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UNITED NATIONS FUND FOR NATURAL RESOURCES EXPLORATION

PROJECT RECOMMENDATION BY THE ADMINISTRATOR

Geothermal exploratory drilling at Las Planillas,  
Jalisco State, Mexico (MEX/NR/83/001)

I. BACKGROUND

1. Mexico became the first developing country to exploit its geothermal resources to produce electricity in 1959, when a 3.5 megawatt (MW) plant was installed at Pathé, Hidalgo State. By the end of 1985, Mexico will have an estimated capacity of 700 MW based on geothermal reserves which have already been proven at the Cerro Prieto and Los Azufres fields. With other newly discovered reservoirs at La Primavera and Los Humeros, the total installed geothermal capacity is planned to reach 2,040 MW by the year 2000; of this total 1,335 MW will be in the form of large power stations and 705 MW from small 5-10 MW units. Between 1985 and 1992 the Government plans to build and deploy 46 of these 5 MW units to produce 230 MW of electric power in various parts of the country.

2. There are more than 100 geothermal prospects in the neovolcanic belt requiring reconnaissance and pre-feasibility studies, and several targets are ready for exploration drilling. The Government offered three such targets, Ixtlán de los Hervores, Los Negritos and Cerros Las Planillas to the Revolving Fund for consideration. These were all evaluated technically by the Fund using the services of the United Nations Department of Technical Co-operation for Development as well as of outside consultants. It was concluded that, of these, the Cerros Las Planillas prospect, near Guadalajara in Jalisco State, offered the best chance of discovery of a high-enthalpy geothermal reservoir suitable for electricity generation and fast development to the production stage.

3. All geothermal exploration in Mexico is handled by the Comisión Federal de Electricidad (CFE), which has carried out most of the pre-feasibility work at Las Planillas necessary to site the first deep large-diameter exploratory hole.

4. The age of the Las Planillas complex, which basically consists of a peralkaline acid suite, is Recent (60,000-100,000 years). The age, size, composition and the phreatoplinian and phreatomagmatic nature of the eruptions suggest ideal conditions for a large body of high temperature fluid in fractured permeable Pre-Caldera rocks at depth within the crater area.
5. The initial exploratory hole at Las Planillas, PL-1, has been sited within a resistivity low, covering approximately two square kilometres. The location lies just south of a pronounced east-north-east by west-south-west structure, the Las Planillas fault, along which approximately 55 fumaroles occur over an area of 67,000 square metres, and where the best chance is considered to exist to intersect permeable zones. The fumarole temperatures range up to 82° Celsius, and their gas composition indicates temperatures at depth of up to 283° Celsius using various geothermometric ratios. To the south of the site is another fumarolic area. The site lies close to the centre of the Las Planillas crater but is offset in the direction of the Agua Caliente outflow to the west.
6. If the exploratory drilling at Las Planillas is successful the Government intends to pursue energetically commercial power development in this area, initially by means of 5-10 MW trailer-mounted turbine-generator units as currently employed at Los Azufres. The area is excellently located for rapid exploitation since it is close to Guadalajara and has high voltage electric transmission lines crossing it.
7. The present per capita consumption of electricity in Mexico is approximately 1,000 kilowatt hours a year. With a rapidly increasing population and an increase in per capital usage, the demand is likely to continue rising at the historic rate of 8-9 per cent per annum.

## II. THE PROJECT

8. The objective of the project is the discovery of a high enthalpy geothermal reservoir for the production of electricity for the national grid within the Las Planillas volcanic complex, 12 kilometres west of Guadalajara. Guadalajara, with a population of approximately 3 million, is the second largest city in Mexico and the third largest industrial centre after Mexico City and Monterrey.
9. The proposed exploration area consists of a rectangle of approximately 110 square kilometres. It is anticipated that 22 square kilometres would eventually be retained should there be a successful discovery.
10. The Minimum Work programme will consist of drilling one production-size exploratory well to an approximate depth of 2,500 metres and the testing thereof. If the results of this first hole are favourable, the Fund will drill a maximum of two further holes, carry out well testing and produce a preliminary reservoir assessment. Should the project exploration meet with success, the Fund, upon the request of the Government, may provide advisory assistance aimed at obtaining investment for developing the resource.

11. In summary, the proposed exploration area is considered to offer excellent geothermal exploration possibilities, taking into account both technical and economic factors. Any resultant discovery should lead to fast production in the short term and facilitate financing for further production drilling and plant construction.

### III. FINANCIAL DATA

#### 12. Revolving Fund allocation

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Minimum Work	2 200 000
Possible additional expenditure for further activities following Minimum Work	<u>2 800 000</u>
Total possible cost of the project	<u><u>5 000 000</u></u>

The financial assets of the Fund are adequate to meet the cost of the project.

### IV. RECOMMENDATION

13. In light of the above, the Administrator recommends that the Governing Council approve this project, at a total possible cost of \$5,000,000; taking note of the obligation of the United Nations Revolving Fund for Natural Resources Exploration to carry out the Minimum Work programme at a cost of \$2,200,000. This approval will be cancelled if the Government has not signed the Project Agreement nine months after the date of the Governing Council decision.

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