

Los Alamos

NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: February 2, 2000
In Reply Refer To: ESH-18/WQ&H:00-0034
Mail Stop: K497
Telephone: (505) 665-1859

Darlene 3/8/00
Chris X
File

L-AMU
7A-57

Ms. Lori Wrotenbery, Director
Oil Conservation Division
New Mexico Energy, Minerals, and Natural Resources Department
2040 South Pacheco Street
Santa Fe, New Mexico 87505

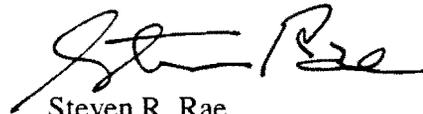
**SUBJECT: REQUEST FOR RENEWAL, LOS ALAMOS NATIONAL LABORATORY,
GROUND WATER DISCHARGE PLAN (GW-031) FOR GEOTHERMAL
OPERATIONS AT FENTON HILL**

Dear Ms. Wrotenbery:

Enclosed please find Los Alamos National Laboratory's application for renewal of the Ground Water Discharge Plan (GW-031) for Geothermal Operations at Fenton Hill, Sandoval County, New Mexico. Also enclosed, please find the \$50 filing fee required by regulation. We are requesting an extension of the existing discharge plan for an additional five-year period (2000-2005) in order to continue experimental work at the Fenton Hill site. As indicated in the renewal application, no major operational changes are anticipated during the renewal period (2000-2005).

Please contact Bob Beers of my staff at 667-7969 if you have any questions concerning this submittal.

Sincerely,



Steven R. Rae
Group Leader
Water Quality and Hydrology Group

SR:RB/rm

Enclosures: a/s

- Cy: D. Duffy, Pueblo of Jemez, Jemez Springs, New Mexico, w/enc.
G. Suazo, CRO-1, w/enc., MS A117
J. Peterson, District Ranger, Jemez Ranger District, Jemez Springs, New Mexico, w/enc.
J. Parker, NMED-DOE/OB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/LAAO, w/enc., MS A316
M. Johansen, DOE/LAAO, w/enc., MS A316
T. Gunderson, DLDOPS, w/enc., MS A100

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DOE OVERSIGHT BUREAU



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EARL/MONCH/REGULATORY

Cy (continued):

D. Erickson, ESH-DO, w/enc., MS K491

B. Beers, ESH-18, w/enc., MS K497

M. Saladen, ESH-18, w/enc., MS K497

D. Thomas, P-FM, w/enc., MS D446

J. Albright, EES-4, w/enc., MS D443

J. Thomson, EES-4, w/enc., MS D433

G. Sinnis, P-23, w/enc., MS H803

WQ&H File, w/enc., MS K497

CIC-10, w/enc., MS A150

**APPLICATION FOR RENEWAL
DISCHARGE PLAN (GW-031) FOR GEOTHERMAL OPERATIONS AT FENTON HILL**

I. General Information

A. Name, Address, and Telephone Number for Discharger or Legally Responsible Party:

Mr. David Gurule, Area Manager
U.S. Department of Energy
Los Alamos Area Office
528 35th Street
Los Alamos, New Mexico 87544
(505) 667-5105

Dennis J. Erickson, Director
Environment, Safety and Health Division
Los Alamos National Laboratory
P.O. Box 1663 MS K491
Los Alamos, New Mexico 87545
(505) 667-4218

B. Location of Discharge: 1/4 NE Section 13, Township 19 North, Range 2 East, NMPM.

The Fenton Hill Project site is located in the Jemez Mountains in Sandoval County of north central New Mexico. It is about 35 miles west of Los Alamos and 10 miles north of Jemez Springs.

C. Type of Operation: Geothermal.

The Los Alamos Hot Dry Rock (HDR) Geothermal Energy Development Project, sponsored by the U.S. Department of Energy (DOE), is a research program to develop the technology necessary to economically extract the energy contained at accessible depths within the earth's crust. The HDR Project has been conducting research activities at the Fenton Hill Project site since 1972. During the past renewal period (1995-2000), the HDR Project experienced a substantial reduction in funding resulting in a termination of project activities and a partial decommissioning of the facility. Below is a list of the significant programmatic changes that occurred during the past renewal period (1995-2000):

1. In 1995, a new astrophysical observatory was constructed in and around the existing 5.7 million-gallon reservoir at the Fenton Hill Project site (Notice of Changed Conditions, Mr. Larry D. Kirkman, U.S. Department of Energy, to Mr. William J. LeMay, N.M. OCD, December, 1995). The observatory, called Milagro, is collaboration between Los Alamos National Laboratory and a number of academic institutions. Using more than 700 light sensitive detectors submerged in the 5.7 million-gallon reservoir, plus another 200 detectors arrayed around the reservoir, the observatory will record signals from high-energy cosmic emissions.
Once the Milagro Project began using the 5.7 million-gallon reservoir for astrophysical research, the reservoir was no longer available to the HDR Project for geothermal operations. As a result, since 1995 all discharges from the venting of geothermal wells have been made exclusively to the 1.0 million-gallon service pond.
2. In 1996, all geothermal wells, with the exception of EE-2A, were plugged and abandoned. As required under New Mexico Oil Conservation Division (OCD) Rule G-203B, Form G-103 (Sundry Notice and Report) was filed with OCD for each of the six (6) geothermal wells plugged and abandoned at the Fenton Hill Project site (Mr. Mathew P. Johansen, U.S. Department of Energy, to Mr. Roy Johnson, N.M. OCD, February 4, 1997, LAAMEP:3MJ-005).

C. Type of Operation: Geothermal.

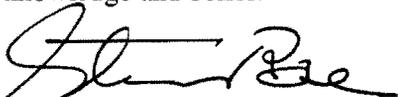
(Con't)

3. On April 6, 1998, N.M. OCD was notified of the Laboratory's intent to conduct micro-borehole drilling experiments at the Fenton Hill Project site (Mr. Bob Beers, Los Alamos National Laboratory, to Mr. Mark Ashley, N.M. OCD, April 6, 1998, ESH-18/WQ&H:98-0118).
4. On July 20, 1998, the Laboratory submitted a Minor Modification to Ground Water Discharge Plan GW-031 for the following operational changes at the Fenton Hill Project site (Mr. Steven R. Rae, Los Alamos National Laboratory, to Mr. Roger C. Anderson, N.M. OCD, July 20, 1998, ESH-18/WQ&H:98-0232):
 - a. The installation of an enhanced evaporation system for the 1.0 million-gallon service pond;
 - b. The discontinuation of NPDES Permit No. NM0028576, as approved by the U.S. Environmental Protection Agency on December 29, 1997 (Mr. Jack V. Ferguson, EPA Region 6, to Mr. G. Thomas Todd, U.S. Department of Energy, December 29, 1997, 6WQ-CA); and
 - c. The mixing of exempt and nonexempt wastes in the 1 million-gallon service pond in accordance with N.M. OCD mixture policy.

The N.M. OCD approved the Laboratory's Minor Modification request on May 10, 1999 (Mr. Roger C. Anderson, N.M. OCD, to Mr. Steven Rae, Los Alamos National Laboratory, May 10, 1999, Certified Mail Receipt No. Z559573595). Approval was contingent upon the successful completion of a Mechanical Integrity Test (MIT) of the 8 inch buried cast iron pipe used to convey wastewater from the Milagro Project's water treatment units to the HDR Project's 1.0 million-gallon pond. On June 1, 1999, the Laboratory successfully completed the required MIT. The test results were forward to the N.M. OCD on June 7, 1999 (Mr. Steven Rae, Los Alamos National Laboratory, to Mr. Roger Anderson, N.M. OCD, June 7, 1999, ESH-18/WQ&H:99-0209).

D. Affirmation:

"I hereby certify that I am familiar with the information contained in and submitted with this application for renewal and that such information is true, accurate and complete to the best of my knowledge and belief."



(Signature)

Steven Rae, Group Leader
Water Quality & Hydrology Group
Los Alamos National Laboratory

II. PLANT PROCESS

A. Describe storage and uses of geothermal waters and any surface disposal impoundments.

Neither the Hot Dry Rock (HDR) Project nor the Milagro Project, both sited at the Fenton Hill Project site, uses geothermal water. The Fenton Hill Project site has two impoundments, the 5.7 million-gallon reservoir used by the Milagro Project, and the 1.0 million-gallon service pond used by the HDR Project. Only the 1.0 million-gallon service pond functions as a disposal impoundment, receiving vented water from geothermal well EE-2A and wastewater from the Milagro Project's water treatment units. The 5.7 million-gallon reservoir was relined in 1996 in accordance with the liner specifications provided in the Laboratory's Notice of Changed Conditions, submitted in December, 1995 (Mr. Larry D. Kirkman, U.S. Department of Energy, to Mr. William J. LeMay, N.M. OCD, December, 1995). The 1.0 million-gallon service pond has been lined in accordance with the plan and specifications approved by the Oil Conservation Division, April 4, 1990 (Mr. Roger C. Anderson, N.M. OCD, to Mr. Jack B. Tillman, U.S. Department of Energy, April 4, 1990, Certified Mail Receipt No. P918402152).

B. Estimated quantities used in gallons per day (gpd).

No geothermal water is used at the Fenton Hill Project site. All water used at the site is from the facility's domestic water supply well. It is estimated that the Milagro Project will use approximately 200,000 gallons per year of domestic water for routine operations. Water usage could be as high as 6 million gallons per year in the event that it is necessary for the Milagro Project to drain the 5.7 million-gallon reservoir and refill. Draining and refilling of the 5.7 million-gallon reservoir is not expected to occur during the next renewal period (2000-2005) except as a result of a catastrophic event.

The HDR Project is not expected to use any domestic water during the next renewal period (2000-2005).

C. Any additives or commingling.

No chemical additives are used at by the HDR or Milagro Projects. No commingling of geothermal and potable water supplies occurs at the Fenton Hill Project site.

III. SITE CHARACTERISTICS

A. Provide the name, description, and location of any ground water discharge sites (water wells, seeps, springs, watercourses) within one mile of the outside perimeter of the facility. For water wells, specify use of water (e.g., irrigation, domestic, etc.)

This information was provided in the original Ground Water Discharge Plan Application submitted to the N.M. OCD in 1984 and has not changed.

B. If known, provide the flow direction of the groundwater most likely to be affected by the discharge. Include the source of the information and how it was determined.

This information was provided in Appendix C of the original Ground Water Discharge Plan Application submitted to the N.M. OCD in 1984 and has not changed.

- C. Provide depth to water of geothermal water, and if possible, any fresh water wells that could be affected by any discharge.**

HDR Project has never used geothermal water. Water in the domestic/experimental water well is tapped at approximately 377 feet.

- D. Depth to and lithologic description of rock at base of alluvium. Provide drillers logs and geologic information and maps as available.**

This information was provided in the original Ground Water Discharge Plan Application submitted to the N.M. OCD in 1984 and has not changed.

- E. Describe flooding potential of the discharge site.**

No flooding danger exists because the Project site is located above nearby streams on top of a narrow (1/2 mile wide) ridge; local runoff is diverted from the developed site.

- F. Any additional information that may be necessary to demonstrate that approval of the renewal of the Discharge Plan will not result in concentrations in excess of the standards of WQCC Regulations, Section 3-103, or the presence of any toxic pollutant at any place of withdrawal of water for present or reasonably foreseeable future use. Detailed information on site geologic and hydrologic conditions may be required for a technical evaluation of the applicant's proposed Discharge Plan.**

HDR Project

As a result of the 1996 plugging and abandonment of all HDR Project geothermal wells with the exception of EE-2A, the HDR Project no longer has the capability of conducting geothermal research and experimentation. The Phase II Hot Dry Rock reservoir is still pressurized to a minimal extent (approximately 160 psi) and, as a result, some venting of the reservoir through well EE-2A may be required in the future. Any vented fluid would be stored in the 1.0 million-gallon pond and will ultimately be evaporated or reinjected into EE-2A. An injection permit will be obtained from OCD before any injection activities are conducted.

During the next renewal period it is expected that HDR Project research activities will be limited to the following: (1) The testing of down-hole logging tools in well EE-2A, and (2) Experimental drilling using micro-borehole equipment. All micro-borehole drill depths will be limited to 350 feet to ensure that the fresh water aquifer is not penetrated. In addition, all drilling fluids will be contained on-site in the HDR Project's 1.0 million-gallon pond.

Milagro Project

Due to the nature of the astrophysical research conducted by the Milagro Project, it is necessary for the water in the 5.7 million-gallon reservoir to be ultra-pure. Purification is achieved through treatment by softening (ion exchange), filtration (multimedia and carbon filters), and disinfection (UV). Wastewater generated during the regeneration/backwashing of these treatment units is discharged to the HDR Project's 1.0 million-gallon pond for evaporation.

Milagro Project (con't)

During the past renewal period (1995-2000) it was necessary for the Milagro Project to drain the contents of the 5.7 million-gallon reservoir to service the submerged light sensitive detectors. In May 1998, approximately 2.5 million gallons of purified water was land applied to forestland at Fenton Hill. Land application was conducted in accordance with the terms and conditions of N.M. OCD's approval of the Laboratory's Notice of Intent to Discharge (Revised Notice of Intent to Discharge, Mr. Steven Rae, Los Alamos National Laboratory, to Mr. Roger Anderson, N.M. OCD, April 16, 1998, ESH-18/WQ&H:98-0127). If it is necessary during the next renewal period (2000-2005) for the Milagro Project to drain the 5.7 million-gallon reservoir then the Laboratory will submit a new NOI to your agency for land application of the ultra-pure water.

Over the next two years the Milagro Project will install approximately 170 500-gallon above ground polypropylene tanks. Each of these tanks will be filled with ultra-pure water from the 5.7 million-gallon reservoir. The tanks will serve to expand the array of light sensitive detectors beyond the boundaries of the existing 5.7 million-gallon reservoir.