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STATE OF NEVADA
COMMISSION ON MINERAL RESOURCES
DIVISION OF MINERALS
400 W. King Street, Suite 106
Carson City, Nevada 89703
(775) 684-7040 | Fax (775) 684-7052
<http://minerals.nv.gov>

Date Received 11/23/21
API Number 27-021-90080
County Mineral
Permit Number 1514
FOR DIVISION USE ONLY

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NOV 09 2021

GEOHERMAL INJECTION WELL PERMIT APPLICATION

DIVISION OF MINERALS

The applicant
ORNI 47 LLC
Name (or Corporate/Business Name)

Street Address 6140 Plumas St
City Reno State NV Zip Code 89519
Telephone 775-356-9029
Email mhanneman@ormat.com

hereby makes application for a geothermal development permit, State of Nevada, Division of Minerals.

Applicant is: Land Owner Lease Holder
Well Name: 83A-3
Lease Name/No: _____ Split Estate? Yes No
Land Type: Federal (BLM, USFS, etc.) Private State
Type and Amount of Bond: NDOM \$100,000 Project Area Bond
(Exempt for Domestic Class)

Bond Issued by: Federal Insurance Company
Serial Number: K40364250

Well Location: SE $\frac{1}{4}$ of, NE $\frac{1}{4}$, Section 3
Township 11N, Range 33E, County Mineral
UTM Northing 4300971 N; UTM Easting 392039 E (NAD83 Datum)

Operator's:
Name: ORNI 47 LLC
Address: 6140 Plumas St.
City, St Zip: Reno, NV 89519

Drilling Contractor's:
Name: Stonehouse Drilling & Construction, LLC
Address: 7801 Lakeside Drive
City, St Zip: Reno, NV 89511
Telephone: 775-432-2900

Hole Size: 17.5 Casing Size: 10.75 Weight/Gauge: 0.25-inch wall

Size of BOP: 2000 psi 3000 psi 5000 psi

Rotary Description:

Mud rotary well drilling rig. Site is not geothermal, so no BOP needed. See attached program.

Identify or locate the sources of the fluids which will be injected:

Pipeline from Wild Rose / Don Campbell geothermal field.

Estimated average daily volume of fluids injected 1,500,000 gallons.

Maximum daily volume of fluids injected 2,500,000 gallons.

Estimated maximum injected pressure 15 psi, temperature 140 °F

List proposed metering equipment, pipelines and safety devices that will be used to prevent accidental pollution:

Water quality at this site is very similar to the geothermal fluid. A temporary pipeline will first be used from the power plant to the site to perform long-term injection test to confirm aquifer hydraulic parameters.

Total Depth to be Drilled: up to 700 feet

Drilling will Commence On: December 1, 2021

Is this well location under an Underground Injection Permit?

If so, provide NDEP Permit number UNEV _____

I certify this information to be true, correct, and complete and that no pertinent matter inquired about in this application has been omitted.

Signature of Applicant/Agent: Mark Hanneman

Print Name: Mark Hanneman

Date: 11/9/2021

Please attach a detailed drilling program including the following information:

1. Well design schematic; casing and mud programs; potential water supply; drilling rig to be used and pad layout; blow out prevention equipment diagram and testing program; directional drilling information if applicable; map of location and access roads. Additional information may be required upon review.
2. The required fee per NAC 534A 210 or 534A.212.

CONDITIONS OF PERMIT

1. All permittees must comply with appropriate sections of the Geothermal Rules and Regulations of the Division of Minerals and with applicable rules and regulations of other local, state, and federal agencies.
2. During the drilling of domestic geothermal wells, all water strata above the geothermal horizon being used must be sealed or separated in order to prevent their contents from passing into other strata.
3. All fresh water and water of value or possible value for other beneficial uses must be confined to their respective strata and be adequately protected by methods approved by the Division. Precautions must be taken in drilling and abandoning wells to guard against any loss of fresh water from the strata in which it occurs, and the contamination of any fresh water by objectionable water.
4. The operator of any well must shut off and exclude all water from any geothermal resource-bearing stratum to the satisfaction of the Division.
5. See attached Conditions of Approval.
6. Please send daily drilling reports to : Cortney Luxford.....cluxford@minerals.nv.gov
and
Valerie Kneefelvkneefel@minerals.nv.gov

7. Additional Conditions/Comments

| | |
|----|---|
| A. | Any injection test that lasts for a period of more than 7 days must have prior approval from NDEP-UIC before commencing test. |
| B. | Any fluids discharged to the ground surface may require a temporary discharge permit be obtained by NDEP. |
| C. | |

This permit does not extend the permittee the right of ingress and egress on public, private or corporate lands.

The issuance of this permit does not waive the requirements that the permit holder obtain other permits from State, Federal, and local agencies.

PERMIT APPROVAL

Approved 11/24/2021 with the conditions noted above.
Date

Permit Number 1514



Administrator
Division of Minerals



STEVE SISOLAK
Governor

STATE OF NEVADA
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MICHAEL VISHER
Administrator

Las Vegas Office: 375 E. Warm Springs Rd, Ste 205, Las Vegas, NV 89119
Phone: (702) 486-4343; Fax: (702) 486-4345

GEOTHERMAL CONDITIONS OF APPROVAL FOR INJECTION WELL 83A-3 DRILLING PERMIT 1514

Submit forms and correspondence to:

Nevada Division of Minerals
400 West King Street
Suite 106
Carson City, NV 89703

Communications with the Division shall be directed to:

Cortney Luxford, Fluid Minerals Program Manager

Office 775-684-7045 Email cluxford@minerals.nv.gov
Cell 775-721-1774
Fax 775-684-7052

Michael Visher, Division Administrator

Office 775-684-7044 Email mvisher@minerals.nv.gov
Cell 775-721-7625
Fax 775-684-7052

Voicemail is available on all cell phones and office phones. Please leave a message if you are unable to speak to someone and we will return your call as quickly as possible.

YOUR APPLICATION TO DRILL THE 83A-3 INJECTION WELL, PERMIT 1514, IS APPROVED SUBJECT TO THE FOLLOWING PERMIT CONDITIONS

1. These conditions and the minimum Blow Out Prevention Equipment (BOPE) requirements shall be posted at the well site and read by all company personnel associated with the subject well.

Nigel Bain; *Large-Scale Mining*
Robert Felder; *Exploration and Development*
Randy Griffin; *Small-Scale Mining and Prospecting*

Commission on Mineral Resources
Josh Nordquist, Chairman; *Geothermal Resources*

Stephanie Hallinan; *Large-Scale Mining*
Art Henderson; *Oil and Gas*
Mary Korpl; *Public at Large*

2. The operator shall give notification at least 48 hours prior to spudding, drill stem testing, or production or injection testing operations. 24 hours notification is required prior to the testing of casing or BOPE. These notifications may be by telephone or email. Please refer to the contacts list on page one of this notice.
3. If the cementing mix for the lead cement in this program includes an additive for reducing density of the cement mix, a high-resolution cement bond log (CBL) may be required if the cement does not reach surface, if the results of a conventional CBL are inconclusive, or if the cementing of the casing appears to be inadequate.
4. Well Cellars - For corrosion prevention, the cellar must be engineered, constructed, and/or maintained, to preclude standing water from long-term contact with the casing or wellbore assembly. The top of the surface casing will be a minimum of 24 inches above the cellar floor, or ground level if a cellar is not present. Surface casing will be as high as possible around intermediate casing with excess, tapered cement so water does not pool on top of cement. At the completion of the well, the drilling pad is to be contoured in a manner that drains water away from the cellar, or surface casing if a cellar is not present.
5. Change in Plans - NAC 534A.540 (3) specifies the operator will submit a sundry for permission for a change in construction of the well bore. Verbal permission may be granted to a sundry notice due to an urgency of a particular matter.
6. Surface Casing - NAC 534A.260 (1) (c) (1) requires that surface casing be sufficient to protect freshwater aquifers and cemented to a depth not less than 10% of the proposed total depth of well, unless approved as part of the original permit. The cementing of casing strings shall be done using the standard procedure of inside casing displacement or stab-in method unless other methods are approved prior to the cementing procedure.
7. Blowout Prevention Equipment (BOPE) – NAC 534A.270 requires the operator to take all precautions necessary to keep wells under control and operating safely at all times. BOPE must be installed on the surface casing and maintained in good operating conditions at all times. BOPE must meet the specifications of API Standard 53 and have a rating for pressure greater than the maximum anticipated pressure at the wellhead. BOPE initial pressure tests should adhere to the recommended pressure test practices as outlined in Table 1 of API Standard 53, unless otherwise approved. The Division must be notified not less than 24 hours before conducting a BOPE pressure test. Stable low and high test pressures shall be maintained for at least 5 minutes. Pressure data and supporting information must be submitted to the Division as soon as practicable after the conclusion of the test.
8. Perform casing shoe pressure test at all casing shoes – A successful casing shoe pressure test, must be performed before drilling deeper. The Division does not want the formation or cement to be fractured or broken down during the test. The purpose of this test is to ensure the integrity of the cement job by showing the area below and around the casing shoe will hold pressure. The operator is to drill out no further than five feet out of the casing shoe, and then pressure up to approximately 10% below the known or estimated fracture gradient for a minimum of 30 minutes. In order to pass a casing shoe pressure test there can be no more than a 10% pressure loss over the course of the minimum 30-minute test. In the event of a failed casing shoe pressure test, a cement squeeze job must be performed below the casing shoe. A successful casing shoe pressure test must be performed before drilling deeper. The following formula is to be used for the applied surface pressure calculation:

Calculate the downhole pressure for a specified or targeted pressure gradient

Specified Pressure Gradient {(psi/ft) x vertical depth (ft)} = Pressure G (psi)

Calculate the downhole pressure due to the current mud in the hole

Mud Density (ppg) x vertical depth (ft) x 0.052 = Pressure M (psi)

Calculate the surface pressure required to test formation or shoe to a specified gradient

Pressure G - Pressure M = Required Surface Pressure (psi)

Example of Formation Integrity Test at 20" Surface Casing Shoe:

Casing Shoe at 271 ft (TVD)

Mud Weight- 9.0 ppg

Specified Pressure Gradient to test casing the 20" shoe - 0.6 psi/ft

Pressure G = 0.6 psi/ft x 271ft = 162.6 psi

Pressure M = 9.0 ppg x 271 ft x 0.052 = 126.8 psi

Required Surface Pressure = Pressure G - Pressure M = 162.6 - 126.8 = 35.8 psi

9. Directional Drilling - NAC 534A.360 requires directional surveys (inclination and azimuth) to be run on any well permitted directionally drilled well. Division conditions of approval further require directional survey (inclination and azimuth) where the inclination exceeds 5 degrees or the projected bottom hole location would be 100 feet or less from the lease boundary, unless otherwise approved by the Division of Minerals. Direction surveys must be performed at least every 250 feet in the directionally drilled portion of the wellbore. The operator is advised that cased-hole logging for the evaluation of cement bonding and hydraulic seal may also be required as part of the well completion. The cased-hole logging technique(s) utilized by the operator must be able to give conclusive results regarding the initial quality of cement bonding and hydraulic seal.
10. Injection liner – If an injection liner is utilized the liner hanger must be located at least 100 feet above the surface or intermediate casing shoe.
11. Hydrogen Sulfide – If hydrogen sulfide is encountered well must be shut-in until measured amounts are determined. Values of hydrogen sulfide encountered must be reported to the Division of Minerals.
12. Air/Aerated Drilling Operations – For air/aerated drilling operations, the following equipment shall be utilized: banjo box (or equivalent), and a staked down blooie line directed to the reserve pit with a minimum distance of 100 feet.
13. Samples – NAC 534A.310 requires samples of cuttings or splits of core shall be collected and submitted to the Nevada Bureau of Mines and Geology (NBMG). Cuttings shall be collected at least every 30 feet from surface to the total depth, unless otherwise approved in the permit.
 - a. TWO separate sets of cuttings, and one split of core, are to be sent prepaid to the Great Basin Science Sample and Records Library, Nevada Bureau of Mines and Geology, 2175 Raggio Parkway, Reno, Nevada 89512. For more information phone 775-682-8766 or e-mail [nbmg@unr.edu](mailto:nbmng@unr.edu).
 - b. EACH SET of cuttings is to consist of at least 15 milliliters of cuttings per sampling interval that must be cleaned, dried, and placed into 3"x5" sample envelopes. The envelopes are to be placed in order by interval into common drill cutting boxes with approximate dimensions of 3"x5"x20". The envelopes are to be identified by the Division permit number, well name/number (as noted on the Geothermal Resource Development Permit Application), and interval.
 - c. The samples are to be PROPERLY IDENTIFIED as follows: Each box is to have legibly written on one end the name of the operator and well (as noted on the Geothermal Resource Development Permit Application), Division permit number, total interval (missing intervals noted), and set number.
 - d. NOTE: the samples are to be sent directly to the NBMG. The samples are due within 30 days of completion of the well. The operator will be responsible for the cost of any further handling of the samples by the NBMG required to meet the standards set out in this permit condition.
14. Drilling Reports - The Nevada Division of Minerals will be included on the daily morning operational report distribution list during the drilling/completion of the well, starting on spud date and through date of drill rig release, or date of completion rig and/or completion equipment release, whichever occurs last. The operational morning report is to be emailed to Cortney Luxford (cluxford@minerals.nv.gov) and Valerie Kneefel (vkneefel@minerals.nv.gov). The

operational morning reports will include date of report, the spud date, casing information such as size, grade, weight, hole size, setting depth, and as needed, the amount and type of cement used, top of cement, depth of cementing tools, casing test method, as well as lithological descriptions of section drilled; intervals perforated, tested, acidized, fractured and results obtained; and the dates all work was performed

15. Well Completion Report - NAC 534.550 (1) (a) requires a well completion form to be filed with the Division of Minerals within 30 days of the cessation of drilling (rig release date). A checklist for the injection or a flow test found at https://minerals.nv.gov/uploadedFiles/mineralsnvgov/content/Programs/OG/OGForms/OGG_ChecklistForInjectionOrFlowTest_20210513_Fl_er.pdf is also due within 30 days completion of injection or flow tests.
16. Logging - NAC 534A.550 requires two paper copies and one digital copy of all well logs run, including lithological and electrical, neutron-gamma or similar, to be filed with the Division. Computed results in LAS format must also be submitted to the Division for each electric log run. Electronic files are to be provided on standard digital media. All logs are to be submitted within 30 days of the completion of the well.
17. Survey Plat - NAC534A.205 requires a certified plat of the location by a professional land surveyor of the well must be filed with the Division of Minerals within 30 days of completion of the construction of the well.
18. Emergency Notification - In the event of a serious accident, blow out, spill or fire, immediately notify the Division of Minerals (see page one for contact information).
19. Spills - Spills in excess of 25 gallons or 200 pounds must be reported within 1 working day to the Nevada Division of Environmental Protection at 1-888-331-6337 or by using the online spill report form found at: <https://nevadaenvironmentalactivities.ndep.nv.gov/Spill/ReportForm.aspx> .
20. Plugging - NAC 534A.540 require all plugging and abandonment programs to be approved prior to commencing plugging and abandonment work. Verbal approval may be given. Subsequent submission of forms is required with 30 days of completion of plugging operations.
21. UIC Requirements – Operators must refer to NDEP Underground Injection Control information publications which can be accessed at: <https://ndep.nv.gov/uploads/water-wpc-permitting-stormwater-uic-docs/uic-permit-req-geotherm-proj-5-2017.pdf> These documents will provide you with guidance for collection of data during the drilling progress which will be required for submission with an application for an Underground Injection Permit.
22. Well head protection and cellar design – Cellar design must prohibit soil and water contact with casing and well head components, as well as prevention of standing water around same. If water chemistry indicates corrosion, precautions and/or cathodic protection may be necessary. The operator must be prepared to document water chemistry and protective measures taken to permit injection into the well via a UIC permit. For further information contact NDEP Bureau of Water Pollution Control 775-687-9418 or visit the Bureau’s website ndep.nv.gov/water.
23. Injection Testing and Stimulation Programs – Programs must have prior approval from the Division. Completion reports must be accompanied by the appropriate checklist of information regarding these programs.
24. The enclosed Abandoned Mines brochure shall be posted at the well site and read by all company personnel associated with the subject well. The operator shall inform all drilling personnel and contractors associated with the drilling of the well of potential dangers, including bodily injury, associated with the exploration of abandoned mine workings, as well as the disturbance of possible bat habitat.
25. The Operator shall ensure proper centering of the casing strings for new wells with downhole centralizers as well as centering the top of the casing with the drilling rig during and immediately after cement is put in place. The Operator must

also ensure that the number and depths of casing centralizers are recorded in a contemporaneous log during the installation of the casing strings.

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SUNDRY NOTICES

Verbal approval for the following work may be given by the Division:

1. Any emergency work necessary to prevent or control blow outs or other situations with significant potential to result in injury to the crew or damage to the environment or resource.
2. Any kick-offs necessary to by-pass bad hole or fish left in hole.
3. Changes in casing points due to bad hole.
4. Deepening, attempting to encounter resource.
5. Necessary well work to keep geothermal power plants operating.
6. Drilling equipment failure.
7. Squeeze or plug backs to prevent any injected geothermal or oil field waters from contaminating other water zones.

The operator is required to file a written sundry notice with the Division subsequent to verbal approval if the sundry notice has not already been filed. Verbal approvals will not be given for any work that can be planned in advance, such as acidizing, changes in casing points or completion, reentry of a well, remedial work, production or injection testing, etc.