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Energy and Environment Division

Open File Data on the Cerro Prieto Geothermal Field

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April 1977

Lawrence Berkeley Laboratory University of California/Berkeley

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Introduction

The Lawrence Berkeley Laboratory (LBL) under the auspices of the U. S. Energy Research and Development Administration (ERDA) has embarked on a cooperative project with the Comisión Federal de Electricidad of México (CFE) in a detailed study of the producing geothermal reservoir at Cerro Prieto, Baja California (Figure 1). Presently, 75 megawatts of electrical power are produced at Cerro Prieto; CFE plans to expand the capacity several fold over the next decade. The cooperative project incorporates studies of the geologic, hydrogeologic, geochemical and geophysical settings of the Cerro Prieto Field, as well as its reservoir engineering and subsidence characteristics.

Open File Data Bank

In 1975 the first contacts were made between LBL and CFE at Mexico City and Mexicali to arrange for LBL to collect available data on the geology, chemistry and reservoir engineering characteristics of the Cerro Prieto geothermal field. It was planned that LBL would prepare an open-file data bank on Cerro Prieto, and would also start analyzing the information to incorporate it in geological, geochemical and numerical models of this liquid-dominated geothermal system.

The response of the Mexican authorities was very favorable, and in late 1975 the first data was sent to Berkeley. During the second half of 1976 the data collection proceeded rapidly. Concurrently, most of the unpublished reports in our files were translated into English. Selected geophysical logs were digitized, and preliminary correlations were made using visual and computer methods. At the present time (early 1977) the data

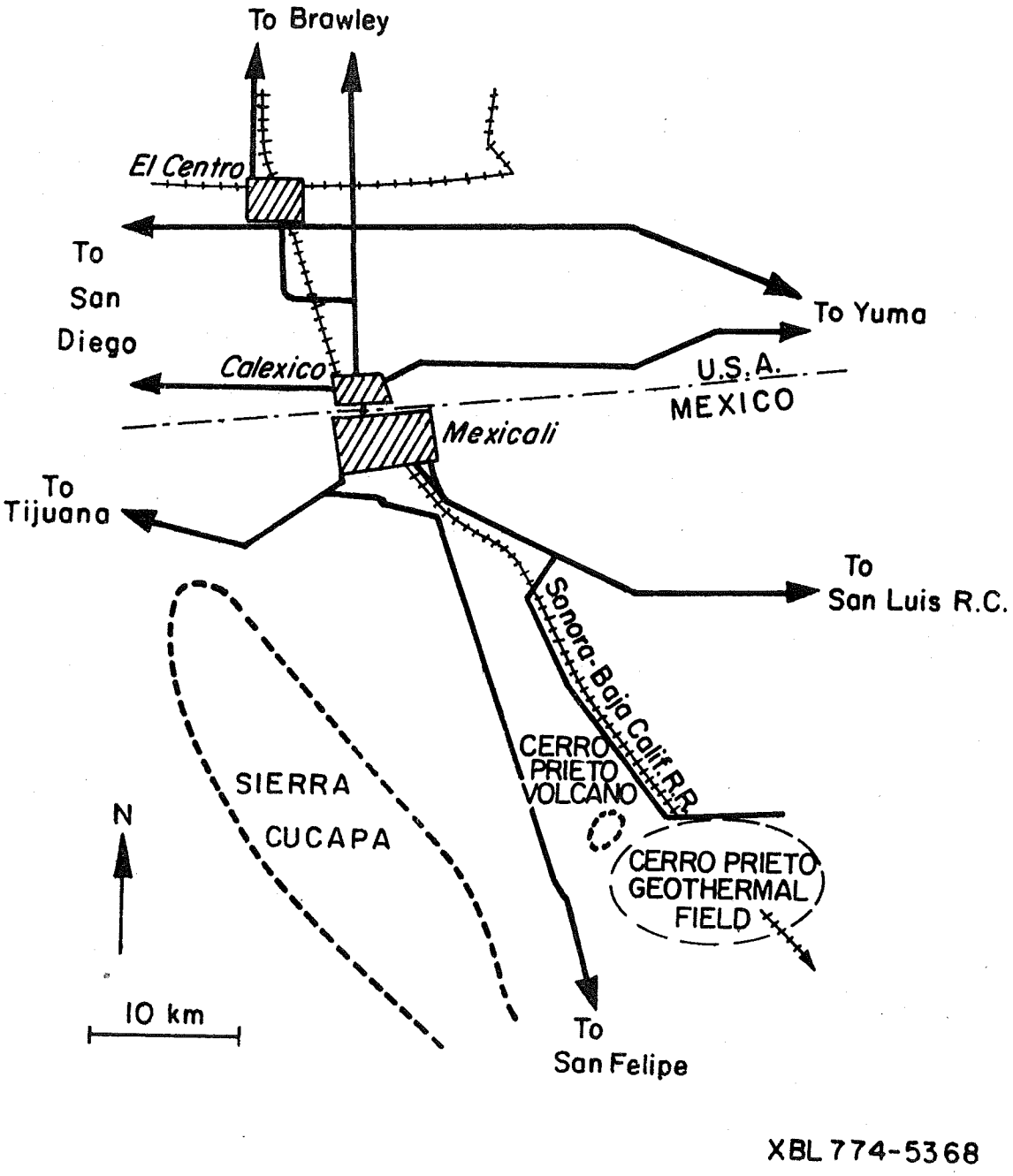

Figure 1. Location of the Cerro Prieto Geothermal Field.

collection and analysis continue. In the near future an agreement will be signed between ERDA and CFE for cooperative active field studies at Cerro Prieto. The information already collected will greatly enhance this program.

Most of the data collected were obtained from CFE at Mexicali and Cerro Prieto. They are primarily internal reports written in Spanish (later translated), internal memoranda, maps and well logs. Persons wishing to obtain copies are encouraged to inspect the data at LBL and to arrange for its reproduction.

In this report we list and describe some of the unpublished data presently available. Most new aquisitions will be translated and their availability announced periodically. In addition, in our files are a number of:

1. CFE internal memoranda on chemical characteristics of the produced fluids and incrustations;
2. published papers on Cerro Prieto and the geologic setting of the Salton Trough;
3. data on the hydrogeology of the Mexicali Valley.

For the present, the reports and maps describing the hydrogeology of the Mexicali Valley will not be placed on open file until authorization is obtained from the International Boundary and Water Commission. All other data are on open file at LBL.

Acknowledgments

We would like to thank the authorities, engineers and technicians of CFE for their valuable help in providing this data.

REPORTS AND DATA PRESENTLY ON OPEN FILE

GEOLOGY

"Structural Geology of the Sierra de los Cucapas, Northeastern Baja California, Mexico and Imperial County, California," Barnard, F.L., Ph.D. Thesis, University of Colorado, 157 pages, 1968.

"Sinopsis Geológica del Campo Geotérmico de Cerro Prieto, B.C. ," Razo Montiel, A., Comisión Federal de Electricidad, Subgerencia de Recursos Energéticos, Depto. Geología, October 1976.

GEOCHEMISTRY

Hydrogeologic Evaluation of the Cerro Prieto Geothermal System Utilizing Isotopic Techniques," Crosby, T.W. III, et al., Washington State University, College of Engineering, Research Division, Project 1G-3811-1040, January 20, 1972.

"Localización de Zonas de Máxima Actividad Hidrotermal por medio de Proporciones Químicas. Campo Geotérmico Cerro Prieto, Baja California, México," Mercado, S., III Congreso Mexicano de Química Pura y Aplicada, (preprint) 32 pages, March 1968.*

"Silica Deposition in Cerro Prieto Geothermal Field," Mercado, S. and J. Guiza, Scale Management in Geothermal Energy Development, U.C. San Diego, (preprint), 35 pages, August 1976.

GEOPHYSICS

"Aeromagnetic Study of the Mexicali-Cerro Prieto Geothermal Area," Evans, K.R., M.S. Thesis, University of Arizona, 1972.

"Aeromagnetic Study of the Colorado River Delta Area, Mexico," De la Fuente Duch, M.F.F., M.S. Thesis, University of Arizona, 1973.

"Estudio Geofísico por el Método de Resistividad en la Zona Geotérmica de Cerro Prieto. B.C.," Garcia Durán, S., Comisión Federal de Electricidad, Depto. Recursos Geotérmicos, Informe Interno, November 1973.*

"Estudio Geofísico de la Zona Geotérmica de Cerro Prieto, Baja California, México," Garcia Durán, S., Comisión Federal de Electricidad, Gerencia Planeación y Programa, Depto. Geología, Informe Interno, October 1975.*

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* Translated into English.

INFORMES (WELL REPORTS)

Reservoir Engineering Data

The "informes" generally include: 1) dates on which repairs, temperature and pressure surveys and changes in flow conditions were made, 2) descriptions of the wellhead installation, 3) temperature and pressure surveys, 4) plots of wellhead pressure versus production rates, and 5) production rates.

Wells

M-5	M-51
M-6	M-53
M-7	

MEMORIAS (WELL REPORTS)

Well Drilling and Completion Data

The "memorias" indicate the location of the well, describe drilling, logging, completion and repair activities, and list installed casings and wellhead equipment. To each report there is attached a blue print giving temperature profiles taken at different times, completion data, lithologic column, electric log and location map. The memorias listed below have all been translated into English.

Wells

M-5	M-19A	M-39
M-7	M-21A	M-42
M-8	M-25	M-45
M-9	M-27	M-46
M-10	M-29	M-48
M-11	M-30	M-51
M-13	M-31	M-53
M-14	M-34	
M-15A	M-35	

RESERVOIR ENGINEERING

"Cerro Prieto Geothermal Field, Mexico. Wells and Plant Operation," Mercado, S., International Congress on Thermal Waters, Geothermal Energy and Vulcanism Mediterranean Area, Athens, (preprint) 15 pages, October 1976.

TOPOGRAPHIC MAPS

The topographic maps were prepared by CETENAL (Comisión de Estudios del Territorio Nacional) México, D.F.

Name	
Mexicali (I11D65)*	1:50,000
Hechicera (I11D66)*	1:50,000
Paredones (I11D67)*	1:50,000
Sierra Cucapa (I11D75)	1:50,000
Guadalupe Victoria (I11D76)	1:50,000
Guardianes de la Patria (I11D85)	1:50,000
Plan de Ayala (I11D86)	1:50,000

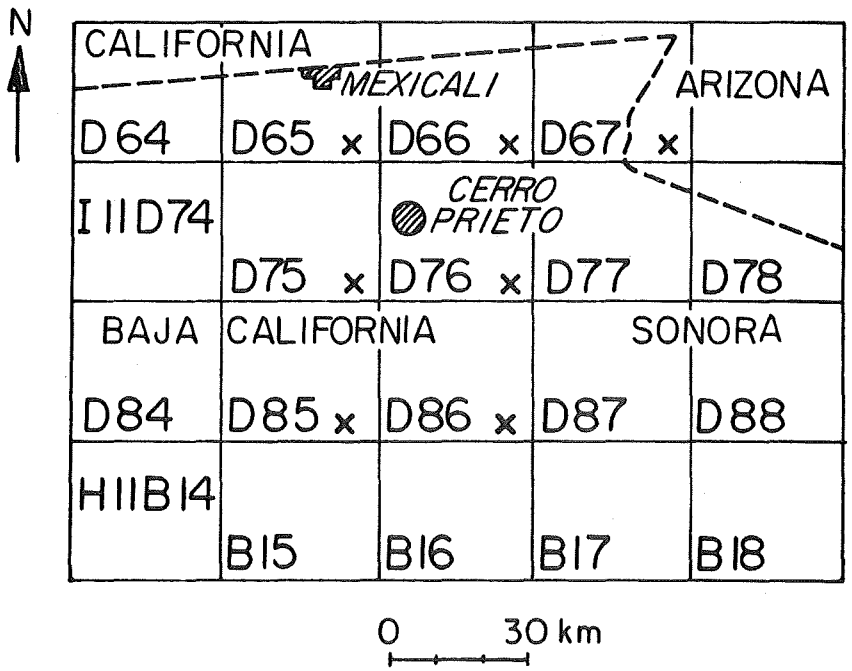

Figure 2. Index of topographic maps. Key: X map presently in our files.

* Preliminary Maps.

WELL LOGS

Most of the geophysical well logs were run by Schlumberger; a few of the early wells were logged by Pan Geo Atlas Corporation.

Well	Log	Depth	Scale
M-3	Electrical	300' - 8600'	2" = 100'
	Potential Spontaneous	3300' - 7600'	5" = 100'
	Potential Spontaneous	7500' - 8500'	5" = 100'
	Temperature	300' - 3300'	2" = 100'
	Temperature	3100' - 7500'	2" = 100'
	Temperature	7500' - 8600'	2" = 100'
M-5	Electrical	351' - 3813'	2" = 100'
	Micro	351' - 2830'	2" = 100'
	Micro	351' - 2986'	5" = 100'
	Micro	2986' - 3800'	5" = 100'
M-6	Electrical	831' - 6493'	2" = 100'
	Micro	836' - 3284'	5" = 100'
	Micro	3100' - 6500'	5" = 100'
M-7	Electrical	454' - 3339'	2" = 100'
	Micro	454' - 3337'	2" = 100'
	Acoustic	0' - 2883'	2" = 100'
M-8	Electrical[1]	470' - 4300'	5" = 100'
	Micro	470' - 3718'	5" = 100'
	Micro	3685' - 4322'	5" = 100'
	Micro	3685' - 4322'	2" = 100'
M-9	Electrical[1]	644' - 3496'	2" = 100'
	Electrical[1]	3493' - 4652'	2" = 100'
	Micro	770' - 3495'	2" = 100'
	Micro	3494' - 4652'	2" = 100'
M-10	Electrical[1]	664' - 3550'	2" = 100'
	Electrical[1]	3545' - 4284'	2" = 100'
	Electrical	660' - 3549'	5" = 100'
	Micro	660' - 3448'	5" = 100'
	Micro	3546' - 4283'	5" = 100'
M-11	Electrical[1]	400' - 2400'	2" = 100'
	Electrical[1]	2494' - 4563'	2" = 100'
	Micro	403' - 2400'	2" = 100'
	Micro	2494' - 4561'	2" = 100'
M-13	Electrical	120' - 4314'	2" = 100'
	Micro	600' - 3230'	2" = 100'
	Micro	2154' - 4313'	2" = 100'

1. Digitized

WELL LOGS (Continued)

Well	Log	Depth	Scale
M-14	Micro	840' - 3140'	5" = 100'
	Saraband	3150' - 4252'	5" = 100'
	Comp. F. D.	3142' - 4268'	2" = 100'
	Induc. Elect.[1]	842' - 3142'	2" = 100'
	Dual Induc. Lat.[1]	3130' - 4263'	2" = 100'
	Comp. NFD[1]	3130' - 4268'	5" = 100'
M-15	Electrical	500' - 2400'	2" = 100'
	Electrical	2400' - 4200'	2" = 100'
	Micro	500' - 2400'	2" = 100'
	Micro	2500' - 4200'	2" = 100'
M-19A	Electrical[1]	189' - 2336'	2" = 100'
	Dual Induc. Lat.[1]	2310' - 4753'	2" = 100'
	Comp. NFD[1]	2312' - 4300'	5" = 100'
	Micro	190' - 2313'	2" = 100'
	Comp. F. D.	2312' - 4300'	5" = 100'
	Saraband	2370' - 4290'	5" = 100'
M-20	Micro	500' - 2700'	2" = 100'
	Micro	500' - 2700'	5" = 100'
	Micro	2700' - 4300'	2" = 100'
	Micro	2700' - 4300'	5" = 100'
	Electrical	500' = 2700'	2" = 100'
	Electrical	500' = 2700'	5" = 100'
	Electrical	2700' = 4400'	2" = 100'
	Electrical	2700' = 4400'	5" = 100'
M-21	Electrical	100' - 600'	2" = 100'
	Electrical	100' - 600'	5" = 100'
	Electrical	600' - 3600'	2" = 100'
	Electrical	600' - 3600'	5" = 100'
	Electrical	3600' - 4900'	2" = 100'
	Electrical	3600' - 4900'	5" = 100'
	Micro	100' - 600'	2" = 100'
	Micro	100' - 600'	5" = 100'
	Micro	600' - 3600'	2" = 100'
	Micro	600' - 3600'	5" = 100'
	Micro	3600' - 4900'	2" = 100'
	Micro	3600' - 4900'	5" = 100'
M-25	Dual Induc. Lat.[1]	280' - 2273'	2" = 100'
	Comp. NFD[1]	280' - 2277'	5" = 100'
	Dual Induc. Lat.[1]	2250' - 4600'	2" = 100'
	Comp. F. D.	280' - 2277'	5" = 100'
	Comp. F. D.	2250' - 4603'	2" = 100'
	Saraband	2260' - 4590'	5" = 100'

1. Digitized

WELL LOGS (Continued)

Well	Log	Depth	Scale
M-26	Electrical	500' - 4200'	2" = 100'
	Micro	500' - 2200'	2" = 100'
	Micro	500' - 2200'	5" = 100'
	Micro	2400' - 4100'	2" = 100'
	Micro	2400' - 4100'	5" = 100'
M-27	Induc. Elect.	900' - 2900'	2" = 100'
	Induc. Elect.	900' - 2900'	5" = 100'
	Dual Induct. Lat.	2900' - 4200'	2" = 100'
	Comp. NFD	2900' - 4200'	5" = 100'
	Comp. FD	2900' - 4200'	2" = 100'
	Saraband	3000' - 4200'	5" = 100'
M-29	Electrical[1]	600' - 3470'	2" = 100'
	Dual Induc. Lat.[1]	3438' - 4185'	2" = 100'
	Comp. NFD[1]	3446' - 4190'	5" = 100'
	Micro	600' - 3470'	2" = 100'
	Comp. FD	3446' - 4190'	2" = 100'
	Dual Induc. Lat.	3446' - 4185'	5" = 100'
M-30	Comp. FD	500' - 2300'	2" = 100'
	Dual Induc. Lat.	2300' - 4900'	2" = 100'
	Electrical	500' - 2300'	2" = 100'
	Electrical	500' - 2300'	5" = 100'
	Comp. FD	500' - 2300'	5" = 100'
	Dual Induc. Lat.	2300' - 4900'	5" = 100'
M-31	Electrical	100' - 600'	2" = 100'
	Electrical	100' - 600'	5" = 100'
	Electrical	600' - 3500'	2" = 100'
	Electrical	600' - 3500'	5" = 100'
	Micro	600' - 3500'	2" = 100'
	Micro	600' - 3500'	5" = 100'
M-34	Electrical	100' - 600'	2" = 100'
	Electrical	100' - 600'	5" = 100'
	Electrical	600' - 3200'	2" = 100'
	Electrical	600' - 3200'	5" = 100'
	Dual Induc.	3200' - 5000'	2" = 100'
	Micro	1000' - 3200'	5" = 100'
	Micro	600' - 3200'	2" = 100'
M-35	Dual Induc. Lat.	500' - 2100'	2" = 100'
	Comp. Neutron	500' - 2100'	5" = 100'
	Comp. FD	500' - 2100'	5" = 100'
	Saraband	600' - 2100'	5" = 100'
	Saraband	2500' - 4500'	5" = 100'

1. Digitized

WELL LOGS (Continued)

Well	Log	Depth	Scale
M-38	Electrical	600' - 3600'	2" = 100'
	Electrical	600' - 3600'	5" = 100'
	Electrical	3600' - 4900'	2" = 100'
	Electrical	3600' - 4900'	5" = 100'
	Micro	600' - 3600'	2" = 100'
	Micro	600' - 3600'	5" = 100'
	Micro	3600' - 4800'	2" = 100'
	Micro	3600' - 4800'	5" = 100'
M-39	Electrical[1]	100' - 596'	2" = 100'
	Electrical[1]	600' - 3647'	2" = 100'
	Electrical[1]	3635' - 4285'	2" = 100'
	Electrical[1]	4285' - 4916'	2" = 100'
	Micro	600' - 3646'	2" = 100'
	Micro	3635' - 4100'	2" = 100'
	Micro	4285' - 4915'	2" = 100'
M-42	Induction	600' - 2600'	5" = 100'
	Dual Induc. Lat.	2600' - 4300'	5" = 100'
	Comp. NFD	2600' - 4300'	5" = 100'
	Induc. Electrical	600' - 2600'	2" = 100'
M-45	Electrical	600' - 2400'	2" = 100'
	Induc. Electrical	600' - 2400'	5" = 100'
	Comp. NFD	2400' - 4600'	5" = 100'
	Comp. FD	2300' - 4600'	5" = 100'
	Dual Induc. Lat.	2400' - 4600'	2" = 100'
	Saraband	2500' - 4500'	5" = 100'
M-46	Micro	646' - 2784'	5" = 100'
	Micro	900' - 2800'	1" = 100'
	Saraband	2775' - 4360'	5" = 100'
	Induc. Electrical[1]	644' - 2788'	2" = 100'
	Dual Induc. Lat.[1]	2770' - 4661'	2" = 100'
	Comp. NFD	2770' - 4667'	5" = 100'
M-48	Dual Induc. Lat.[1]	638' - 3194'	2" = 100'
M-51	Electrical	511' - 2315'	2" = 100'
	Electrical	511' - 2315'	5" = 100'
	Micro	512' - 2313'	5" = 100'
	Dual Induc. Lat.	2305' - 5248'	2" = 100'
	Saraband	2310' - 5240'	5" = 100'
M-53	Dual Induc. Lat.	762' - 3605'	2" = 100'
	Dual Induc. Lat.	3601' - 6210'	2" = 100'
	Saraband	815' - 3590'	5" = 100'
	Saraband	3604' - 4860'	5" = 100'

1. Digitized

FS- 1

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