth in the next five years.

In February 1994 there was an important economic seminar held in San Salvador that discussed various options for the future government. The speakers represented a variety of political viewpoints and agreed upon the need for increased government spending in education and health. Important businessmen agree that the low education levels of many workers, often just through the third and fourth grade, must be improved.

SECTION III. IMPLICATIONS FOR THE U.S

Generally about one-third of all Salvadoran imports come from the United States. The Salvadoran market is very receptive to U.S. products.

Important U.S. exports to El Salvador include grain, animal and vegetable oil, processed agricultural products, chemicals, electrical machinery, and construction equipment. Excellent opportunities exist for power generation and distribution equipment, machine tools, telecommunications equipment, computers and software, and transport equipment, including used buses. One fast growing, but very fragmented area, is automobile parts and accessories.

In 1993, U.S. imports from El Salvador included coffee, sugar, shrimp, melons, and apparel produced in the export processing zones.

A key factor in the Salvadoran market is the direct and indirect influence of the one million or more Salvadorans who live in the United States. Word of successful new products or new fashions in the United States is quickly passed to this nation.

SECTION IV. INVESTMENT CLIMATE

For enterprising investors, aware of possible risks in a developing nation recovering from a civil conflict, El Salvador presents a promising investment opportunity. El Salvador invites foreign investment; its free market economic reforms have considerably enhanced prospective returns for foreign investors. The regulatory landscape is positive. With the resolution of the CAESS (an electric utility) nationalization case in March 1993, there are no expropriation cases pending in El Salvador.

Foreign investors in El Salvador are not required by law to operate through a joint venture. Similarly local management and control are not required by law, but in El Salvador's small and

highly concentrated local economic environment, local participation is generally desirable for all but major companies with significant overseas experience. Many foreign maquila investments do not have local participation. Promising investment opportunities include apparel assembly, fruit and vegetable processing, fast food franchises, supermarkets, hardware/builder's supply, plus automobile parts and accessories.

The Embassy estimates that in 1993 there was about 40 million dollars of new direct foreign investment in El Salvador. This investment includes the equipment for maquila plants, gasoline stations, both new and upgrades, and the terminal expansion for one major oil company.

Factors that favor El Salvador for foreign investment include the modern airport with many direct flights to the United States each day; a new intellectual property rights law that was enacted in 1993, reasonable industrial electricity costs of about eight cents per kilowatt hour, and a highway system that is being rehabilitated with the support of loans from the Central American Development Bank. In addition, the GOES is working on a national investment office to facilitate foreign investment.

Increasing public debate has led to the possibility of future privatization of services now provided by the government owned telephone and electric companies, various port facilities, and the sugar mills now in government hands.

El Salvador: Key Economic Indicators

12-Apr-94

	1989	1990	1991	1992	1993	1994
Domestic Economy						
Population	4.90	4.95	5.00	5.05	5.17	5.28
GDP (millions of current colones)	32230.0	41057.0	47792.0	54853.0	66238.4	75803.8
Real GDP (in constant 1962 prices)	3177.0	3285.0	3400.9	3575.9	3753.9	3958.6
Real GDP growth (%)	1.1	3.4	3.5	5.1	5.0	5.5
GDP (millions of dollars) 1/	4958.5	5332.1	5974.0	6491.5	7613.6	8422.6
GDP per capita (dollars)	1011.9	1077.2	1194.8	1285.4	1473.7	1593.7
Consumer Price Index (% change)	23.5	19.3	9.8	20.0	12.1	8-10
Central Govt. revenue before grants (millions, current colones)	2660.0	3567.4	4395.0	5478.0	6759 6691	8430.0
Central Govt. expenditures (millions, current colones)	4232.6	4881.8	6602.0	8081.0	9887 8671	10675.0
Central Govt. deficit before grants (as percent of GDP)	4.9	3.2	4.6	4.7	3.5	3.0
External Sector (millions of dollars)						
Exports						
Of Which						
Coffee	228.6	260.2	219.5	151.2	226.3	194.0
Shrimp	10.0	14.4	19.9	19.8	25.8	25.6
Sugar	13.5	20.3	32.0	44.7	31.1	37.5
Imports	1161.3	1262.5	1406.0	1698.5	1912.2	2067.0
Current Account Balance (including official transfers)	-183.8	-135.4	-117.8	-151.5	-71.6	-133.8
Current Account Balance (excluding official transfers)	-466.2	-358.6	-296.3	-378.0	-321.9	-353.7
External Debt (year end)	1910.7	1991.9	2101.5	2337.5	1985.1	2292.2
Debt service ratio (as percent of goods and services exports)	21.7	27.4	40.0	35.8	29.1	27.7
Debt Service	174.2	247.6	371.9	346	332.0	350.1
Exports of Goods and Services	802.8	904.7	929.9	966.1	1142.7	1262.0
Net International Reserves (of the consolidated banking system)	278.3	468.8	488.8	554.2	703.6	803.6
Prevailing exchange rate (colones/dollar)	6.50	7.70	8.00	8.45	8.7	9.0
Money and Credit (millions of colones)						
Money Supply (M1)	3163.4	3861.3	4079.6	5389	6330.6	7245.1
Quasi-money (time & savings depos. of consolidated banking system)	4468.6	5896.4	7612.7	9984.8	12671.4	14493.1
Credit to Private Sector (consolidated banking system)	6328.9	7935.7	9290.4	11390.4	13285.2	15877 10561
Credit to Public Sector (net, consolidated banking system)	2870.6	3768.4	3699.9	4217.5	4269.8	3549.8
US-El Salvador Trade (millions of dollars)						
US Exports to El Salvador	461.7	537.2	557.1	677.8	844.3	868.1
US Imports from El Salvador	178.5	194.6	196.4	200.3	218.6	279.0

El Salvador
5/31/94

FOR: DOFLECA

ROUTINE -- UNCLASSIFIED -- DSSCS MESSAGE -- 94862 CHARACTERS

VZCZCMSS6612

ACTION = DOE,DOE AN1(2),CMS(1),EIA(1),EP(4)

DOE,OIN IDD(-),EETID(-)

INFO = ** UNASSIGNED **

MLN = 15212 DAN = 402-116672

RR RHEBDOE

DE RUEHSN #2518/01 0702203

ZNR UUUUU ZZH

EZ02:

R 112203Z MAR 93

FM AMEMBASSY SAN SALVADOR

TO RUEHC/SECSTATE WASHDC 2995

INFO RUEHZA/ARA CENTRAL AMERICAN COLLECTIVE

RUCPCIM/CIMS NTDB WASHDC

RUCPDC/USDOC WASHDC

BT

UNCLAS SECTION 01 OF 12 SAN SALVADOR 002518

**** SECTION BREAK ****

SECTION 01 OF 12

STATE FOR EB/CLP;AWHLTE

SRATE ALSO FOR USTR

USDOC FOR 4322/WH/OLA/AD/HLEE

E.O. 12356: N/A

TAGS: BEXP, BTIO, ETRD, ECON, KSPR, KTDB, ES

SUBJECT: SPR 0509 - COMMERCIAL ACTIVITIES REPORT FOR

EL SALVADOR

EZ05:

REF: (A) STATE 52821

1. THIS CABLE FULFILLS A DEPT AND POST REPORTING REQUIREMENT. PER REF A INSTRUCTIONS, TEXT OF 1993 COMMERCIAL ACTIVITIES REPORT FOR EL SALVADOR FOLLOWS.

2. BEGIN TEXT.

- 1993
- COMMERCIAL ACTIVITIES REPORT
- EL SALVADOR

U.S. EMBASSY SAN SALVADOR

FEBRUARY 1993

SECTION A: THE COMMERCIAL SETTING AND TRENDS

THE SIGNING OF PEACE ACCORDS BETWEEN THE GOVERNMENT OF EL SALVADOR AND THE FMLN GUERRILLA FRONT IN JANUARY 1992 OPENED A SIGNIFICANT WINDOW FOR

REVITALIZED COMMERCIAL ACTIVITY IN EL SALVADOR. IN ADDITION, EL SALVADOR'S SMALL BUT DYNAMIC ECONOMY IS REAPING THE BENEFITS OF PRESIDENT CRISTIANI'S SWEEPING FREE MARKET REFORMS INITIATED IN 1989. DESPITE SEVERE ENERGY RATIONING DURING THE FIRST SEMESTER OF 1992 AND THE LOWEST RECORDED INTERNATIONAL COFFEE PRICES IN TWENTY YEARS, THE SALVADORAN ECONOMY GREW BY 4.6 PERCENT IN REAL TERMS IN 1992, THE HIGHEST RATE ACHIEVED IN THE PAST FOURTEEN YEARS. A 25.4 PERCENT INCREASE IN THE EXPORT OF NON-TRADITIONAL PRODUCTS, GROWTH IN THE CONSTRUCTION SECTOR, FOREIGN DIRECT INVESTMENT OF APPROXIMATELY 38 MILLION USD, AND THE RETURN OF SOME FLIGHT CAPITAL CONTRIBUTED GREATLY TO THE ACCELERATED GDP GROWTH. PRELIMINARY ESTIMATES ARE FOR 5.0 PERCENT REAL GROWTH IN 1993.

ECONOMIC REFORM: IN 1989, THE CRISTIANI ADMINISTRATION INITIATED A COMPREHENSIVE ECONOMIC STRUCTURAL ADJUSTMENT PROGRAM, WHICH IS ONGOING. BY JANUARY 1993, EXTERNAL TARIFFS HAVE BEEN COMPRESSED TO A RANGE OF 5 TO 20 PERCENT FOR ALL BUT A FEW CATEGORIES OF GOODS. ALTHOUGH TELEPHONE SERVICES (ANTEL) AND ELECTRICITY GENERATION (CEL) REMAIN IN THE HANDS OF THE SALVADORAN GOVERNMENT, PRIVATIZATION OF SEGMENTS OF THESE AREAS IS PLANNED. FOR EXAMPLE, A PRIVATE COMPANY PROVIDES CELLULAR TELEPHONE SERVICE AND IT IS EXPECTED THAT WITHIN SEVERAL YEARS THE PRIVATE SECTOR WILL BE ALLOWED TO COGENERATE AND SELL ELECTRICITY. AS PART OF THE GENERAL PRIVATIZATION PROGRAM UNDERWAY, IN 1992, EL SALVADOR'S TWO LARGES BANKS AND ONE SMALL BANK WERE PRIVATIZED. TWO OTHERS ARE PRESENTLY BEING SOLD TO PRIVATE INVESTORS. AS OF OCTOBER 1992, MORE THAN 60 PRIVATE AND BANK AFFILIATED EXCHANGE HOUSES WERE OPERATING IN EL SALVADOR. THE ESTABLISHMENT OF NEW FOREIGN AND DOMESTIC BANKS WILL BE ALLOWED AS OF JULY, 1993. IN 1992, THE GOVERNMENT SOLD A LARGE MODERN HOTEL TO PRIVATE SHAREHOLDERS. AS PART OF THE EXTENSIVE REFORM OF THE TAX SYSTEM BEGUN IN 1989, THE SALVADORAN GOVERNMENT INTRODUCED A TEN PERCENT VALUE ADDED TAX (VAT) IN SEPTEMBER 1992 TO REPLACE THE ANTIQUATED STAMP TAX. ALTHOUGH INFLATION INCREASED SIGNIFICANTLY IN AUGUST 1992, DUE IN PART TO EXPECTATIONS ABOUT THE INTRODUCTION OF THE VAT, THE VAT ALLOWED THE SALVADORAN GOVERNMENT TO INCREASE ITS REVENUES BY 26 PERCENT (AS OF NOVEMBER 1992). BY THE END OF 1993, THE VAT IS EXPECTED TO BE THE MAJOR SOURCE OF GOVERNMENT REVENUE, CONTRIBUTING UP TO 50 PERCENT OF TOTAL REVENUES.

IMPORTS AND EXPORTS: THE READY AVAILABILITY OF FOREIGN EXCHANGE, REDUCED TARIFFS, AND FREE MARKET EXCHANGE RATE SYSTEM HAVE BOOSTED IMPORTS INTO EL SALVADOR SINCE 1990. IN 1992, IMPORTS INCREASED BY APPROXIMATELY 25 PERCENT ON THE HEELS OF A 13 PERCENT INCREASE IN IMPORTS IN 1991. THE U.S. REMAINS EL SALVADOR'S SINGLE MOST IMPORTANT TRADING PARTNER. WITH ITS CONTINUED ECONOMIC EXPANSION AND FOREIGN EXCHANGE EARNING CAPACITY, THE SALVADORAN ECONOMY CAN SUPPORT INCREASING LEVELS OF IMPORTS FROM ABROAD. CONTRIBUTING TO EL SALVADOR'S FOREIGN EXCHANGE RESERVE LEVELS ARE INCREASED EXPORT EARNINGS (DESPITE LOW COFFEE PRICES), THE RETURN OF SIGNIFICANT FLIGHT CAPITAL, AND FAMILY REMITTANCES ESTIMATED AT 700 MILLION USD ANNUALLY FROM SALVADORANS

UNCLAS SECTION 02 OF 12 SAN SALVADOR 002518

STATE FOR EB/CLP;AWHLTE
SRATE ALSO FOR USTR
USDOC FOR 4322/WH/OLA/AD/HLEE

E.O. 12356: N/A
TAGS: BEXP, BTIO, ETRD, ECON, KSPR, KTDB, ES
SUBJECT: SPR 0509 - COMMERCIAL ACTIVITIES REPORT FOR EL SALVADOR

LIVING ABROAD (PRIMARILY IN THE U.S.). THE U.S. GOVERNMENT PROVIDED 244 MILLION USD IN ECONOMIC ASSISTANCE TO EL SALVADOR IN FY 92, AND IN THE WAKE OF THE JANUARY 1992 PEACE ACCORDS, OTHER INTERNATIONAL DONORS HAVE SREPPED UP DEVELOPMENT AND RECONSTRUCTION AID TO THE COUNTRY.

AGRICULTURE, ESPECIALLY COFFEE, SUGAR, AND BASIC GRAIN PRODUCTION REMAIN THE BACKBONE OF EL SALVADOR'S ECONOMY. HOWEVER, THE 25.4 PERCENT GROWTH IN 1992 IN NON-TRADITIONAL EXPORTS (MERCHANDISE OTHER THAN COFFEE, SUGAR, SHRIMP, COTTON, AND BEEF) ILLUSTRATES A DRAMATIC CHANGE IN THE FOCUS OF SALVADORAN COMMERCIAL ACTIVITY. THE MANUFACTURING SECTOR IS RESTRUCTURING TO COPE WITH EXTERNAL COMPETITION AND CAN BE EXPECTED TO PLAY AN INCREASINGLY IMPORTANT ROLE. THE PRIVATE SECTOR AS A WHOLE, THE MAJOR PLAYER IN SALVADORAN SOCIETY, IS VIGOROUSLY RENEWING ITSELF WITH THE ARRIVAL OF PEACE. SALVADORANS ARE KEEN ENTREPRENEURS AND SIGNS OF BRISK COMMERCIAL ACTIVITY (FROM NEW HOUSING STARTS TO CONGESTED ROADWAYS) EXIST IN SAN SALVADOR AND THROUGHOUT THE COUNTRY.

MONETARY/FISCAL POLICIES: STRICT ADOPTION OF AN

ORTHODOX MONETARY POLICY ENABLED THE GOVERNMENT TO REIN IN INFLATION FOR THE FIRST HALF OF 1992. BEGINNING IN AUGUST 1992, HOWEVER, DUE TO EXPECTATIONS ABOUT THE INTRODUCTION OF THE VAT, A 30 PERCENT ELECTRICITY RATE HIKE, A 40 TO 50 PERCENT INCREASE IN PUBLIC TRANSPORTATION FARES, AND A TEN PERCENT TARIFF INCREASE ON MILK IMPORTS, INFLATION INCREASED. THE INFLATION RATE FOR 1992 WAS 20 PERCENT AS COMPARED TO 9.8 PERCENT IN 1991. THE SALVADORAN GOVERNMENT IS COMMITTED TO MAINTAINING THE FREE MARKET EXCHANGE RATE SYSTEM ADOPTED IN 1990. SINCE 1990 THE COLON HAD TRADED AT AN AVERAGE OF 8.1 COLONES PER USD, DESPITE A BRIEF AND SHARP DEPRECIATION OF THE COLON IN LATE 1992 TO OVER 9 COLONES PER USD. AS OF FEBRUARY 23, 1993, THE EXCHANGE RATE WAS 8.75 COLONES TO THE DOLLAR. ROBERTO ORELLANA, PRESIDENT OF EL SALVADOR'S CENTRAL BANK, CONSIDERS THE COLON TO BE FAIRLY VALUED AT ITS PRESENT RATE. HE POINTS TO THE BALANCE BETWEEN FUNDS SPENT ON IMPORTS AS COMPARED TO THE SUM OF EXPORTS INCOME, FAMILY REMITTANCES OF OVER 700 MILLION USD A YEAR, AND OFFICIAL DONATIONS. SOME EXPORTERS ARGUE THAT THE COLON IS OVERVALUED AND THEY ARE LOSING COMPETITIVENESS COMPARED TO OTHER CENTRAL AMERICAN NATIONS. THE GOVERNMENT FACES A DIFFICULT FISCAL SITUATION AS EXPENDITURES, INCLUDING MANY ASSOCIATED WITH THE POST-CONFLICT RECONSTRUCTION EFFORT AND IMPLEMENTATION OF THE PEACE ACCORDS, ARE INCREASING. THE 1992 FISCAL DEFICIT WAS 5.6 PERCENT OF GDP, COMPARED TO 4.4 PERCENT IN 1991. LOW WORLD COFFEE PRICES, THE INABILITY OF MANY GOVERNMENT MINISTRIES TO DOWNSIZE, AND THE SLOWER THAN EXPECTED IMPLEMENTATION OF THE VAT AND ELECTRICITY RATE INCREASE HAVE ALSO CONTRIBUTED TO THE FISCAL DEFICIT.

FOREIGN INVESTMENT: IN 1992 FOREIGN INVESTMENT, THE WEAK LINK IN THE SALVADORAN ECONOMIC PICTURE DURING THE YEARS OF INTERNAL STRIFE, CONTINUED THE REBOUND BEGUN IN 1991. FOREIGN DIRECT INVESTMENT IN EL SALVADOR FOR 1992 WAS APPROXIMATELY 38 MILLION USD, AN INCREASE IN 8 MILLION USD FROM 1991, AND COMPARED TO A TOTAL OF 4.7 MILLION USD IN 1990. AREAS WHICH EXPERIENCED APPRECIABLE INFLOWS OF FOREIGN CAPITAL INCLUDE APPAREL (APPROXIMATELY 30 MILLION USD), OIL (SERVICE STATIONS), SOAP AND CLEANING PRODUCTS MANUFACTURING, NON-METALLIC MINERAL PRODUCTS, AND VINYL AND PRINTED PAPER BAGS. SAVVY INVESTORS HAVE BEEN ATTRACTED BY THE ONSET OF PEACE, AN AVAILABLE LABOR FORCE, AND THE DEVELOPMENT OF FREE ZONE AREAS. EL SALVADOR WELCOMES FOREIGN INVESTMENT AS HIGHLIGHTED BY THE COMPREHENSIVE 1990

FOREIGN INVESTMENT AND PROMOTION AND GUARANTEE LAW WHICH ALLOWS FOR THE UNRESTRICTED REMITTANCE OF PROFITS, EXCEPT IN SERVICE INDUSTRIES WHERE ONLY 50 PERCENT OF

PROFITS MAY BE REMITTED. HOWEVER, PROBLEMS FOR FOREIGN INVESTORS REMAIN. THERE IS A CONTINUING SHORTAGE OF INDUSTRIAL SPACE, THE ENERGY DISTRIBUTION SYSTEM MUST BE UPGRADED AND EXPANDED, AND THE TELECOMMUNICATIONS SYSTEMS IS INADEQUATE.

 - EL SALVADOR'S PRINCIPAL EXPORTS
 - JANUARY - OCTOBER
 - (MILLIONS OF US DOLLARS)

1991 1992
 UNCLAS SECTION 03 OF 12 SAN SALVADOR 002518

STATE FOR EB/CLP;AWHLTE
 SRATE ALSO FOR USTR
 USDOC FOR 4322/WH/OLA/AD/HLEE

E.O. 12356: N/A
 TAGS: BEXP, BTIO, ETRD, ECON, KSPR, KTDB, ES
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 TRADITIONAL EXPORTS:

- COFFEE	201.5	142.3
- SUGAR	30.9	44.4
- SHRIMP	16-4	15.3
- COTTON	0.7	1.5

NON-TRADITIONAL EXPORTS:

- TO CENTAM COMMON MKT	159.0	206.7
- TO REST OF WORLD	106.2	104.1
-		
TOTAL EXPORTS FOB	514.6	514.2

SOURCE: BCR CENTRAL RESERVE BANK
 NOTE THAT THESE FIGURES DO NOT INCLUDE APPROXIMATELY USD 100 MILLION FOB !N MAQUILA EXPORTS.

 SECTION B: IMPORT DATA

THE U.S. REMAINS EL SALVADOR'S SINGLE MOST IMPORTANT TRADING PARTNER. IN 1992, THE U.S. SUPPLIED APPROXIMATELY 41 PERCENT OF EL SALVADOR'S TOTAL IMPORTS AND RECEIVED APPROXIMATELY ONE-THIRD OF EL SALVADOR'S EXPORTS. ACCORDING TO U.S. DEPARTMENT OF COMMERCE FIGURES, THE U.S. EXPORTED 671 MILLION USD IN MERCHANDISE TO EL SALVADOR FROM JANUARY TO NOVEMBER 1992, AN INCREASE FROM 468 MILLION USD FOR THE SAME PERIOD IN 1991. THE MOST IMPORTANT SHIPMENTS IN 1992

INCLUDED GRAIN, ANIMAL AND VEGETABLE OILS, AGRICULTURAL FERTILIZERS, PARTS AND ACCESSORIES FOR ADP MACHINES (3.5 MILLION USD), PHARMACEUTICAL PRODUCTS (3.6 MILLION USD), RUBBER ARTICLES (6.1 MILLION USD), AND INDUSTRIAL SEWING MACHINES (2.3 MILLION USD). THE GROWTH IN U.S. EXPORTS OF INDUSTRIAL SEWING MACHINES (UP FROM 1.4 MILLION USD IN 1991) IS DIRECTLY LINKED TO EL SALVADOR'S EXPANDING MAQUILA INDUSTRY WHICH SHOULD CONTINUE TO OFFER GREATER OPPORTUNITIES FOR U.S. EXPORTS IN 1993. OTHER BROAD CATEGORIES ENCOMPASSING A WIDE RANGE OF GOODS WHICH THE U.S. EXPORTED TO EL SALVADOR IN 1992 ARE: MACHINERY (93.4 MILLION USD), PAPER AND PAPERBOARD ARTICLES (28.4 MILLION USD), PLASTICS (27.2 MILLION USD), AND CHEMICALS AND CHEMICAL PRODUCTS (19.3 MILLION USD).

THE MOST STRIKING CHANGE IN THE SALVADORAN IMPORT PICTURE IS THE SURGE IN IMPORTS IN BOTH CAPITAL GOODS AND CONSUMER GOODS. THE CAPITAL GOODS IMPORT INCREASE OF 32.8 PERCENT REFLECTS THE RESTRUCTURING OF THE INDUSTRIAL SECTOR IN THE WAKE OF PEACE AND TARIFF REDUCTIONS. SOPHISTICATED INDUSTRIES ARE NOW SEEKING TO UPGRADE MACHINERY AND IMPROVE EFFICIENCY TO COMPETE IN THE WORLD MARKET. THE INCREASE ALSO REFLECTS THE BOOM IN THE CONSTRUCTION SECTOR, WHICH BROUGHT ABOUT A 32 PERCENT INCREASE IN CAPITAL GOODS IMPORTS FOR CONSTRUCTION. CAPITAL GOODS IMPORTS FOR TRANSPORT ALSO GREW BY A REMARKABLE 37 PERCENT. THE DEMAND FOR USED BUSES AND TRANSPORT VEHICLES (IN FACT, USED VEHICLES OF ALL TYPES) IS HIGH. THE U.S. IS THE MARKET OF CHOICE FOR THE SALVADORAN IMPORTER OF USED VEHICLES SINCE MOST USED VEHICLES ENTER EL SALVADOR AFTER BEING DRIVEN OVERLAND FROM THE U.S. THROUGH MEXICO AND GUATEMALA. SALVADORAN IMPORTS OF CONSUMER GOODS SOARED IN 1992, INCREASING BY OVER 33 PERCENT. OPPORTUNITIES FOR U.S. EXPORTERS OF CONSUMER GOODS ABOUND IN EL SALVADOR AS THE SALVADORAN CONSUMER STRONGLY IDENTIFIES WITH U.S. PRODUCTS, A TASTE GREATLY ATTRIBUTABLE TO THE VAST NUMBER OF SALVADORANS RESIDING IN THE U.S. WITH THE END OF THE CIVIL CONFLICT, THE GROWING SALVADORAN MIDDLE CLASS IS SEARCHING FOR A WIDE RANGE OF GOODS, FROM HOME APPLIANCES AND FURNISHINGS TO SPORTS AND LEISURE EQUIPMENT. EL SALVADOR'S OWN CONSUMER GOODS PRODUCTION INDUSTRY IS QUITE SMALL.

 - LEADING U.S. EXPORTS TO EL SALVADOR
 - JANUARY - NOVEMBER 1992
 - (MILLIONS OF US DOLLARS)

OIL (NOT CRUDE)/GASOLINE	25.4
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WHEAT	19.5
SOYBEAN	16.6
ELECTRONIC CAPACITORS	14.0
ANIMAL OILS AND FATS	13.6
MILITARY EQUIPMENT	9.8
FERTILIZERS	9.4
BEVERAGE MANUFACTURE PREPARATIONS	9.3
VEGETABLE OILS	8.9
UNCLAS SECTION 04 OF 12 SAN SALVADOR 002518	

STATE FOR EB/CLP;AWHLTE
 SRATE ALSO FOR USTR
 USDOC FOR 4322/WH/OLA/AD/HLEE

E.O. 12356: N/A
 TAGS: BEXP, BTIO, ETRD, ECON, KSPR, KTDB, ES
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 EL SALVADOR

WOMEN'S/GIRL'S COTTON KNIT BLOUSES/SHIRTS	8.1
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SOURCE: U.S. DEPARTMENT OF COMMERCE

 - EL SALVADOR'S IMPORTS: TOP 10 SUPPLIERS
 - JANUARY - OCTOBER 1992

	IMPORTS MILLIONS USD	EXPORTS MILLIONS USD
TOTAL	1,413.7	514.2
UNITED STATES	573.0	180.9
GUATEMALA	165.6	111.9
MEXICO	91.2	8.4
VENEZUELA	76.2	6.5
JAPAN	71.0	3.9
GERMANY	68.8	35.4
COSTA RICA	49.4	45.5
BRAZIL	21.9	0.0
GREAT BRITAIN	15.8	1.5
CANADA	13.6	4.1

SOURCE: BCR CENTRAL RESERVE BANK
 NOTE THAT OFFICIAL EL SALVADOR STATISTICS UNDERESTIMATE
 OR EXCLUDE A LARGE VOLUME OF THE COUNTRY'S IMPORTS.

 - EL SALVADOR'S IMPORTS: PRINCIPAL GROUPS
 - JANUARY - OCTOBER

(MILLIONS OF US DOLLARS)

	1991	1992	PCT CHANGE
CONSUMER GOODS	289	384	33.2
- NON-DURABLE	249	329	32.3
- DURABLE	40	55	39.1
INTERMEDIATE GOODS	596	680	14.2
- INDUSTRY	453	534	17.7
- (OF WHICH PETROLEUM)	105	98	(7.4)
- AGRICULTURE	62	65	5.3
- (OF WHICH FERTILIZER)	29	29	(0.2)
- CONSTRUCTION	72	73	1.7
- OTHER	9	8	(1.8)
CAPITAL GOODS	263	349	32.8
- INDUSTRY	71	101	43.2
- TRANSPORTATION	124	170	37.0
- AGRICULTURE	9	10	15.6
- CONSTRUCTION	9	12	31.6
- OTHERS	50	56	11.3
TOTAL IMPORTS	1,147	1,414	23.2

SOURCE: BCR CENTRAL RESERVE BANK

SECTION C: MARKET POTENTIAL AND STRATEGIES TO INCREASE U.S. SALES

THE SALVADORAN MARKET IS EXTREMELY RECEPTIVE TO U.S. PRODUCTS. MANY SALVADORAN BUSINESSMEN WERE EDUCATED IN THE U.S. AND ENJOY DOING BUSINESS THE AMERICAN WAY. MOREOVER, THE MILLIONS OF SALVADORANS RESIDING IN THE U.S., MANY OF WHOM HAVE RESUMED TRAVEL TO EL SALVADOR WITH THE ONSET OF PEACE, DISPLAY CONSUMER TASTES STRONGLY ORIENTED TOWARDS U.S. PRODUCTS. SALVADORAN IMPORTERS OFTEN PREFER U.S. TO ASIAN OR EUROPEAN SUPPLIERS BECAUSE THE PROXIMITY OF U.S. PORTS MEANS QUICKER DELIVERY. SALVADORAN IMPORTERS PLANNING LARGE PURCHASES, ESPECIALLY FIRST-TIME BUYERS, AND THOSE SEEKING LONG-TERM AGENT/REPRESENTATIVE RELATIONSHIPS WILL FREQUENTLY TRAVEL TO THE SOURCE TO PERSONALLY VISIT DISTRIBUTORS AND MANUFACTURERS. THEREFORE, THE PROXIMITY OF THE U.S. AND THE LIKELIHOOD OF FINDING A SPANISH-SPEAKING TRADE CONTACT MAKE THE U.S. ESPECIALLY CONVENIENT.

WITH FOREIGN EXCHANGE FREELY AVAILABLE AND TARIFF RATES ON NON-CENTRAL AMERICAN COMMON MARKET (CACM) PRODUCTS REDUCED TO A MAXIMUM OF 20 PERCENT WITH A FEW EXCEPTIONS AS LISTED BELOW, IMPORTING GOODS HAS BECOME RELATIVELY UNCLAS SECTION 05 OF 12 SAN SALVADOR 002518

STATE FOR EB/CLP;AWHLTE
SRATE ALSO FOR USTR
USDOC FOR 4322/WH/OLA/AD/HLEE

E.O. 12356: N/A
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EASY FOR SALVADORAN BUSINESS. HOWEVER, SOME PROBLEMS STILL PERSIST FOR IMPORTERS. PRODUCTS REMAINING SUBJECT TO TARIFFS IN THE 20-30 PERCENT RANGE ARE CERTAIN TYPES OF MOTOR VEHICLES, ALCOHOLIC BEVERAGES, TEXTILES, AND CERTAIN LUXURY ITEMS. ALSO, IN 1992, THE MINISTRY OF AGRICULTURE IMPOSED NON-TARIFF BARRIERS, IN THE FORM OF RESTRICTIVE ZOO-SANITARY IMPORT REGULATIONS, TO PROTECT LOCAL PRODUCERS OF POULTRY PRODUCTS, IN LIGHT OF GROWING COMPETITION FROM NON-CACM SUPPLIERS, ESPECIALLY THE U.S. IMPORTERS OFTEN EXPERIENCE BUREAUCRATIC DELAYS IN PROCESSING CUSTOMS DOCUMENTS RESULTING IN SHIPMENTS UNDULY DELAYED. DAMAGE AND ROBBERY OF MERCHANDISE AT CUSTOMS AND BORDER POSTS ARE NOT UNCOMMON. HOWEVER, THE SALVADORAN GOVERNMENT HAS INITIATED A PROGRAM TO MODERNIZE CUSTOMS OPERATIONS AND STREAMLINE PROCEDURES.

U.S. COMPANIES SEEKING TO TAKE ADVANTAGE OF THE EXPORT OPPORTUNITIES OFFERED IN EL SALVADOR WOULD BE BEST SERVED BY FINDING A QUALIFIED LOCAL REPRESENTATIVE. THE SALVADORAN BUSINESS COMMUNITY IS TIGHT-KNIT AND CONTACTS WITHIN THE SMALL ESTABLISHED COMMUNITY ARE OF UTMOST IMPORTANCE. U.S. COMPANIES LOOKING FOR INVESTMENT OPPORTUNITIES ARE ALSO ADVISED TO WORK CLOSELY WITH A SALVADORAN PARTNER WITH THE CONTACTS AND EXPERTISE TO MAKE AN INVESTMENT WORK, UNLESS THEY HAVE PRIOR EXPERIENCE IN OPERATING OVERSEAS.

I. BEST PROSPECTS

BEST PROSPECTS

- A. RANK OF SECTOR: 1
- B. NAME OF SECTOR: TELECOMMUNICATIONS EQUIPMENT
- C. INDUSTRY SECTOR CODE: TEL
- D. EST. MARKET SIZE - 1993: USD 30 MILLION
- E. EST. ANNUAL GROWTH RATE OF MARKET 1992-94: 12 PERCENT

*** UNCLASSIFIED ***

COUNTRY'S SINGLE LARGEST TRADE EVENT. IN NOVEMBER 1992, POST MANAGED PARTICIPATION OF 32 U.S. COMPANIES IN THE U.S. PAVILION, INCLUDING TWO NEW-TO-MARKET FIRMS. INCLUDED AMONG THE U.S. COMPANIES WERE XEROX CORPORATION, IBM, APPLE COMPUTERS, AMERICAN AIRLINES, UNITED AIRLINES, GMC TRUCKS, AND SEVERAL COMPANIES REPRESENTING U.S. FOOD AND AGRICULTURAL PRODUCTS. THE PAVILION PRODUCED SALES CONTACTS FOR ALL PARTICIPATING COMPANIES.

THE FAIR IS AN EXCELLENT ACCESS POINT FOR U.S. FIRMS WISHING TO ENTER THE SALVADORAN MARKET. AN ESTIMATED 505,000 PEOPLE VISITED THE FAIR IN 1992, 375,000 OF WHOM PASSED THROUGH THE U.S. PAVILION, TRADITIONALLY THE MOST POPULAR. THE U.S. PAVILION IS SELF-FINANCED AS POST DOES NOT RECEIVE USDOC FUNDING FOR THE EVENT- HOWEVER, POST HOPES TO INCREASE U.S. PRESENCE AT THE 1994 FAIR BY OBTAINING SOME USDOC FINANCING.

U.S. COMPANIES INTERESTED IN PARTICIPATING IN THE NEXT INTERNATIONAL FAIR, SCHEDULED FOR NOVEMBER 1994, SHOULD CONTACT THE EMBASSY FOR RENTAL RATES AND INFORMATION:

- ECONOMIC/COMMERCIAL SECTION
- U.S. EMBASSY - SAN SALVADOR
- UNIT 3112
- APO AA 34023
- TEL. 011-503-98-1666
- FAX: 011-503-98-2336

III. MAJOR PROJECTS

IT IS STRONGLY RECOMMENDED THAT U.S. FIRMS SEEKING TO WIN CONTRACTS IN EL SALVADOR BE REPRESENTED BY A LOCAL AGENT WHO CAN TRACK MARKET INTELLIGENCE ON ONGOING AND UPCOMING PROJECTS AND HANDLE THE LOGISTICS OF BID OPENINGS. LEAD TIMES ON PROCUREMENT TENDERS ARE OFTEN VERY SHORT, MAKING IT DIFFICULT FOR BIDDERS OUTSIDE THE AREA TO OBTAIN BID DOCUMENTS AND SUBMIT PROPOSALS. ALL CORRESPONDENCE R

UNCLAS SECTION 09 OF 12 SAN SALVADOR 002518

STATE FOR EB/CLP;AWHLTE
SRATE ALSO FOR USTR
USDOC FOR 4322/WH/OLA/AD/HLEE

E.O. 12356: N/A
TAGS: BEXP, BTIO, ETRD, ECON, KSPR, KTDB, ES
SUBJECT: SPR 0509 - COMMERCIAL ACTIVITIES REPORT FOR EL SALVADOR

REGARDING PROCUREMENT OPPORTUNITIES AND

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BIDS SHOULD TAKE PLACE BY TELEPHONE AND FAX BECAUSE THE LOCAL MAIL SYSTEM IS SLOW AND UNRELIABLE. CONSULTANTS AND OTHER INTERESTED FIRMS ARE ALSO REMINDED THAT IN LATIN AMERICA BUSINESS OFTEN HINGES ON PERSONAL CONTACTS. VISITING EL SALVADOR TO MEET PERSONALLY WITH POTENTIAL BUYERS IS STRONGLY RECOMMENDED.

BELOW ARE NAMES AND ADDRESSES OF PROCUREMENT OFFICIALS IN MAJOR SALVADORAN PUBLIC WORKS ADMINISTRATIONS.

ELECTRIC ENERGY:

ING. VICTOR MANUEL AVILES
PURCHASING MANAGER
COMISION EJECUTIVA HIDROELECTRICA DEL RIO
LEMPA - CEL
(STATE ELECTRIC UTILITY)
PRIMERA PLANTA, EDIFICIO CEL
CENTRO DE GOBIERNO
SAN SALVADOR, EL SALVADOR, C.A.
TEL. 011-503-71-0855
FAX: 011-503-71-3939

TELECOMMUNICATIONS:

LIC. ERNESTO ANTONIO GOMEZ
CHIEF PROCUREMENT OFFICER
ADMINISTRACION NACIONAL DE TELECOMUNICACIONES -
ANTEL
(NATIONAL TELECOMMUNICATIONS COMPANY)
CENTRO DE GOBIERNO, PRIMERA PLANTA
SAN SALVADOR, EL SALVADOR, C.A.
TEL. 011-503-71-7815
FAX: 011-503-21-3463

CIVIL AVIATION:

MR. OSCAR GIRON
PROCUREMENT OFFICER
DIRECCION GENERAL DE AERONAUTICA CIVIL
AEROPUERTO DE ILOPANGO
SAN SALVADOR, EL SALVADOR, C.A.
TEL. 011-503-27-0026/77-2022 EXT. 117
FAX: 011-503-27-1962

MILITARY SALES:

COL. ALEJANDRO MONTERROSA AMAYA
PROCUREMENT OFFICER
MINISTERIO DE DEFENSA
(MINISTRY OF DEFENSE)
CARRETERA A SANTA TECLA
SAN SALVADOR, EL SALVADOR, C.A.
TEL. 011-503-23-0233
FAX: 011-503-98-2443

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MILITARY HOSPITAL:
MAJOR VICTORIA GUEVARA DE SALINAS
PROCUREMENT OFFICER
HOSPITAL MILITAR
AVENIDA BERNAL
SAN SALVADOR, EL SALVADOR, C.A.
TEL. 011-503-74-1116/74-4360
FAX: 011-503-74-1498

RAILROADS:
ING. JULIO OMAR VERGARA
MANAGER
FERROCARRILES NACIONALES DE EL SALVADOR - FENADESAL
AVENIDA PERALTA NO. 903
SAN SALVADOR, EL SALVADOR, C.A.
TEL. 011-503-22-9000/71-5632
FAX: 011-503-71-5650

ELECTRIC POWER DISTRIBUTION:
ING. MANUEL MAYORGA
PROCUREMENT OFFICER
COMPANIA DE ALUMBRADO ELECTRICO DE SAN SALVADOR - CAESS
(ELECTRIC POWER DISTRIBUTION COMPANY OF SAN SALVADOR)
FRENTE HOTEL CAMINO REAL
P.O. BOX 186
BOULEVARD DE LOS HEROES
SAN SALVADOR, EL SALVADOR, C.A.
TEL. 011-503-23-6033
FAX: 011-503-23-6483

WATER AND SEWAGE:
LIC. PATRUCIA SORAYA ALEMAN
PROCUREMENT OFFICER
ADMINISTRACION NACIONAL DE ACUEDUCTOS Y ALCANTARILLADOS
- ANDA
(NATIONAL ADMINISTRATION OF SEWAGE AND WATER)
UNCLAS SECTION 10 OF 12 SAN SALVADOR 002518

STATE FOR EB/CLP;AWHLTE
SRATE ALSO FOR USTR
USDOC FOR 4322/WH/OLA/AD/HLEE

E.O. 12356: N/A
TAGS: BEXP, BTIO, ETRD, ECON, KSPR, KTDB, ES
SUBJECT: SPR 0509 - COMMERCIAL ACTIVITIES REPORT FOR
EL SALVADOR

FINAL AVENIDA PERALTA
PLANTEL EL CORD
SAN SALVADOR, EL SALVADOR, C.A.
TEL. 011-503-22-9780
FAX: 011-503-71-4531

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SONSONATE, SAN MIGUEL, EL POY AND OTHER AREAS.

TELECOMMUNICATIONS

ANTEL (NATIONAL TELECOMMUNICATIONS COMPANY)

USD 28.1 MILLION

FUNDING: N/A

IN 1989 ANTEL LAUNCHED A 5-YEAR PLAN TO EXPAND THE NUMBER OF TELEPHONE LINES IN EL SALVADOR FROM 150,000 LINES TO 350,000 BY 1995. ANTEL'S INVESTMENT FOR 1993 WILL BE ORIENTED TO THE DEVELOPMENT OF THE "IV PROYECTO DE TELEFONIA" (PHASE IV TELEPHONE PROJECT). THIS PHASE OF THE PROJECT INCLUDES THE INSTALLATION OF TRANSMISSION EQUIPMENT IN TEN URBAN CENTERS TO OPEN 51,000 NEW TELEPHONE LINES, TEN EXTERNAL PLANTS, AND CONSTRUCTION OF TELECOMMUNICATIONS FACILITIES IN NINE LOCATIONS THROUGHOUT THE COUNTRY.

ELECTRIC ENERGY GENERATION

CEL (EXECUTIVE HYDROELECTRIC COMMISSION FOR THE LEMPA RIVER)

USD 125.9 MILLION

FUNDING: IDB

REHABILITATION AND EXPANSION OF THE POWER GENERATION SYSTEM, INCLUDING OPERATION OF A NEW COMBINED CYCLE PLANT, REHABILITATION OF 2 UNITS OF 30 AND 33 MW IN THE ACAJUTLA THERMAL PLANT, FEASIBILITY STUDY FOR THE DEVELOPMENT OF A GEOTHERMAL UNIT IN SAN VICENTE, AND A 5 MW PLANT FOR THE GEOTHERMAL PLANT IN BERLIN, USULUTAN. POWER SECTOR TECHNICAL ASSISTANCE PROJECT (PSTAP)
USD 105 MILLION

FUNDING: WORLD BANK (33 PERCENT); CEL RESERVE FUNDS (19 PERCENT); IDB, CABEI, USAID, OCEF (38 PERCENT)

TECHNICAL ASSISTANCE FOR THE IMPLEMENTATION OF PLANS RECOMMENDED BY PSTAP. FEASIBILITY STUDIES OF THE TWO MOST ECONOMICALLY ATTRACTIVE HYDROELECTRIC PROJECTS (EL TIGRE AND SAN MARCOS), SUPPLY OF ELECTRICITY FOR UNDERDEVELOPED REGIONS USING ENVIRONMENTALLY FRIENDLY GENERATION OPTIONS (PHOTOVOLTAIC CELLS AND WINDMILL GENERATORS). MODERNIZATION OF EXISTING POWER PLANTS: UPGRADING 5 OLD POWER PLANTS, IMPROVEMENT OF ENVIRONMENTAL OPERATING CONDITIONS AT AHUACHAPAN GEOTHERMAL POWER PLANT (WASTEWATER DISPOSAL), REPOWERING 3 GAS TURBINE UNITS IN SOYAPANGO, AND 1 MW PILOT PROJECT TO USE BINARY CYCLE TURBINES. ELIMINATION OF TRANSMISSION BOTTLENECKS: UPGRADING OF ALARM, PROTECTION AND COMMUNICATION SYSTEMS; REHABILITATION OF 3 115KV SUBSTATIONS, AND CONSTRUCTION OF A 21 KM. LINE. DISTRIBUTION, REHABILITATION, AND EVENTUAL PRIVATIZATION OF COMPANIES.

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El Salvador
5/31/94

FOR: DOFLECA

ROUTINE -- UNCLASSIFIED -- DSSCS MESSAGE -- 12323 CHARACTERS
VZCZCMSS3339

ACTION = DOE, OIN IDD(-), EETID(-)

DOE, DOE AN1(2), CMS(1), EP(4)

INFO = ** UNASSIGNED **

MLN = 20493 DAN = 403-110446

RR RHEBDOE

DE RUEHC #8898 3541355

ZNR UUUUU ZZH ZEX

EZ02:

R 191352Z DEC 92

FM SECSTATE WASHDC

TO ALL DIPLOMATIC AND CONSULAR POSTS

RUEATRS/TREASURY DEPT 0000

RUEHPPH/CDC ATLANTA 0000

RUCPDIR/ALL USDOC DISTDIR

RUKLDAR/U.S. ARMY MATERIEL COMMAND ALEX VA.//AMCMI-SS//

RUWDOAA/NAVOCEANSYSCEN SAN DIEGO CA JAMES C SHIELDS

RUEAHQA/HQ USAF WASHDC//XOXXI//

RUEABOA/BOLLING AFB WASHDC//IVOA//

RUCNJVW/AL INOCCO 8105721076 USDOE DKRE

RUKGNHA/FAA WASHDC//ACS-400//

RULSNAA/COMNAVAIRSYSCOM WASHDC//AIR1031B//

RUKGNFA/NRC WASHDC//INFOSEC//

RUEANAT/NASA HQ WASHDC//CODE NIS JVERBA

RUCJACC/USCINCCENT MACDILL AFB FL//CCJ2-JIT//

RUCPCIM/CIMS NTDB WASHDC

ZEN/PORT AU PRINCE POUCH

ZEN/KINSHASA POUCH

ZEN/MINSK POUCH

ZEN/ALMA ATA POUCH

ZEN/YEREVAN POUCH

ZEN/BISHKEK POUCH

ZEN/SPECIAL EMBASSY PROGRAM POUCH

BT

UNCLAS STATE 408898

INFORM CONSULS

E.O. 12356: N/A

TAGS: CASC, OTRA

SUBJECT: CONSULAR INFORMATION SHEET - EL SALVADOR

EZ05:

1. EMBASSY LOCATION: THE U.S. EMBASSY IN EL SALVADOR IS LOCATED AT FINAL BOULEVARD SANTA ELENA, URBANIZACION SANTA ELENA, ANTIGUO CUSCATLAN; TELEPHONE (503)78-4444.

2. COUNTRY DESCRIPTION: EL SALVADOR HAS A DEVELOPING ECONOMY. ITS TOURIST FACILITIES ARE NOT FULLY DEVELOPED. CREDIT CARDS ARE WIDELY ACCEPTED.

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3. ENTRY REQUIREMENTS: A PASSPORT AND A VISA ARE REQUIRED FOR ENTRY TO EL SALVADOR. THERE ARE NO AIRPORT VISAS OR TOURIST CARDS AVAILABLE FOR LAST-MINUTE ENTRY. FOR ADDITIONAL INFORMATION, TRAVELERS CAN CONTACT THE CONSULAR SECTION OF THE EMBASSY OF EL SALVADOR AT 1010 16TH ST., NW, THIRD FLOOR, WASHINGTON, D.C. 20036, TEL (202) 331-4032, OR THE NEAREST CONSULATE IN HOUSTON, LOS ANGELES, SAN FRANCISCO, MIAMI, NEW ORLEANS, NEW YORK OR CHICAGO.

4. SECURITY: THE PEACE ACCORDS SIGNED ON JANUARY 16, 1992 BETWEEN THE GOVERNMENT OF EL SALVADOR AND THE FARABUNDO MARTI NATIONAL LIBERATION FRONT (FMLN) HAVE

RESULTED IN A CESSATION OF HOSTILITIES AND HAVE BEEN MARKED BY INCREASED TRAVEL THROUGHOUT THE COUNTRY BY SALVADORANS AND FOREIGNERS ALIKE.

-- ALTHOUGH ALL OF THE ACCORDS HAVE NOT BEEN FULFILLED WITHIN THE TIMEFRAME ORIGINALLY PRESCRIBED, PARTICULARLY THE DEMOBILIZATION OF THE FMLN FORCES, THERE IS NO INDICATION THAT HOSTILITIES WILL RESUME. INDISCRIMINATE ATTACKS BY THE FMLN AGAINST CIVILIAN TARGETS SHOULD NO LONGER POSE A PARTICULAR THREAT TO TRAVELERS.

-- THE U.S. EMBASSY IN SAN SALVADOR ADVISES ITS PERSONNEL TO AVOID TRAVEL ON UNPAVED ROADS IN THE NORTHERN AND EASTERN REGIONS OF EL SALVADOR AND AL TRAVEL AFTER DARK OUTSIDE OF METROPOLITAN AREAS BECAUSE OF POOR ROAD CONDITIONS, THE UNAVAILABILITY OF EMERGENCY SERVICES AND RANDOM BANDITRY.

-- TRAVELERS INTO BACK COUNTRY REGIONS MAY RISK INJURY FROM LAND MINES WHICH HAVE CAUSED NUMEROUS UNINTENDED CASUALTIES AND WHICH WILL CONTINUE TO POST A THREAT UNTIL EXTENSIVE DEMINING OCCURS.

-- FORMER CONFLICTIVE ZONES AND SAFE CONDUCT PASSES (SALVACONDUCTOS): GOVERNMENT OF EL SALVADOR REGULATIONS GOVERNING THE ISSUANCE OF SALVACONDUCTOS FOR TRAVEL TO CERTAIN AREAS OF THE COUNTRY ARE STILL IN PLACE. AT PRESENT, HOWEVER, THESE REGULATIONS ARE NOT BEING IMFLEMENTED AND TRAVEL THROUGHOUT THE COUNTRY IS PERMITTED WITHOUT PRIOR PERMISSION. TRAVEL INTO THE 15 ZONES OF FMLN CONCENTRATION PRIOR TO DEMOBILIZATION IS RISKY AND ACCESS TO THESE AREAS MAY BE IMPEDED OR CONTROLLED BY FMLN SECURITY FORCES. THOSE PLANNING TO TRAVEL OUTSIDE OF MAJOR METROPOLITAN AREAS MAY CONSULT THE CONSULAR SECTION ABOUT THE LOCATION OF THESE ZONES.

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5. CRIME INFORMATION: COMMON CRIME IS FREVALENT THROUGHOUT EL SALVADOR, INCLUDING THE CAPITAL, THE BEACH AREAS AND THE ROAD FROM THE CAPITAL TO THE INTERNATIONAL AIRPORT. UNITED STATES CITIZENS ARE NOT SINGLED OUT FOR ROBBERIES OR ASSAULTS.

-- THE U.S. EMBASSY ADVISES ITS PERSONNEL TO DRIVE WITH THEIR DOORS LOCKED AND WINDOWS PARTIALLY RAISED, AND STRONGLY DISCOURAGES TRAVEL VIA CAR ON ROADS OR HIGHWAYS OUTSIDE OF THE CAPITAL OR OTHER METROPOLITAN AREAS BETWEEN 6:00 P.M. AND 6:00 A.M. BECAUSE OF THE CRIME SITUATION AND

GENERAL ROAD SAFETY CONDITIONS. DESERTED PARK OR BEACH AREAS IN PARTICULAR CAN BE DANGEROUS. USEFUL INFORMATION ON GUARDING VALUABLES AND PROTECTING PERSONAL SECURITY WHILE TRAVELING ABROAD IS PROVIDED IN THE DEPARTMENT OF STATE PAMPHLET, "A SAFE TRIP ABROAD,. IT IS AVAILABLE FROM THE SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON D.C. 20402.

6. MEDICAL FACILITIES: MEDICAL CARE IS LIMITED. DOCTORS AND HOSPITALS EXPECT IMMEDIATE PAYMENT FOR HEALTH SERVICES. U.S. MEDICAL INSURANCE IS NOT ALWAYS VALID OUTSIDE THE UNITED STATES. IN SOME CASES, MEDICAL INSURANCE WITH SPECIFIC OVERSEAS COVERAGE MAY PROVE TO BE USEFUL. MAJOR CREDIT CARDS ARE ACCEPTED IN MOST PRIVATE HOSPITALS. FOR ADDITIONAL HEALTH INFORMATION, TRAVELERS MAY CONTACT THE CENTERS FOR DISEASE CONTROL'S INTERNATIONAL TRAVELERS' HOTLINE AT (404) 332-4559.

7. DRUG PENALTIES: PENALTIES FOR POSSESSION, USE OR TRAFFICKING IN ILLEGAL DRUGS ARE STRICT, AND CONVICTED OFFENDERS CAN EXPECT LENGTHY JAIL SENTENCES AND FINES.

8. TIPS FOR TRAVELERS: THE DEPARTMENT OF STATE'S PAMPHLET "TIPS FOR TRAVELERS TO CENTRAL AND SOUTH AMERICA, IS AVAILABLE FROM THE SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402.

9. REGISTRATION: AMERICANS WHO REGISTER AT THE U.S. EMBASSY DURING A VISIT TO EL SALVADOR CAN ALSO OBTAIN CURRENT INFORMATION ON TRAVEL AND SECURITY.

10. OTHER INFORMATION: THE SALVADORAN CONSTITUTION PROHIBITS FOREIGNERS FROM PARTICIPATING IN DOMESTIC POLITICAL ACTIVITIES, INCLUDING PUBLIC DEMONSTRATIONS. THE GOVERNMENT OF EL SALVADOR CONSIDERS SUCH INVOLVEMENT TO BE A VIOLATION OF THE PARTICIPANT'S TOURIST VISA STATUS.

11. THIS CONSULAR INFORMATION SHEET REPLACES THE ONE ISSUED OCTOBER 27, 1992 TO PROVIDE UPDATED INFORMATION ON

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THE CRIME AND SECURITY SITUATIONS. EAGLEBURGER

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