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REPORT ON A MISSION TO THE PHILIPPINES

REGARDING THE OPPORTUNITIES FOR PRIVATE

INVESTMENT IN GEOTHERMAL POWER GENERATION

Prepared By:

United States Geothermal Industries Corporation
Evergreen, CO
and
Bechtel National, Inc.
Arlington, VA

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1. INTRODUCTION

1.1 Purpose and Scope

This report describes the findings of a mission to the Philippines, sponsored by the A.I.D. Office of Energy, and conducted by representatives of United States Geothermal Industries Corporation (USGIC) and Bechtel National, Inc. (Bechtel), to investigate the opportunities for private investment in geothermal power generation in the Philippines. The dates of the mission were 26 August through 1 September 1990, inclusive.

The mission objectives were:

(a) to assess the opportunities for American private investment in the Philippines geothermal industry;

(b) to evaluate the intensity of the current Philippine energy crisis and the alternatives available to the Philippine government and private sectors;

(c) to identify those geothermal projects having the greatest potential and priority for development;

(d) to discuss these matters with representatives of Philippine government agencies concerned with energy issues;

(e) to evaluate the institutional framework and constraints related to geothermal power development, and especially those relating to possible American investment; and

(f) to review the opportunities for financing available through such sources as Asian Development Bank, World Bank, OPIC, Ex-Im Bank, A.I.D., Philippine private companies and commercial banks.

USGIC is a private company, whose 20-plus stockholders are companies and individuals providing a wide range of goods and services for use in exploring, drilling and developing geothermal resources for electric power generation, and in operating geothermal fields and power plants. USGIC was founded in 1990, is incorporated in the State of Delaware, and is headquartered in Evergreen, CO. USGIC's charter mission is to increase the export of American goods and services for

geothermal resource development. It currently is considering investment opportunities in several countries, including the Philippines.

A detailed chronology of events reported upon herein is given in Appendix A.

1.2 Participants

Mission members were (full addresses and telephone/telefax numbers are given in Appendix B):

James B. Koenig (Team Leader)
President
GeothermEx, Inc.

Dr. Ernest Y. Lam
Project Manager
Bechtel National, Inc.

Kenneth E. Nichols
Principal
Barber-Nichols, Inc.

Roy Alper
Chairman
Independent Power Corporation

GeothermEx, Inc., Barber-Nichols Engineering Co., and Independent Power Corporation are stockholders in USGIC; Koenig and Nichols are members of the USGIC Board of Directors.

Companies and government agencies interviewed by the mission team include (full names and addressed are given, to the degree available, in Appendix C):

Philippine National Oil Company (PNOC)
National Power Corporation (NPC)
Office of Energy Affairs (OEA)
Asian Development Bank (ADB)
International Finance Corporation (IFC) of the World Bank (WB)
United States Agency for International Development (A.I.D.)
United States Embassy (US Embassy)
Economic Development Foundation (EDF)
U.S.-ASEAN Council for Business and Technology, Inc. (US-ASEAN)
American Chamber of Commerce (AmCham)

Philippine Geothermal Inc. (PGI), which is a subsidiary of Unocal Corporation (Unocal)
Caltex (Philippines) Inc. (Caltex), a jointly owned subsidiary of Chevron Oil Company (Chevron) and Texaco Oil Company (Texaco)
SGV Consulting (SGV)
Blackgold Oilfield Supplies, Inc. (Blackgold)
and others.

1.3 Acknowledgements

The mission team acknowledges with gratitude the funding provided by the Office of Energy and the guidance given by Dr. James B. Sullivan, Director, and Mr. Alberto J. Sabadell, Deputy Director of the Office. Additional thanks are given to Mr. Malcolm Butler, Mission Director, and Mr. Alex Sundermann, Project Development Officer of the USAID Mission in Manila, Mr. Lance Marston, Director, Office of Private Sector Development, Bureau for Asia and Near East and other senior officials in the Bureau, A.I.D., and Mr. Ralph E. Burr of the Department of Energy, for their interest and support.

The Honorable Emmanuel Pelaez, Philippine Ambassador in the U.S., took a strong interest in the mission and offered valuable advice to the team. The help from His Excellency and his staff is gratefully acknowledged.

The mission also wishes to acknowledge the special assistance given by Messrs. John J. Callebaut and Philip J. Gielczyk of the U.S.-Philippine Business Committee of the U.S. Chamber of Commerce.

Additionally, the USGIC representatives wish to thank Dr. Ernest Y. Lam for the creative and effective assistance that he provided to the mission. Without his and Bechtel's efforts it is unlikely that the mission could have accomplished its goals as completely and swiftly as it did.

Thanks are given also to the several persons who met with the mission in the Philippines. They are too numerous to mention individually; however, Mr. Ernesto M. Aboitiz, President of National Power Corporation (NPC), Mr. Samson P. Javellana, Energy Planning Manager, Philippine National Oil Company (PNOC), and Mr. Wenceslao (Pat) de la Paz, Executive Director of the Office of Energy Affairs (OEA) of the Philippines deserve special thanks for taking time from pressing government affairs to meet with the mission team.

Finally, thanks are given to several persons who met with mission team members before or after the Philippines visit, and who provided valuable background and confirmation of data for this report. Again, they are too numerous to mention individually, except to say that Dr. Anil Malhotra of the World Bank repeatedly supplied useful information on the Philippine energy situation to team members.

2. FINDINGS

2.1 Geothermal Resources of the Philippines

The Philippine geothermal power industry is the world's second largest (after the United States), with approximately 880 MW of installed geothermal generating capacity. Of this, 660 MW is equally divided between 2 fields (Tiwi and Bulalo) on Luzon Island (see figure 1), and has been developed by Philippine Geothermal Inc. (PGI), a subsidiary of Unocal Corporation (Unocal), in cooperation with the Philippine National Power Corporation (NPC).

The remaining 220 MW is equally divided between a field on Negros Island (Palimpinon) and one on Leyte Island (Tongonan). These were developed by the Philippine National Oil Company (PNOC). PNOC also currently is engaged in the development of the Manito (BacMan or Bacon-Manito) field on southern Luzon. Reserves of over 50 MW have been proven to date.

By comparison, some 3,000 MW of geothermal generating capacity exists in the United States. Mexico, the third-largest geothermal nation, has about 750 MW. Table 1 lists the 10 principal geothermal nations by installed capacity.

Reserves of geothermal energy in the Philippines have been estimated at 8,000 or 10,000 MW for 30 years of power generation. This makes it one of the world's top 5 nations in terms of reserves, along with Indonesia, Japan, Mexico, Kenya and Ethiopia.

Current NPC plans call for the installation of some 1,840 MW of additional geothermal power as base load capacity by 2001. This represents almost 30% of all new power generation planned by NPC. Much of this (at least 440 MW) will come from the existing Tongonan field on Leyte, and adjacent areas to the south and north may produce up to several hundred additional MW. Significant amounts also are expected from BacMan (perhaps to 150 MW) and Del Gallego (also called Mt. Labo), on Luzon.

PGI expects to install up to 25 MW additional at its 330 MW Bulalo (MakBan or Makiling-Banihaw) field. Additional capacity probably will be installed at the existing Palimpinon (South Negros) geothermal field, perhaps 20 to 40 MW. No specific sites are identified for most of the remaining geothermal developments, although numerous fields have

been explored or drilled in varying degree. Several of these are shown on figure 1.

PNOC has had the principal role in exploration of these additional areas. However, PGI also has had a continuing evaluation program, and two other companies, Caltex (Philippines), Inc. (Caltex), and Total Petroleum Company (Total), explored individual prospects in prior years.

2.2 Legal Structure of the Philippine Geothermal Industry

Geothermal resources are owned by the Government of the Philippines on behalf of the Philippine people, and are administered through the Office of Energy Affairs (OEA). OEA is a successor to the Ministry of Energy (MOE) of the previous regime, which was abolished. OEA has prepared a partial catalogue of Philippine geothermal areas based on reconnaissance evaluations conducted by itself and PNOC. Several properties in this catalogue have been assigned by OEA to PNOC for exploration, drilling and field development. One area appears to have been assigned recently to PGI. Other areas remained unassigned.

The OEA assignment procedure had been established within the MOE under the previous Philippine administration, by a combination of Executive Order and Congressional legislation. It has not attracted any significant new foreign investment in Philippine geothermal regions because of the complexity of its terms and conditions and the financial disincentives that it has presented.

The assignment by OEA takes the form of a service contract, under which the field developer is given an exclusive permit to explore and drill a specific geothermal area at its own risk and cost. The performance of specific tasks is called for within stated periods, or the permit is voided. If a resource is found within the permit time period, the developer must negotiate a separate contract with NPC for the sale of geothermal steam or electricity. No assurance is offered that NPC will agree to negotiate a contract or will offer a realistic price for steam or electricity produced.

In return for his risk and expenditure, the service contractor is given a percentage of the revenue derived from the sale of steam or electricity generated from wells drilled. The remainder is kept by OEA as the government's royalty. The developer's earnings are subject also to Philippine corporate income tax. A complex formula governs the percentages paid by the developer in royalty and income tax.

Two geothermal regions were assigned by the previous Philippine government to NPC and PGI before this procedure had been created. These are similar to resource concessions, and are outside of regulation by any other agency. Under a joint development committee, NPC and PGI have financed field development, and on-going field operations. NPC has designed and financed the power plants, typically with vendor credits. PGI obtains revenue under a pricing contract with NPC, and pays income taxes to the Philippine government.

Because of dissatisfactions with the existing OEA service contract mechanism, a bill has been introduced into the Philippine Congress to modify the procedure. The nominal intent is to attract foreign investment at a time of critical electric power needs in the Philippines. However, growing nationalist sentiment in Congress has caused the bill's provisions to remain onerous. The mission was reminded on several occasions that certain influential Congressmen may have aspirations for the Presidential election of 1992, and therefore may oppose liberalizing legislation.

Discussions are underway regarding amendments to the draft bill. PGI and the American Chamber of Commerce in the Philippines (AmCham) have worked to obtain such amendments, and USGIC has written comments on the draft legislation as well. Of specific concern are issues regarding:

(a) restrictions on foreign ownership of energy projects;

(b) the granting of tax preferences only for energy companies that are majority-owned by Philippine nationals;

(c) tax and royalty percentages to be paid on revenues, and possible holidays or exemptions from these payments;

(d) repatriation of dividends and invested capital;

(e) guarantees of avoided-cost power-sales contracts from NPC; and

(f) terms and conditions of transfer to NPC of power plants built by foreign investors.

2.3 Conditions Affecting Geothermal Power Generation in the Philippines

The electric energy needs of the Philippines are critical, with no simple resolution. The country produces essentially no oil or natural gas; coal reserves are moderate in quantity, but of low BTU content and of poor chemical quality. Indigenous power resources

include geothermal, hydro and biomass. The island nature of the country results in local electric power surpluses (for example, Leyte Island), and at the same time massive power shortages and forced outages (Metro Manila area of Luzon, with over 10 million of a 60 million population). The increased price of oil will worsen the financial problems of the country.

Electric power generation and distribution have become increasingly unreliable. Industry and commerce often are curtailed because of power outages. NPC says that it cannot guarantee system reliability. This comes with an enormous (and growing) economic cost to the Philippines.

NPC's strategy is to add new generating capacity (principally hydro, blended imported and domestic coal, and geothermal), and to improve the transmission grid. As part of this strategy, NPC is attempting to create a network of submarine power cables to intertie several major island groups within the Philippines.

A cable connecting Leyte-Samar-Luzon is planned to begin operation in 1995, probably utilizing Japanese financing, with World Bank (WB) financing available as a backup. This will allow power from the large Tongonan geothermal field to flow to Metro Manila. Another cable, being completed with Asian Development Bank (ADB) financing, connects Negros and Panay; it is planned to extend this cable to connect Negros-Cebu in 1995, again with Japanese financing. This will allow geothermal power from Negros (Palimpinon) to flow to the large population center of Cebu City. By the end of the century, NPC hopes to connect Mindanao to the Leyte-Samar-Luzon grid, thereby allowing Mindanao hydro and geothermal power to reach the huge Luzon market.

NPC anticipates adding some 6,900 MW of power generation facilities by 2001. This is expected to more than double the 6,000 MW of installed capacity of 1989. The planned mix of generation is:

Mode	MW Planned
Hydro	1,624
Geothermal	1,840
Coal	2,620
Diesel	64
Gas Turbine	835

The diesels and gas turbines are to be installed in the years 1990-1993 to help meet the immediate crisis condition. Beginning in 1992, geothermal is to become the major addition to base load capacity.

It will be augmented by coal and hydro increasingly in the years beginning about 1998. Very few specific sites are identified by name for coal, hydro or geothermal generation in the years after 1998.

In addition to construction of the submarine cables discussed above, NPC has received offers of geothermal financing from WB, ADB, the Government of Italy, and Japanese manufacturers (possibly with guarantees from Japanese government agencies). These include the following:

> BacMan (Manito): Government of Italy has agreed to finance the first 110 MW (BacMan I) plant. Protocols have been signed and contracts are being put in place for purchase of equipment. An additional 40 MW (BacMan II) is to be financed by WB. Not all of this resource has yet been proven by drilling and well testing.
>
> Palimpinon: WB has agreed to finance the Palimpinon II power plant. Size is reported variously to be 20 or 40 MW. Reserves are not yet fully proven by drilling.
>
> "Universal" design turbines: NPC has accepted an Italian recommendation to adopt a so-called "universal" 20 MW turbine design for standardization of modular power plants. Twenty of these are to be purchased from an as-yet-unnamed supplier, under financing to be provided by the Government of Italy, WB, and ADB. Seven or 8 of these units are planned to be used for BacMan I and II. Sites for the remaining 20-MW units have not been determined, although one or two may be assigned to Palimpimon II.

PNOC has requested that interested parties submit proposals for joint ventures, to develop geothermal properties in which PNOC has conducted exploration and drilling. PNOC has specified that it will have a minimum 60% interest in the wellfield and a minimum 10% interest in the power plant(s) constructed under such a joint venture. (A minimum 60% Philippine-owned interest in the wellfield is necessary in order to obtain certain tax benefits for the joint venture.)

The joint venture will sell electricity to NPC, under contracts to be negotiated between the joint venture and NPC. BOOT (Build, Own, Operate, Transfer) schemes appear to be favored by PNOC, and apparently are acceptable to NPC. NPC has indicated a willingness to purchase electric power, and ultimately to accept transfer of a power plant built under a PNOC joint venture. However, NPC indicates that it will require that power price be no higher than its lowest-cost alternative ("avoided

cost"). NPC's view of its avoided cost is very low, perhaps unrealistically low.

To date, PNOC has issued 3 separate joint venture calls, as follows:

1. Development of some combination of the Pinatubo, Cagua and Natib prospects on Luzon.

2. Development of an additional 440 MW at Tongonan, Leyte.

3. Development of up to 440 MW at several prospects located to the south and north of Tongonan, including Burauen and Biliran prospects.

2.4 Interest in Private Geothermal Investment

As mentioned, OEA is offering service contracts to entities interested in exploring and developing geothermal resources. Amongst foreign organizations, only PGI is believed to currently hold a permit from OEA, covering a prospect north of their Tiwi field in southern Luzon, called Isarog. PNOC is the only domestic Philippine organization known to hold geothermal assignments from OEA.

The list of PNOC current holdings includes:

(a) the producing fields of Palimpinon (Negros) and Tongonan (Leyte);

(b) adjacent drilled and undrilled areas on Leyte such as Burauen and Biliran;

(c) the Manito (BacMan) field currently undergoing development on Luzon;

(d) such Luzon prospects as Cagua, Pinatubo, Natib, Del Gallego (Mt. Labo) and Bulusan (also called Irosin and Sorsogon); and

(e) prospects on other islands, including Montelago (Mindoso Island), Mambucal (Negros Island), and Mt. Apo and Manat (both Mindanao Island).

Several of these areas have been drilled by PNOC. However, some of these represent new exploration activities or have not yet been approved by PNOC for drilling. Still others not on this list (for example, Daklan) have been dropped by PNOC after being drilled.

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Five groups responded to the PNOC request for joint venture proposals for Pinatubo-Cagua-Natib. They are: (a) USGIC; (b) PGI; (c) Ormat, an American-Israeli turbine manufacturer, which is also a member of USGIC; (d) the New Zealand consulting firm GENZL; and (e) a consortium of the New Zealand engineering firm Design Works and the Japanese trading company Mitsui. No award has been announced by PNOC.

In a subsequent review of the Pinatubo and Natib prospects, the mission concluded that exploration and preliminary drilling results were not sufficiently encouraging for immediate investment. PNOC agreed to supply data from the drilling at Cagua as they become available. Preliminary results from the first Cagua well supposedly were attractive. However, to date, nothing further has been received from PNOC. Because of this lack of immediate encouragement, the mission team directed USGIC's interest to other prospects.

Regarding Leyte A (the request for joint venture proposals to develop up to 440 MW additional at Tongonan), it is reported that two groups have been qualified by PNOC: (a) Ormat and (b) Design Works-Mitsui. It had earlier been reported that PGI was interested in Leyte A, but they are not on the list of qualified proposers.

A response to PNOC's Leyte B call is due by 30 January 1991. It is possible that Ormat and USGIC will submit a joint response. It is not known who else will respond.

In addition to these prospects, PGI reportedly has held discussions with PNOC and OEA regarding the Del Gallego (Mt. Labo) prospect. This originally had been explored by Total and a Philippine partner in 1981-83 under a permit from the MOE (OEA's predecessor). PGI reportedly tried to obtain this permit from the Philippine partner after Total's withdrawal. The status is unclear, with PNOC claiming it holds the service contract with OEA, and is in the process of detailed exploration.

Ormat also had proposed to NPC to add generation capacity to its existing Tongonan and Palimpinon plants, and to provide power plants at Manito field in place of the Italian funding. NPC has not accepted these proposals, but has encouraged both Ormat and USGIC to negotiate agreements with PNOC for Cagua, Del Gallego and/or Bulusan. All of these are on Luzon and therefore are easily accessible to the Metro Manila market via the existing transmission grid.

Caltex, which previously had explored the Batong Buhay prospect of northern Luzon, may again become interested in a joint investment venture with an American entity. No specific prospect has been identified, and no agreement has been reached with USGIC.

Other Philippine investors may be forthcoming, especially in light of the tax benefits accruing to a Philippine-owned energy project. However, the Philippine capital market is limited, and is extremely cautious in light of the political and economic climate in the country.

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3. DISCUSSION AND ANALYSIS

3.1 Evaluation of Findings

NPC currently is not able to satisfy electric power demands, and has set what appear to be unrealistic goals for power generation during 1990-2001. These goals are based on plans to more-than-double the installed generating capacity in a 12-year period, and to base the long-term load on hydro, coal and geothermal power.

To achieve these goals will require an enormous capital investment (perhaps U.S. $12 to $15 billion in 1990 dollars) in power plants, submarine cables, and transmission grid. Although WB, ADB, and the governments of Italy, Japan, and the United States indicate a willingness to help finance this investment, there may be a significant shortfall. Room exists for private investment.

In addition to capital cost, the strategy of building more coal-fired power plants will serve as a continuous and increasing drain on Philippine foreign exchange reserves, because up to 80% of this coal must be imported. Hydro and geothermal are indigenous resources.

PNOC is eager to recover its sunk costs of exploration and drilling at many prospects and fields. Its exploration budgets are constrained. The time required for field development and plant construction apparently has increased in recent years. WB will lend for development projects but not for exploratory drilling. Therefore, PNOC has begun to offer properties for joint venture in exploration and development. Some of the offerings are unattractive. Others, although attractive, will require great capital outlays, at a minor but real risk.

Until submarine cables link Luzon with Leyte (perhaps late 1995) and ultimately with Mindanao (maybe in 2001), only those geothermal fields on Luzon will be attractive for rapid development. Thereafter, the large reserves believed to exist on Leyte and Mindanao will become more valuable. A short-term strategy emphasizes Luzon; a longer-term strategy looks at several interconnected islands.

PNOC holds properties other than those offered for joint venture, both on Luzon and elsewhere. Additionally, OEA has unexplored or partially explored prospects in inventory, available for service contracts without PNOC. This includes areas on Luzon.

NPC has stated its willingness to buy steam or electric power at any place on Luzon, and at many places outside Luzon, and to connect these rapidly into their grid. However, the pending Congressional legislation is nationalistic in tone, and has left many impediments to private investment. Conditions of site logistics, accessibility and physical security impose extra constraints on investment.

Two sets of agreements will need to be negotiated before a prospect can be developed:

1. With PNOC (joint venture) or with OEA (service contract) regarding the steamfield development and power plant construction. Moot points include: prospect selection, royalty and tax requirements, percentage of foreign and domestic ownership, performance obligations and development timetables.

2. With NPC regarding sale of steam or (preferably) electricity. Moot points include: avoided-cost pricing, plant size, transmission linkage, conditions of ownership transfer, and timetables for all of these.

It may also be necessary to negotiate with OEA and with various other ministries for exemptions from specific royalty, income tax, labor law, social security law and other regulations and from import, customs and local-content regulations; and with the Central Bank of the Philippines for guaranteed conditions of repatriation of dividends and capital.

NPC has excluded the BacMan I and II and Palimpinon II projects from foreign investment. NPC has suggested that USGIC consideration be given to Cagua, Del Gallego and/or Bulusan prospects, all on Luzon and all apparently in PNOC's inventory, because of NPC's early ability to accept electric power into its grid from these sites. PNOC, as mentioned, has offered Cagua with the less-attractive Pinatubo and Natib sites in one package, and Tongonan (Leyte A) and other Leyte prospects (Leyte B) in separate additional packages. PNOC also has stated its willingness to consider other suggestions.

Despite this, PNOC has been slow to respond to proposals, and appears to be somewhat reluctant to actually enter into joint venture negotiations. It appears that financial conditions and OEA pressure, rather than free choice, is pushing PNOC.

NPC has stated that its avoided cost is that of the "next" geothermal project. In reality, the extreme electric power needs cannot

be satisfied by the next geothermal project. The capital cost of future coal-fired plants and the foreign exchange costs of coal and diesel fuel represent the true avoided cost. This may require intensive negotiation with NPC to accomplish.

Competitive interest comes from PGI, which has a long history of joint operations with NPC; and from the Design Works-Mitsui venture, which draws its strength from past cooperation between the government of New Zealand and PNOC, and has the implicit support of the Japanese government.

3.2 Opportunities for USGIC Investment

Choices available to USGIC are:

(a) joint venture with PNOC on a prospect of mutual choice within PNOC's inventory;

(b) selection of a prospect in OEA's inventory, and negotiation of a service contract, either (1) alone or (2) with other Philippine partners.

A Philippine partner is needed in order to obtain the tax benefit given to an energy development project at least 60% locally owned. However, OEA or the Philippine Congress may be able to grant exemptions from this requirement. PNOC is desirable as a partner because of its inventory holdings and its advanced stage of development of certain properties. Here, again, attractive prospects also can be obtained through OEA.

Reasonable investment strategies include:

(a) selection of the lowest-cost, shortest-lead-time project (probably one on Luzon already drilled by PNOC and having a small proven reserve, not currently under contract to NPC); followed by

(b) negotiation of an avoided-cost, take-or-pay contract with NPC for supply of 10 to 20 MW, with commissioning in 3 to 4 years, on Luzon; while simultaneously

(c) negotiating with PNOC or OEA for a larger-size property, not necessarily on Luzon, for development after inter-island cables are emplaced, in increments of 20 to 50 MW.

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3.3 Actions Taken Since Return of the Mission

The Executive Committee of USGIC approved the summary report of the mission team in September 1990, and authorized the following:

(a) preparation of Statements of Principles to be submitted to PNOC and to NPC regarding joint venturing and power plant construction, and sale of electricity;

(b) preparation of a request for project feasibility funds from EDF under the PIF program;

(c) contacts with potential Philippine and American financiers, both debt and equity;

(d) final selection of a prospect for development; and

(e) preparation for negotiations with PNOC, NPC and other Philippine agencies.

In mid-September, team member Alper returned privately to Manila, where he met with representatives of PNOC, NPC and EDF to explain USGIC's intentions and explore courses of action. Team leader Koenig also met with representatives of A.I.D. and other agencies in Washington to review mission results.

Early in October 1990, Statements of Principles were submitted separately to PNOC and to NPC. Receipt was acknowledged by PNOC, but no formal response ever was received from them. NPC responded formally, and suggested a course of action to be followed.

In October, also, a proposal was submitted to EDF for PIF funds, based on a presumed USGIC outlay for a feasibility study of over $125,000. Requests for funding also have gone to other government agencies, including the California Energy Commission (CEC).

USGIC has subsequently solicited an expression of interest from several would-be equity partners. A Build-Own-Operate-Transfer (BOOT) mechanism is favored.

USGIC has reviewed prospect alternatives with various parties. USGIC and Ormat are considering a joint course of action. Prospects currently being evaluated in preliminary fashion include: Cagua, Luzon; Batong Buhay, Luzon; Del Gallego (Labo), Luzon; Bulusan, Luzon; Mt. Apo, Mindanao; and the Leyte B group. No final selection has been made.

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Most recently, EDF informed USGIC of its intention to help co-finance a feasibility study of a designated field area. Subsequent communications have been focused on the mechanics for implementing this. USGIC is proceeding with planning and project organization. However, no formal invitation to negotiate has been obtained from PNOC. Further financing needs to be arranged at an early opportunity in order to proceed with prospect acquisition, feasibility studies and negotiations with Philippine government agencies.

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TABLES

TABLE 1: Installed Geothermal Generating Capacity

Country	MW
United States	2,800
Philippines	880
Mexico	750
Italy	500
New Zealand	280
Japan	215
Indonesia	145
El Salvador	95
Nicaragua	70
Iceland	45
Kenya	45

FIGURES

Figure 1: Philippine geothermal areas.

1991, GeothermEx, Inc. PHILBASE/012391/H3137/EMMY1=5/PHIL.JP

APPENDIX A:

Chronology of Events

CHRONOLOGY OF EVENTS

26 August 1990 (Sunday)	Mission member Nichols and mission leader Koenig arrive Manila; join mission member Lam; review and planning activities.
27 August 1990 (Monday)	Koenig, Nichols and Lam meet with Philip Gielczyk, U.S.-Philippine Business Committee; jointly meet with USAID Mission Director Malcolm Butler, Deputy Director Richard Johnson, and senior Mission officials Bruno Cornelio, Dennis Zvinakis, Alex Sundermann, Richard Dangler and Conchita Silva, and US Embassy officer Diane Castiglione; review goals and plans; Koenig, Lam and Nichols visit PNOC, meet with Samson Javellana, Herman Guillen, Hermes Ferrer, Zosimo Sarmiento and Alberto Salanga, to discuss joint venture proposals; Koenig, Lam and Nichols brief US Embassy officers Jonathan Bensky and Cleo Alday regarding mission goals; mission member Alper arrives Manila.
28 August 1990 (Tuesday)	Koenig, Alper, Lam and Nichols meet with EDF representatives Gil Garcia and Atenogenes Bundoc regarding pre-feasibility funding; mission team travels to Quezon City, meet with NPC President Ernesto Aboitiz and aides Deogracias Peralta, Pio Benavides and Danilo Cantiller, and General Mamerto Bocanegra, regarding BOOT concept and power purchase agreements; mission team returns to PNOC for further meeting with Javellana, Guillen, Ferrer and Sarmiento regarding joint ventures.
29 August 1990 (Wednesday)	Mission team meets with AmCham representatives: Gregory Raasch (PGI), Conrad Geeslin (Morris), Phil Gielczyk, Roger Gant (Armco-Marsteel), Bernard Conroy (Parsons), P.K. Mathay (Alconn Petroleum) and Richard Stevenson (ERI) regarding business conditions in Philippines and pending legislation; separate meeting with Raasch regarding PGI interests; lunch meeting at SGV between mission team and Adriano Dy, Rene Fuentes, Antonio Lim, Emmanuel Travino (all SGV) and Alfonso Quintans (Bechtel), regarding economic and legal aspects of geothermal investment; mission team meet with OEA

	head Wenceslao de la Paz and aides Rufino Bomasang, Freddie Rillera and Josefino Adajar regarding geothermal service contracts and legislation; evening meeting between mission team, Travino (SGV), and Cesar E.A. Virata (former Philippine Finance Minister) and Gabriel Y. Itchon (former President of NPC) regarding political and economic climate.
30 August 1990 (Thursday)	Alper departs; mission team meets with Caltex President Francis Ablan and aide George Tabbernah re possible private investment interest; visit ADB, meet with Richard Zechter, Vladimir Bohun and William Douglas Ferguson regarding ADB financing for geothermal projects; dinner meeting between mission team and representatives of Blackgold Oil Field Supplies regarding exploration activities.
31 August 1990 (Friday)	Mission team briefs USAID Mission (Johnson, Zvirakis, Cornelio, Silva and Sundermann); final meeting with Ablan and Tabbernah (Caltex); at US Embassy, brief John Moggerno, Castiglione and Bensky; mission team meets with WB/IFC representative Krishan Sehgal regarding IFC financing of geothermal projects; final meetings and telecommunications with representatives of PNOC, NPC, US-ASEAN and Caltex; team dinner meeting and final review.
1 September 1990 (Saturday)	Lam, Koenig and Nichols depart Manila.

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APPENDIX B:

Mission Team Members

MISSION TEAM MEMBERS

Mission Team Leader

James B. Koenig
President
GeothermEx, Inc.
5221 Central Avenue, Suite 201
Richmond, CA 94804
Telephone: 415/527-9876
Telefax: 415/527-8164

Team Members

Kenneth E. Nichols
Principal
Barber-Nichols, Inc.
6325 West 55th Avenue
Arvada, CO 80002
Telephone: 303/421/8111
Telefax: 303/420-4679

Roy Alper
Chairman
Independent Power Corporation
2101 Webster Street, Suite 1650
Oakland, CA 94612
Telephone: 415/839-3346
Telefax: 415/839-7891

Dr. Ernest Y. Lam
Manager, Conventional Energy
Technical Assistance Project
Bechtel National, Inc.
1601 N. Kent Street, Suite 914
Arlington, VA 22209
Telephone: 703/528-4488
Telefax: 703/528-2280

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APPENDIX C:

Organizations and Persons Interviewed

ORGANIZATIONS AND PERSONS INTERVIEWED

Philippine Government Agencies

1. Office of Energy Affairs
PNPC Complex, Merritt Road
Fort Bonifacio, Makati
Metro Manila, Philippines

Telephone: (632) 85-10-21 to -31
Telefax: (632) 817-8603
Telex: 22666 EDC PH

Wenceslao (Pat) de la Paz
Executive Director

Rufino B. Bomasang
Deputy Executive Director

Freddie G. Rillera
Director, Energy Development Service

Josefino C. Adajar
Supervising Science Research Specialist

2. National Power Corporation
Quezon Avenue at Agham Road
Diliman, Quezon City
P.O. Box 10183
Metro Manila, Philippines

Telephone: (632) 921-3541 to -3579
Telefax: (632) 921-2408
Telex: 742-40120

Mr. Ernesto M. AboitizTelephone: 921-2998
PresidentTelefax: 922-4339

Gen. Mamerto S. BocanegraTelephone: 921-3323
Senior Vice President

Deogracias S. Peralta
Vice President, Planning ServicesTelephone: 922-7848

Pio Benavides
Manager, Research and Development

Danilo B. Cantiller

3. Philippine National Oil Company
PNPC Complex, Merritt Road
Fort Bonifacio, Metro Manila
Philippines

Telephone: (632) 815-8961
Telefax: (632) 815-2747
Telex: 22666 EDC PH

Alberto R. Salanga
Vice President & Special Assistant
to the President

Samson P. Javellana — Telephone: 851-339
Energy Planning Manager

Hermes P. Ferrer
Geothermal Exploration Manager

Herman V. Guillen
Engineering Design Manager

Zosimo F. Sarmiento
Reservoir Engineering Manager

Multi-National Agencies

4. Asian Development Bank
P.O. Box 789, 1099 Manila
Philippines

Telephone: (632) 711-3851
Telefax: (632) 741-7961
Telex: 23103 ADB PH

Richard H. Zechter — Telephone: 834-3054
Assistant to the U.S. Executive Director

Vladimir Bohun — Telephone: 834-3398
Senior Project Engineer

William Douglas Ferguson — Telephone: 834-3418
Financial Analyst
Private Sector Department

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5. World Bank/International Finance Corporation
c/o Central Bank of the Philippines
Manila, Philippines

Telephone: (632) 521-16-64 & 521-55-07
Telefax: (632) 522-01-56
Telex: ITT 40541

Krishan K. Sehgal
Chief of Mission

6. Economic Development Foundation
5th Floor, Eurasia Bldg.
Ayala Avenue, Makati 1200
Metro Manila, Philippines

Telephone: (632) 810-0833 & -0835
Telefax: (632) 818-9269
Telex: 64429 CESO PN

Gil S. Garcia
Program Manager
Private Sector Pre-Investment Facility (PIF)

Atenogenas Bundoc
Project Officer

7. U.S. - ASEAN Council for Business
and Technology, Inc.
7/F, JEG Building
150 Legaspi Street, Legaspi Village
Makati, Metro Manila
Philippines

Telephone: (632) 88-43-36
Telefax: (632) 816-6359

Philip James Gielczyk
Country Director

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Private Companies and Individuals

8. Philippine Geothermal, Inc.
Metrobank Plaza, 15th Floor
Sen. Gil J. Puyat Avenue Ext.
Makati, Metro Manila
Philippines

Telephone: (632) 817-8876 to -8880
Telefax: (632) 817-8622
Telex: 63851 UNION PN

Gregory D. Raasch
Manager, Operations - Production

9. Sycip, Gorres, Velayo & Co. (SGV)
105 Del la Rosa St.
Legaspi Village, 1200 Makati
Metro Manila, Philippines

Telephone: (632) 817-0301
Telefax: (632) 819-0872
Telex: 45096 PH

Adriano C. Dy
Managing Director
SGV Consulting

Rene R. Fuentes
Principal
The SGV Group

Antonio G. Lim
Principal
SGV Consulting

Emmanuel Travino
Manager
SGV Consulting

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10. Caltex (Philippines), Inc.
540 Padre Faura
Ermita, Manila
Philippines

Telephone: (632) 521-35-01

Francis Ablan
President

George Tabberrah
Manager, Distribution

11. C. Virata & Associates
DAP Bldg., San Miguel Avenue
Pasig, Metro Manila
Philippines

Telephone: (632) 631-0921 to -0930
Telefax: (632) 631-2161
Telex: 29001 PXO PH

Cesar E. A. Virata
Principal

Gabriel Y. Itchon
Associate

12. Alcorn Petroleum and Minerals Corporation
Mezzanine Adamson Center
121 Alfaro Street
Salcedo Village, Makati
Metro Manila, Philippines

Telephone: (632) 817-9539; 817-9550
Telefax: (632) 817-4643

Ponciano K. Mathay
Vice President

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13. Morris Corporation
18th Floor, Metrobank Plaza
Sen. Gil J. Puyat Avenue
Makati, Metro Manila
Philippines

Telephone: (632) 86-63-53; 817-1141
Telefax: (632) 815-4763
Telex: 230-75 MRSC PH

E. Conrad Geeslin
President

14. Blackgold Oilfield Supplies, Inc.
Room 504, 5th Floor, PBCOM Bldg.
Ayala Avenue, Makati
Metro Manila, Philippines

Telephone: (632) 810-2328
Telefax: (632) 810-2336
Telex: ETPI 64556 BOIL PN

Manuel G. Mendoza
President

Enrique P. Subardiaga
Vice President

C. H. Dunham
Consultant

15. Bechtel Corporation
c/o United Primovers Corp.
Salcedo/Herrera Sts., Makati
Metro Manila, Philippines

Telephone: (632) 873-667; 852-823
Telex: 45004 FEDMEN PM

Alfonso M. Quintans
Resident Manager

16. Parsons International Limited
105 Rada Street
Legaspi Village, Makati
Metro Manila, Philippines

Telephone: (632) 818-6085
Telefax: (632) 818-6035
Telex: RCA 22303 RPC PH

Bernard H. Conroy
General Manager

17. Armco Marsteel Alloy Corporation
Alpap I Bldg., 140 Alfaro Street
Salcedo Village, Makati
Metro Manila, Philippines

Telephone: (632) 818-1311 to -1315
Telefax: (632) 818-5264
Telex: 45582 AMAC PM

Roger A. Gant
President

18. Energy Resources International, Inc.
1366 Caballero St.
Das Marinas, Makati
Metro Manila, Philippines

Telephone: (632) 810-9279
Telefax: (632) 815-6575
Telex: 64957 DALEY PN

Richard S. Stevenson
Vice President

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U.S. Government Agencies

19. Agency for International Development
18th Floor, Ramon Magsaysay Center
1680 Roxas Boulevard
Manila, Philippines

Malcolm Butler
Mission Director

Richard Johnson
Deputy Mission Director

Dennis Zvinakis
Director, Office of Capital Projects

Alex Sundermann
Project Development Officer

Bruno Cornelio
Director, Office of Private Enterprise Support

Conchita Silva

Richard M. Dangler

20. Embassy of the U.S.
Manila, Philippines

John Moggerno
Economic Counselor

Jonathan M. Bensky
Commercial Counselor

Diane F. Castiglione

Cleo A. Alday