NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
Underground Injection Control Program

UIC PROJECT FACT SHEET

(pursuant to NAC 445A.874)

Project Name: **Steamboat Geothermal Power Project**
Permittee Name: **Steamboat Geothermal LLC, Steamboat Hills LLC, ORNI 7 LLC, ORNI 6 LLC**
Permit Number: **UNEV2007204 2025T**
Associated Permits: **UNEV2007204**

A. Description of Discharge

Injection wells: IW-1, IW-2, IW-4, IW-5, IW-6, 64A-32, 23-33,14-33, 14A-33, 43-33, 21-32, and 42A-32.

Injection wells and surface basins located in: T17N R20E Sections 5 & 6, T18N R20E Sections 28, 29, 32, & 33, Washoe County.

Cooling tower water (upper plant) is discharged to the injection system, and injected into well 42-32, 21-32 and 64A-32.

Characteristics: All injectate is geothermal fluid (predominantly NaCl with high bicarbonate content) which has passed through six geothermal power plants (binary or flash/binary) located at Steamboat, Nevada. Injectate has a TDS concentration of approximately 2,300 mg/l. The major constituents are fluoride (2.48 mg/l), chloride (800-900 mg/l), arsenic (1.5- 3.2 mg/l), and boron (36.1-42.5 mg/l).

B. Receiving Water Characteristics

Fluid chemistry of the production and injection wells has been shown to be similar, of geothermal temperature and chemistry. Analysis of the receiving zone indicates boron of 48.8 mg/l; fluoride of 2.4 mg/1; arsenic of 3.2 mg/l; and chloride of 950 mg/l. All available data indicate there is no potable shallow ground water in the immediate area of the power plant, production or injection wells. However, there is high-quality shallow ground water surrounding the project site, to the north of Mt. Rose Hwy, east of Hwy 395 and in the Pleasant Valley area.

Hydrogeologic and water chemistry data indicate the ground water in the immediate area of the lower Steamboat project area/lease is of geothermal nature and exceeds drinking water standards. Monitoring indicates environmental impacts (water quality and water level elevations) from the existing geothermal power production and injection activities in the area have not occurred.

C. UNEV2007204 Permitting history

2025: Temporary Permit UNEV2007204 2025T was issued to increase the combine injection rates from 49,500 to 55,000 gpm. The permitee has applied for a renewal and modification of UNEV2007204

2019: A Minor modification to the permit was made to remove IW-3 and the Steinhart monitoring well (both were plugged). Well 42A-32 was added and the flow rate limit was increased to 49,500 gpm.

2018: A minor modification was made to remove the Curti Barn monitoring well.

2016: Currently, there are 13 of 13 injection wells permitted. There are new injection wells, 43-33 and 21-32, each with a new monitoring well. Monitoring wells were installed due to the proximity of the new injection wells to the project boundary.

2014: Currently, there are 22 production wells, and 9 injection wells. Proposed drilling of new injection well (21-32) and conversion of wells 14-33 and 14A-33 to injection wells to better manage resources. Planned stop of injection into well 23-33 and 64-32.

2007 Permit issuance: The applicant (Ormat Nevada Inc.) is seeking issuance of a new permit UNEV2007204 to combine (and renew) two existing permits UNEV50018 & UNEV70007, and proposes to continue injection into IW-1, IW-2, IW-3, IW-4, IW-5, IW-6 and 64A-32 to reinject spent geothermal fluids. Ormat is proposing to add up to an additional six injection wells, including 42-32, 14-33 and 23-33.

A. Proposed Determination

The permittee is requesting an increase in injection rates from 49,500 to 55,000 gpm for all injection wells combined. The Division has made the tentative decision to issue the temporary permit for one hundred and eighty (180) days, with conditions of continued monitoring and under a schedule of compliance. Extensive monitoring of surrounding wells shall be required to ensure offsite degradation does not occur due to injection practices. The temporary permit is to be kept in accordance with the compliance schedule below:

Schedule of Compliance		
Requirement	**NAC Reference**	**Date from UNEV2007204T2025-1 Issuance**
Notification to TMWA	NAC 445A.842	**PRIOR TO INITIAL INJECTION**
Implement additional Monitoring Plan requirements as detailed in Section V. of this Temporary Permit	NAC 445A.867 NAC 445A.912 NAC 445A.913 NAC 445A.921	At Commencement of Injection
Complete Area of Review (AOR) analysis based on the project area. Provide land ownership showing APN and lease number, project area boundary and 1-mile buffer around project area.	NAC 445A.867 NAC 445A.897 NAC 445A.898	Within 14 Days
Provide Description, Maps and Cross Sections of Regional Ground Water: For each injection well listed in this Temporary Permit authorization. Provide the drill logs and include a description and lithology of the injection zone.	NAC 445A.867	Within 14 Days
Provide list of all additives and copies of all signed and approved U240 chemical use request forms.	NAC 445A.867	Within 14 Days
Provide fracture pressure for each injection well. Show calculations and list any assumptions used.	NAC 445A.899 NAC 445A.911	Within 14 Days
Provide a comprehensive description of the pumps utilized in the facility. This needs to include the make and model, as well as operating parameters such as pump rate and pressure.	NAC 445A.867	Within 14 Days
Provide a table listing all production and injection wells, test wells, and monitoring wells, including the following information: installation date, if permitted, dates of active injection or production during the monitoring/reporting period, well depth, slotted/perforated and/or open depths, type, operational status, name/ID, location, and any other relevant information.	NAC 445A.867	Within 30 Days
Provide current well diagrams for each injection well; including project -wide flow schematic showing flow rates	NAC 445A.867	Within 30 Days
Plan for monitoring the elevation or quality of groundwater within the Area of Review.	NAC 445A.867	Within 30 Days

An updated and comprehensive plugging cost estimate plan including type, number, and placement of plugs to be used, a description of the grade, type, and quantity of cement, and the method to be employed for plug placement.	NAC 445A.867 NAC 445A.871	Within 30 Days
Update Operation and Maintenance Manual. (See NDEP Form – UIC Minimum Info Requirements for O&M Manual – Geothermal Projects)	NAC 445A.869	Within 30 Days

B. Historical Notes

The Steamboat Hot Springs Geothermal Area is in southern Washoe County, 10 miles south of Reno. The geothermal reservoir is confined to Cretaceous granodiorite, Tertiary volcanics and Quaternary siliceous sinter. Steeply dipping, northeast to occasional northwest trending faults control the flow of geothermal waters. There is evidence of horizontal structure/ movement of geothermal water in some zones – mostly in the granitic rock. Ground water in the area outside the project area is influenced by natural geothermal activity, as evidenced by high temperatures, arsenic, boron and chloride. "Productive" geothermal horizons lie below depths of 400 feet below ground surface in fractured volcanics and granodiorite.

In addition to confirming the injection zone waters are similar in quality to the production fluids (i.e. both are within the geothermal reservoir), the other major concern is that the production and injection fluids do not cause degradation to the surrounding surface or "fresh" ground water zones. The Steamboat geothermal system is a complex system. The most extensive work on the system was done by Donald E. White, a geologist with the U.S. Geological Survey. White's reports and work conducted by others indicate a high degree of fluctuation in the natural geothermal discharge from the system to the surrounding surface and ground waters.

This variation is due to such factors as yearly and seasonal changes in precipitation, changes in barometric pressure, earth tides, local earthquakes, discharge from geothermal wells, and other random short-term events (White, 1968, USGS Prof. Paper 458-C, 109p.). Recent studies conducted by P.C. Van de Kamp and C.B. Goranson indicate regional groundwater decline during the drought period (1986 to 1997) and consequent reduction in freshwater heads. This has resulted in a greater influx of geothermal waters containing high amounts of dissolved salts from shallow subsurface sources into the ground water aquifers (April 1990).

C. Procedures for Public Comment

Anyone wishing to comment on the proposed permit modification can do so in writing for a period of 30 days following the posting date of the public notice. All written comments received during the comment period will be retained and considered in the final determination. A public hearing on the proposed determination can be requested by the applicant, any affected state, any affected interstate agency, the regional administrator of EPA or any interested agency, person or group of persons.

Opportunity for a public workshop shall be provided with 30-day advance notice pursuant to NAC 445A.890. Any public hearing determined by the Administrator to be held must be conducted in

the geographical area of the proposed discharge or any other area the Administrator determines to be appropriate. All public hearings will be conducted in accordance with NAC 445A.238.

D. Rationale for Permit Requirements

Verification that the quality of fluid discharged to the injection well(s) remains constant and does not impact regional groundwater.

Prepared by: Russ Land
Date: 1998, June 2007, updated June 2016

Last updated by: Lisa Aleman
Date: June 20205