Research Paper Geology

Geothermal Prospection of the Chapala Ciénega, Central México

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ABSTRACT

The Michoacan area of the Cienega of Chapala is located eastern side of the Citalarift which houses a geological system that gives rise to regional geothermal activity, mainly Pajacuarán andIxtlanfaults, the stratigraphy of the area consists mainly of andesites and basalts of late Tertiary (Miocene) to the Quaternary (Late Pleistocene) interspersed with lacustrine sediments, mainly siltstones and dolomites of Pliocene.

Regional Geothermal consists of a surface hydrothermalismconsisting of springs and wells of hot water with temperatures between 48 and 94 ° C in Ixtlan of boils as well as from mud volcanoes in the Los Negritos. The waters and hydrothermal manifestations of these gases have chemical and physical characteristics that indicate the presence of geothermal fluids.

For all the foregoing, the Michoacan zone of the Cienega de Chapala is an area where work of geothermal exploration can continue using conventional techniques or even art technology.

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KEYWORDS Geothermal Prospection, michoacan ciénega

INTRODUCTION

Michoacan area of the Ciénega de Chapala is located east of the rift Citala giving rise to graben and Lake Chapala, the graben is bounded by a pair of faults that allow the geothermal activity in the region: Pajacuarán and Ixtlan faults (Gomez Tuena et al, 2005).

REGIONAL GEOLOGY

Ixtlan Fault is part of the northern flank of the Chapala graben with a length of 30 km in NW-SE alignment along the banks of the Duero River, the fault is visible through a series of surface hydrothermal manifestations (Rosas et al, 1989; Viggiano and Gutierrez, 2007), while Pajacuarán fault is part of the southern edge of the graben with a length of 20 km in EW direction (Rosas and Olguin, 1981; Viggiano and Gutierrez, 2007). The stratigraphy of the area consists mainly of andesites and basalts from the late Tertiary (Miocene) to the Quaternary (Late Pleistocene) that crop out south of the region interspersed with lacustrine sediments, mainly siltstones and dolomites of the Pliocene, which outcrop in the center west and north of the area (Rosas et al, 1989; Viggiano and Gutierrez, 2007)

GEOTHERMAL ACTIVITY

Regional Geothermal consists of a surface hydrothermalism of springs and wells of hot water with temperatures between 48 and 94 ° C in Ixtlan de los Hervores (Quijano and Chacon, 1982; Taylor, 1986a; Viggiano and Gutierrez, 2007) as well as mud volcanoes in the Los Negritos (Villamar, Zarate and Simoneit, 2005). The waters of these hydrothermal manifestations are mainly sodium chloride type with a boron content indicating the presence of geothermal fluids.Gases turn the same manifestations show a characteristic composition of geothermal gases. Geothermometers of both fluids result in medium-temperature geothermal reservoir (125 to 225 C) for the area (D'Amore and Panichi, 1980; Taylor, 1986b; Viggiano and Gutierrez, 2007). Moreover, the isotopy of the waters show an enrichment in oxygen 18 (18O) typical of geothermal environments (Taylor, 1986b; Viggiano and Gutierrez, 2007). All of the above features together may result in a wide geothermal reservoir fracture (fault width greater than 100 m) of low relief with a maximum water level 3 m deep.

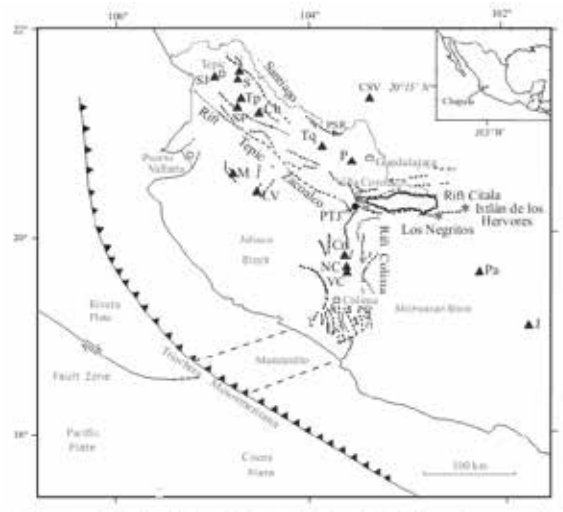


Figure 1: RegionalGeologicalMap

GEOTHERMAL PROSPECTION

For the above described, the Cienega de Chapala Michoacan is an area where work of geothermal exploration can continue by conventional techniques as well as research and development with emerging technologies like enhanced geothermal reservoirs or hot dry rock or even technical totally innovative.

REFERENCES

D'Amore, F. y Panichi, C., 1980. Evaluation of deep temperatures of hydrothermal systems by a new gas geothermometer. Geochimica et Cosmochimica Acta, 44, 549-556. | Gómez Tuena, A.; Orozco-Esquivel, Ma. T. y Ferrari, L., 2005. Petrogénesis ignea de la Faja Volcánica Transmexicana. Boletín de la Sociedad Geológica Mexicana, 52-3, 227-283 | Quijano, J.L. y Chacón, M., 1982. Evaluación geoquímica de las zonas geotérmicas de Ixtlan de los Hervores y Los Negritos, Mich., Informe técnico interno No. 59/82. Morelia, México: C.F.E., 28 pp. | Rosas, J. y Olguín, A., 1981. Estudio Geológico de Ixtlan de los Hervores, Estado de Michoacan. Informe técnico interno, No. 38/81. Morelia, México: C.F.E., 43 p. | Rosas, J.; Urrutia, J. y Maciel, R., 1989. Geología del Extremo oriental del graben de Chapala, breve discusión sobre su edad: zonas geotérmicas Ixtlan de los Hervores-Los Negritos, México. Geotermia, 5-1, 3-18. | Tello,E., 1986a. Características químicas e isotópicas del agua de manantiales termales de las zonas geotérmicas de Ixtlan de Los Hervores y Los Negritos, Michoacán. Geotermia. 2-1, pp. 43-53. | Tello,E., 1986b. Química de los gases de las zonas geotérmicas de Ixtlan de los Hervores y Los Negritos, Mich. Informe técnico interno No. 07/86. Morelia, México: C.F.E., 13 pp. | Viggiano Guerra, J.C. y Gutiérrez Negrin, L.C.A., 2007. Estudio Petrográfico y modelo conceptual Preeliminar de la Zona geotérmica de Ixtlan de los Hervores, Michoacán, México. IngenieríaHidráulica en México, 22-4,61-73. | Zarate del Valle, P.F. y Simoneit, B.R.T., 2005. La generación de Petróleo Hidrotermal en sedimentos del Lago de Chapala y su relación con la actividad geotérmica del rift Citala en el estado de Jalisco, México. Revista Mexicana de Ciencias Geológicas, 22-3, 358-370. |