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EARTH SCIENCE LAB.

Marriott Lb GR 1199.5 G48V.1	Geothermal Resources Council Transactions, VOL 1; "Geothermal Energy: A NOVELTY Becomes Resource"; Annual Meeting, 25-27 July, 1978 Hilo, Hawaii
FC USGS OFR 71-213	Muffler, L.J.P.; Evaluation of Initial Investigations Dieng Geothermal Area, Central Java, Indonesia,
Area Indo.	Kadir, Abdul; Arismunandar, A.; Radja, V.T.; Geothermal Energy Exploration at the Dieng Mounta and Policy to Utilize Other Geothermal Resources in Indonesia,
Area Philippines	Saldivar-Sali; Arthur and Olympia, E.U.; Sur. Energ Development, Manila, Philippines.
USGS OFR 71-285	Truesdell, A.H, Geochemical Evaluation of the Dieng Mountains, Central Java, for the production of Geothermal Energy
Ted Glenn.	Anderson, R.N.; Heat Flow in the Mariana Margin Basin, Jour. of Geop. Research, VOL. 80. NO. 29
SER COO 4051- 23	DiPippo, Ronald; Geothermal Power Plants of New Zealand, Philippines and Indonesia. A Technical Survey of Existing and planned Installations

April, 13, 1982.

Mr. J.Stringfellow
Publications - ESL
University of Utah Research Inst.
Salt Lake City, UTAH.

Dear Mr. Stringfellow,

I have receive d your letter and the reproduction from GRC Transaction on the 8th of April. Thank you very much for your kindness.

According to my previous letter, herewith I send you a list of papers about Geothermal development in Indonesia that had been published internationally. If you or your staff have any interest in those papers, please let me know and I would send the reproduction to your place. Beside this papers, there are numerous papers which had been written in Indonesia(mostly in Indonesian language) but they were unpublished reports and all the data were held by Indonesian Government(PERTAMINA) and/or by the agency of the New Zealand Government(GENZL); so it's difficult to make such kind of list. By the way, if there are special questions from you, I am happy to answer them ensuring you could keep it confidential.

Best regards.

Yours sincerely,

ASuwana

Drs. Ardi Suwana
Jl. Arun Raya 37
Ujung Menteng-Cakung.
Jakarta-Timur, INDONESIA

List of papers about Geothermal Development in INDONESIA.

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2. V.T.Radja, "Geothermal Energy Prospects in South Sulawesi, Indonesia", Geothermics,Spec.Issue 2,Vol.2,1970, pp 136-149.
3. D.Hadikusumo, L.Pardyanto & M.Alzwar, "Possible Energy Resources in Indonesian Volcanic Areas-Summary", Papers from the Circum Pacific Energy and Mineral Conference,Hawaii,USA 1974, published by the AAPG Memoir-25, pp135-139.
4. I.Akil, "Developments of Geothermal Resources in Indonesia", Proceedings:Second United Nation Symposium on the Development and Use of Geothermal Resources,California,USA,vol-1, 1975, pp11-16.
5. V.T.Radja, "Overview of Geothermal Energy Studies in Indonesia", Proceedings:Second United Nation Symposium on the Development and Use of Geothermal Resources,California,USA, Vol-1, pp233-240.
6. W.Kartokusumo, W.A.J.Mahon & K.A.Seal, "Geochemistry of the Kawah Kamojang Geothermal Systems,Indonesia", Proceedings: Second United Nation Symposium on the Development and Use of Geothermal Resources,California,USA,Vol-1,1975, pp757-760.
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8. V.T.Radja, "Investigations of Geothermal Energy Resources in the Minahasa Area,North-Sulawesi,Indonesia", Proceedings: International Congress of Thermal Waters, Geothermal Energy and Volcanism of the Mediterranean Area, Athens,Greece,Vol-1 1976, pp467-481.
9. M.Basoeki & V.T.Radja, "Recent Development of 30 MW Kamojang Geothermal Power Project,West-Java,Indonesia", Transactions: Geothermal Resources Council, Vol-2,1978, pp35-38.
10. M.Basoeki & V.T.Radja, "Plan for Development of the Lahendong Geothermal Area,North-Sulawesi,Indonesia",Transactions:

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11. M.Basoeki & V.T.Radja, "Towards the Construction and Environmental Impacts of the Kamojang Geothermal Power Project, West-Java,Indonesia", Transactions:Geothermal Resources Co-uncil, Vol-3,1979, pp49-53.
12. D.F.X.Finn, "Geothermal Developments in the Republic of Indonesia", Tranactions:Geothermal Resources Council, Vol-3, 1979, pp211-212.
13. M.A.Grant, "Mapping Kamojang Reservoir", Transactions:Geothermal Resources Council, Vol-3,1979, pp271-274.
14. M.A.Grant, "Water Content of the Kawah Kamojang Geothermal Resources", Geothermics, Vol-8 No.1,1979, pp21-30.
15. B.S.Hadipoetranto, "Geothermal Exploration in Indonesia", Paper presented at the First Meeting of the Standing Advisory Comittee on Geothermal Training, Pisa-Italy, 1980.

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AAPG Bull
v62 no 7 (July 1978)

of mineral deposits are closely
e geotectonic units and are char-
examples, the Mother Lode gold
accreted oceanic crustal terrane,
rtly coincident with, the eastern-
marked by the Melones fault sys-
its in the Coast Ranges are struc-
he Coast Range thrust fault; and
s, with one exception, are in sili-
island-arc terranes. Recognition
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ation programs and in estimating
f discrete large areas.

HECTOR, Federal Commission
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Prieto Geothermal Field, Baja

othermal field is located 20 km
xicali, in the State of Baja Cali-
e field is in an alluvial flat and is
osits originating from the Colo-
ng granitic intrusive rocks which

rieto (from which the field takes
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through these weak areas into
ers close to the surface where the
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rted exploration of this field in
first results in May 1964. Based
ng program was determined for
ng enough steam to install the
plant with a capacity of 75,000
ed in April 1973. The plant has
th a capacity of 37.5 Mw each
ing since its opening with out-
ar reaching 90.3% capacity.
ng and on the success obtained
k, it was determined to enlarge
al 75,000 kw, to start operating

drilling work carried out in Cer-
nued to date and, based on the
eted, a capacity of 700,000 kw
is hoped that this figure will be
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and northern boundaries of the

ederal Commission of Electric-
cludes enlargement of the pres-
s already mentioned; to gener-
1980 using the low-pressure
water which is presently being
ration lagoon; addition of an-

other 110 Mw, in units of 55 Mw each, to be installed in 1982 and 110 Mw more in 1983.

If the results obtained from the exploratory work are positive, it is thought that the capacity to be constructed during the following 2 years will reach 400,000 kw more, thereby obtaining in Cerro Prieto an operating capacity of 800,000 kw by 1984.

ASAKAWA, TADASHI, SHUNJI SATO, and YASUFUMI ISHIWADA, Japan Petroleum Development Corp., Tokyo, Japan

Contrast of Hydrocarbon Potential Between Fore-Arc and Back-Arc Basins of Tohoku Arc, Japan

Over 80 million bbl of oil and 50 Bcf of gas have been produced from the Neogene formations of the Akita basin, a subbasin of the back-arc basin. This basin is closely related to volcanic activity during and after the Neogene. Hydrocarbons have accumulated in anticlines, which were mainly formed by block-faulting of the basement. Tuffaceous rocks are important reservoir facies, and sandy tuff is an especially good reservoir rock.

Relatively large oil fields lie in areas where the shales of both the Onnagawa and Funakawa Formations are thick. These formations were deposited in a stagnant environment characteristic of a closed marginal sea, and therefore organic matter must have been well preserved.

The terrestrial heat flow in the back-arc side is three or four times as high as that in the fore-arc side (Kitakami basin).

In contrast to the Akita basin, no hydrocarbon discovery has been made in the Kitakami basin. The hydrocarbon potential in this basin might be handicapped by geologic factors such as low heat flow and an oxygen-rich sedimentary environment of deposition. However, this basin has a high percentage of sandstone and an abundance of sedimentary rocks (over 4,000 m thick). Moreover, the geologic structures are large. Undoubtedly this basin had the same Neogene history as that at the Hidaka oil field, Hokkaido Island. In addition, an exploratory well recently drilled had gas shows at many depths. The hydrocarbon type might be gas rather than oil because there have been no oil seepages in the near onshore and units have a low pyrolysis fluorescence.

AUBOUIN, JEAN, Université Pierre et Marie Curie, Paris, France

From Caribbean to South and North American Cordilleras

The Caribbean area developed to the detriment of the North and South American Cordilleran systems. A succession of axial terminations of these Cordilleras is situated along the Huancabamba and Barquikimeto transverse structures in the Andes and along the Parras and Guatemala transverse structures in the Mexican Sierra Madres. The Caribbean belt, which has alpine features, thus was situated in an intercontinental position at the western end of the Tethys Sea as a result of the opening of the Atlantic.

BASOEKI, M., and VINCENT T. RADJA, State Electric Company, Jakarta, Java, Indonesia

Recent Development of Kamojang Geothermal Project, West Java, Indonesia

Kamojang geothermal project is located on a large volcano complex 42 km southeast from Bandung, at an altitude of 1,650 m above sea level. This area has been investigated by Dutch scientists from 1896 to 1951.

Exploration drilling started in 1926 when five shallow wells were drilled. Present development started with detailed geologic, geophysical, and geochemical surveys in 1972 and exploration drilling in 1974.

Production drilling of 10 wells started in 1976 for the purpose of construction of the first stage unit of 30 Mw capacity.

A boundary of the geothermal reservoir has been defined by geophysical survey. Steam production has been demonstrated, and physical and chemical measurements have been made in the exploration and production wells.

To enable commercial scale of electricity generation, 10 production wells of 230-mm diameter should be drilled. For the purpose of turbine design the following data could be used: (1) turbine inlet pressure of 5 kg/sq cm; (2) steam condition will be dry saturated so that at 5 kg/sq cm the temperature of the steam will be 158 to 159°C; (3) local boiling point is 94°C and m atmospheric pressure is 0.815 kg/sq cm; (4) the steam contains less than 1.42% by weight of gas. The gas is 96% carbon dioxide and 4% hydrogen sulfide. No corrosion problem would be encountered.

The design of the Kamojang first-stage geothermal power plant of 30 Mw will be prepared by the government of the Republic of Indonesia under the support of the New Zealand Government grant.

The construction of this power plant will require approximately 48 months. The work will be in three major phases: site preparation, foundation and building construction, and equipment installation.

The success of the Kamojang project demonstrates that new resources are available for the production of electricity in Indonesia. This successful venture will create favorable atmosphere for geothermal power development in the future.

Based on the size and thickness of the geothermal reservoir, porosity of 0.15, rate of energy conversion from well fluids to electricity, the estimated life expectancy of Kamojang field is 538.5 years for the production of 30 Mw and 161.5 years for production of 100 Mw.

DENT, RICHARD, J., Attorney, Tulsa, Okla.

What Foreign Companies Should Know About United States Antitrust Laws

United States antitrust laws affect the operations of business concerns in the United States, whether the business concerns are foreign entities operating directly in the United States, or American subsidiaries of multinational corporations organized and headquartered abroad.

The basic antitrust statutes are the Sherman Act, the

The American Association of Petroleum Geologists Bulletin
V. 62, No. 7 (July 1978), P. 1207-1242

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, 1978. Offshore activity
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ASSOCIATION ROUND TABLE

SECOND CIRCUM-PACIFIC ENERGY AND MINERAL RESOURCES CONFERENCE

July 30–August 4, 1978

Abstracts of Papers

ACHALABHUTI, CHARAN, Natural Gas Organization of Thailand (NGOT), Ministry of Industry, Bangkok, Thailand

Natural Gas Deposits in Gulf of Thailand

The rate of success in drilling for oil and gas in the Gulf of Thailand has increased to a ratio of one success in three wells drilled. Two commercially explorable gas-condensate fields, with total estimated reserves up to 5 Tcf, have been found in Union Oil's concession Block 12 and Texas Pacific's concession Block 15 and Block 16. The Union field is in the southern part of the Pattani trough, and the Texas Pacific field is in the northern part of the Malay basin. Several gas-condensate reservoirs have been identified in middle to lower Miocene deltaic sandstones, which range in depth from 3,300 to 8,800 ft (1,005 to 2,680 m) in the Texas Pacific field and 5,000 to 8,700 ft (1,525 to 2,580 m) in the Union field.

A 620 km submarine pipeline connects these fields with the Sattahip shore, and was formed as a common carrier. Combined gas flow, at the rate of 500 MMcf/day, is planned by the Natural Gas Organization of Thailand (NGOT). An initial gas production of 150 MMcf/day from the Union field is expected to be on-stream by January 1981, to supply electricity for industrial and domestic use in Bangkok and the eastern provinces, as a substitute for imported fuel oil.

Pre-Tertiary basins in the relinquished areas of the inner Gulf are considered to be potential petroleum-bearing basins.

ADAMS, R. H., California Energy Co., Inc., Santa Rosa, Calif., H. DYKSTRA, Petroleum Engineering Consultant, Concord, Calif., and O. SALINAS, Empresa Nacional De Luz Y Fuerza (ENALUF), Managua, Nicaragua

Development and Reservoir Analysis of Momotombo Geothermal Project, Nicaragua

Geologic and geophysical exploration for the Momotombo geothermal resource of Nicaragua began in 1966, and by early 1978 was essentially complete. The initial discovery was made in 1970. Active development commenced in November 1974, and during the following 13 months four wells were drilled, one of which was hot but dry. From late 1975 to February 1978 an additional 24 wells were drilled.

To assure the Nicaraguan government that the resource would produce for extended periods of time, a detailed reservoir-testing program was conceived. This program, using the Hewlett-Packard quartz-crystal sensor and a downhole Sperry-Sun chamber, was conducted during May, June, and July 1977. Prior to this time all testing had been only by lip-pressure measurements of vertical and horizontal discharge and by measurements of surface wellhead pressure of producing wells. The purpose of the detailed tests was to evaluate the hot-water reservoir, to determine well interference effects, to determine reservoir boundary conditions, and to obtain mass flow rates and enthalpy.

Although additional final testing for enthalpy will be required, most facets of the test were accomplished and definitive answers were obtained. The resource can generate over 100 Mw by supplying hot water from already completed wells at a surface pressure of 150 psi (1,034 kPa) for extended periods of time. Recharge to the system is essentially complete indicating a large resource. Interference tests indicated little pressure interference between certain wells and no interference between other wells.

An unexpected result recorded by the ultrasensitive pressure-measuring device showed the capability of establishing periods of rainfall by the pressure reflections at depth.

AKIL, ISMET, and RUMBOKO TASAN, Geothermal Div., PERTAMINA, Jakarta, Indonesia

Exploration and Development of Geothermal Fields in Indonesia

Since the first Circum-Pacific Conference in 1974, geothermal exploration in Indonesia has been intensively activated. Geologic, geophysical, and geochemical methods have been used in three areas, mainly in Java (e.i., Kawah Kamojang, Kawah Derajat, and the Dieng Plateau). For the first time a magnetic-telluric 5-EX survey was carried out in Dieng. These efforts resulted in 6 exploration wells in Kawah Kamojang followed by 5 development wells, 2 exploration wells in Kawah Derajat and 1 well in Dieng Plateau. In total, 7 wells are producing steam or wet saturated steam. The average producing depths are between 500 and 700 m, and the temperature recorded in the wells is between 180 and 235°C.

The present estimations of production are 100 Mw for Kamojang and Derajat combined and 100 Mw for Dieng. For the present, a 30-Mw power plant will be installed in the Kamojang area, and a small pilot geothermal power plant (¼Mw) will be installed. Outside of Java, a general inventory of geothermal resources was continued by the Geological Survey of Indonesia. In two places, North Sulawesi and West Sumatra, more exploration work was done to estimate the geothermal potentials.