

DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
CALIFORNIA STATE OFFICE

Notice to Lessees and Operators of  
Federal Geothermal Leases  
in California

(NTL-CA-86-01)

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I. INTRODUCTION

Geothermal Resources Operational Order No. 1 (effective February 1, 1975) prescribes requirements for exploration operations as defined in 43 CFR 3264.4. That Order limits the drilling of temperature gradient holes to a depth of 500 ft (152m) unless otherwise authorized. Experience has shown that in many geothermal areas gradient holes must be drilled to depths greater than 500 ft (152m) to obtain deeper more indicative temperature data. Unless otherwise approved by the authorized officer, the guidelines described below must be followed in order to drill temperature gradient holes greater than 500 ft (152m) in depth.

II. DEEP TEMPERATURE GRADIENT HOLE DEFINITION

For the purposes of these guidelines a deep temperature gradient hole (TGH) is a hole drilled or cored to a depth greater than 500 ft (152m) and used to obtain geophysical information or other information approved by the authorized officer. A deep TGH cannot be used to produce or flow test geothermal resources.

III. INFORMATION REQUIRED OF THE APPLICANT

The lessee/operator shall submit the following information with the Geothermal Exploration Permit (Form 9-1956).

- A. The approximate map location (to the nearest 100 ft (30m) within the smallest legal subdivision) and the number or designation of each proposed hole and the probable order of drilling;

- B. The type and size of drilling rig;
- C. The proposed drilling program including, surface casing specifications and setting depth, cementing program, type and specifications of blowout prevention equipment (BOPE), and drilling fluids program;
- D. The type and dimensions of the drilling sump and the proposed method of sump abandonment at each location;
- E. The approximate time that each hole will be used for observation; and
- F. A proposed downhole abandonment program designed to prevent interzonal migration of fluids.

The applicant shall clearly mark all information to be kept proprietary. If the authorized officer concurs, all such information shall be proprietary according to 43 CFR 3264.5.

#### IV. DRILLING REQUIREMENTS

Unless otherwise approved by the authorized officer the lessee/operator shall comply with the following minimum requirements. Waivers may be granted by the authorized officer whenever an applicant can adequately demonstrate on a site- or project-specific basis that some alternative method will satisfy the intent to protect life, property, and the environment.

- A. Surface casing setting depth shall be a minimum of ten percent of the proposed depth of the hole, but not less than 100 ft (30m).
- B. The surface casing shall be cemented by filling the annular space from the casing shoe to the surface using acceptable industry practices.
- C. The lessee/operator shall install either an annular BOP (blowout preventer) and full opening gate valve, or a pipe ram/blind ram BOP, acceptable to the authorized officer. The BOPE shall be pressure tested before drilling out the shoe of the surface casing or any intermediate casing strings. The BOPE shall be capable of being operated at a safe distance from the borehole. In coring operations a valve shall also be retained at the drill site and shall be placed on the drill string before retrieving the core barrel.
- D. A kill line shall be installed below the BOPE, lead directly to the mud pumps, and be fitted with a valve through which cement could be pumped, if necessary.

- E. A blow-down line shall be installed below the BOPE. The blow-down line shall be placed in such a manner as to permit containment of displaced fluids and to minimize any safety hazard to personnel.
- F. A supply of drilling fluid and lost circulation and mud weighting materials shall be readily available to cure significant lost circulation problems or any abnormal formation pressures or water entries which may be encountered.
- G. During mud drilling operations, inlet and outlet temperatures shall be recorded either hourly or at 30-ft (9m) intervals.
- H. When drilling without the return of drilling fluids to the surface, the unstabilized bottom-hole temperature (BHT) shall be recorded at a minimum of 100-ft (30m) intervals. Should the BHT reach 125°F (52°C) and later 175°F (79°C), the recording intervals shall be 50 ft (15m) and 30 ft (9m), respectively.
- I. If a 175°F (79°C) circulating flowline temperature is reached while drilling, further drilling shall stop immediately and the operator shall notify the authorized officer. The hole will be either:
  - (1) Completed as an observation hole by running and either hanging or cementing steel tubing from total depth to the casing head, and securing the well by a locked wellhead valve that is approved by the authorized officer;
  - (2) Abandoned by cementing from total depth to the surface; or
  - (3) If approved by the authorized officer after a review of onsite drilling equipment, drilling may resume.
- J. If a 212°F (100°C) BHT is reached while drilling without the return of drilling fluids to the surface, the lessee shall immediately stop drilling and the hole will then be either completed as in I(1) or abandoned as in I(2), or if approved by the authorized officer the hole may be deepened.
- K. If no lost circulation problems, or no abnormal formation pressure or water entry problems are evident, final abandonment may be done either by placing a 50-ft (15m) cement plug across the shoe of the casing and plugging the hole with cement from 10 ft (3m) to the surface, or by such other manner as is approved by the authorized officer.

#### V. REPORTING THE COMPLETION OF OPERATIONS

Records of any operation must be submitted in duplicate within 30 days after the operation is completed. A completion report shall be submitted in duplicate within 30 days after all operation sites are abandoned. The report shall contain a copy of the approved Geothermal Exploration Permit, and the following information for each hole drilled:

- A. A final hole designation and location;
- B. A driller's log or well history, if not previously submitted, that notes the depths to the water table and other water aquifers, and to any other mineral deposits (salt, coal, etc.) encountered;
- C. The method of completion, including cementing, and casing or tubing used with wellhead components. The completion method may be presented by engineering drawings;
- D. Complete details of the abandonment procedures;
- E. Any information on drilling difficulties or unusual circumstances encountered which would be helpful in assuring future safety of operations or protection of the environment in the area concerned; and
- F. All temperature data and all other logs or surveys run for each hole, if not previously submitted.

The lessee/operator shall clearly mark all information to be kept proprietary. If the authorized officer concurs, all such information shall be proprietary according to 43 CFR 3264.5.

#### VI. ADDITIONAL REQUIREMENTS

- A. The lessee/operator shall notify and receive the approval of the authorized officer before any change in the location of an approved hole or for any additional holes which the lessee/operator desires to drill.
- B. The applicant shall notify the authorized officer before actual entry upon the land.
- C. Drilling fluids or cuttings shall not be discharged onto the surface where such discharge will contaminate lakes and perennial or intermittent streams.
- D. After fluids are removed or have dried, excavated pits or sumps shall be backfilled as soon as practicable and restored to conform to the original topography and vegetation.
- E. Unattended sumps shall be completely fenced to protect the public, domestic animals, and wildlife.