NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER POLLUTION CONTROL
UNDERGROUND INJECTION CONTROL (UIC) PROGRAM

FACT SHEET
(Pursuant to NAC 445A.874)

Type of Project:	**Geothermal (Electric Power)**
UIC Area Permit:	**UNEV89037**
Injection Well Subclass:	**5A5 (Electric Power Re-Injection)**
Project/Site:	**Soda Lake Geothermal Project Area**
Facility:	**Soda Lake Geothermal Facility**
Facility Address:	**5500 Soda Lake Road | Fallon, NV 89406**
Active Plant(s):	**Soda Lake 3 (Nameplate capacity: 26.5 MW)**
Permittee:	**AMOR IX, LLC (Cyrq Energy Inc.)**
Permittee Address:	**15 W. South Temple, Suite 1900 | Salt Lake City, UT 84101-1573**
Property Owner:	**Private and Public Land Ownership, see application**
Legal Description:	**T20N, R28E, Sec. 28, 29, 33, NE¼ Sec. 34, E½ Sec. 32, MDB&M Churchill County, Nevada**
Qty. of Injection Wells: (on area permit)	**Fifteen (15): 77-29 (1-29), 81-33, 45-28, 64-33, 87-29 Up to ten (10) additional wells.**
Other Discharges:	**Surface discharge of cooling tower blowdown to an infiltration basin T20N, R28E, NE¼ Sec. 34 (MDB&M) Surface discharges to basins adjacent to wells.**

A. Description of Discharge

Injection wells: Fifteen (15) injection wells, including five existing wells: #77-29 (1-29), #45-28, #81-33, #64-33, and #87-29, and up to ten (10) additional wells. Additionally, there are surface infiltration basins located in the NE¼ of Section 34. Soda Lake Geothermal Power Plant, Churchill County, Nevada.

Characteristics:

(1) All injectate is geothermal fluid that has passed through a binary geothermal power plant; additives include scale and corrosion inhibitors as well as synthetic organic lubricant oil for production well pumps. The injectate water has a TDS concentration of approximately 5,040 mg/L with major constituents sodium (1,600 mg/L) and chloride (2,900 mg/l). Arsenic and iron levels in the injectate are above the Maximum Contaminant Levels (MCL's) with concentrations of 0.058 and 0.83 mg/L, respectively.

(2) Fluids discharged into the surface basin are cooling tower blow-down and geothermal fluid. Blow-down TDS concentration is approximately 1,640 mg/L with major constituents chloride (630 mg/l), bicarbonate (260 mg/L), arsenic (0.049 mg/L), and manganese (0.13 mg/L). Cooling tower blow-down may contain NDEP-approved biocides in addition to scale and corrosion inhibitors.

Table 1: Relative concentrations of injectate, surface discharge, and receiving water in the injection zone.

Parameter	Drinking Water Standard (MCL*, mg/L)	Injectate (mg/L)	Surface Discharge from Cooling Tower (mg/L)	Injection Zone Baseline (mg/L)
TDS	1,000	5040*	1640*	4,500-6,500
Sodium	N/A	1600	450	1500
Chloride	400	2900*	630*	3,000*
Fluoride	4	1.2	0.9	0.9
Arsenic	0.010	0.058*	0.049*	0.094*
Boron	N/A	9.5	3.5	10.9
Manganese	0.1	0.07	0.13*	.026

* Exceeds MCL

B. Synopsis

2024: Issuance UIC temporary permit UNEV2024206T (1/8-4/7/2024) – continued testing of production well 45A-33.
Limits: 1,500 gpm injection rate; 10,000 gpm total combined with wells on UNEV89037
1,278 psig wellhead pressure

2024: Injection test (10/10-1/8) – evaluation of inactive production well 45A-33 for potential conversion to injection well and addition to UIC area permit UNEV89037.
Limits: 1,500 gpm injection rate | 1,278 psig wellhead pressure

2024: Injection well 77-29 back online in August following submission of repair/MIT report.

2019: Commissioning of Soda Lake 3 plant (Nameplate capacity: 26.5 MW)

2019: Soda Lake 2 plant (Nameplate capacity: 21.0 MW) taken offline, stopped from permanent operation; 3 of 6 Ormat Energy Converter units decommissioned in October; other units to remain in standby mode.

2018: Soda Lake 1 plant (Nameplate capacity: 5.1 MW) taken offline permanently in December.

2018: Injection well 77-29 shut in (September) due to hole below cellar floor.

2018: Spill report (May) - Leak in heat exchanger and introduction of pentane into the injection stream.

2015: Minor Modification (Effective 12/2) – Conversion of injection wells 25A-33, 53-28, and 55-33 to production, observation, and observation well, respectively, and removal from permit UNEV89037. Permitted injection wells: 45-28, 77-29, 81-33, 87-29, 64-33, and up to ten (10) additional wells.

2015: Minor Modification (Effective 1/8) - Transfer of Ownership from Magma Energy (U.S.) Corp to Raser Power Systems LLC.
2014: Spill report (June) - Leak in heat exchanger with no pentane loss.
2014: Renewal, working on steam recycle project that would have discharge of condensate into SL Plant 1 wet cooling tower, then being discharge with CT blowdown water into infiltration basin.
2012: Minor Modification (Effective 4/24) - Production well 25A-33 was converted to injection well and added to permit.
2009: Two new production wells 45A-33 & 41B-33 drilled and flow tested.
2009: Leak found in injection well 45-28 casing near surface – to be repaired starting 8/31/2009.
2006: Renewal issued - Injection wells 1-29, 81-33, 45-28, 64-33, 55-33, 87-29, 53-28, and up to 8 additional wells.
2001: Renewal – Injection wells 1-29, 81-33, 45-28, 64-33, 55-33, 87-29, 53-28, and up to 8 additional wells.
1996: Renewal, combined NEV89037 (with seven injection wells and fifteen proposed injection wells) and NEV70008 (cooling water blowdown surface discharge) into UNEV 89037.
1990: Original permit issued for Soda Lake – injection to well #77-29 (1-29) and up to twenty-one (21) additional injection wells, and discharge to a surface basin adjacent to #77-29 during maintenance.

C. Wells currently permitted for injection

Currently, there are five (5) permitted injection wells (UNEV89073 – 45-28, 77-29, 81-33, 87-29, 64-33; UNEV2024206T – 45A-33) and the injection stream is sourced from six active production wells (84A-33, 84B-33, 84B-33, 32-33, 41A-33, 25A-33, 41B-33). The maximum daily volume of fluids to be injected is 20,000,000 gallons. Analysis of groundwater sampled from production and injection wells indicates that the wells are completed in the same geothermal reservoir.

Kettleman #	77-29	81-33	87-29	45-28	64-33	45A-33
Operational Status	Active	Active	Active	Inactive	Inactive	Testing
UIC permit (UNEV)	89037	89037	89037	89037	89037	2024206T
Injection Zone (ft bgs)	791-890	1,785-3,809	721-1,285	1,635-1,755 2,375-4,758	-	3,452-3,850
NDOM Permit	253	596	265	266	257	912
API (27-001-#####)	90233	90189	90187	90188	90168	90395
UTM E	340257	342014	340357	341161	341673	341188
UTM N	4381025	4380599	4381179	4381458	4380129	4379876
Projection	NAD83	NAD83	NAD83	NAD83	NAD83	NAD83
Ownership	Private	Private	Private	BLM	Private	Private

D. Geology/Hydrogeology

The geology within this area consists of eolian sand deposits at the surface overlying and interbedded with Quaternary lacustrine and deltaic sediments of ancient Lake Lahontan. Plio-Pleistocene unconsolidated and semi-consolidated clay, silt and sand, and Pliocene basalt underlie the Lahontan deposits. Below the basalt are heterogeneous Tertiary

volcanic and sedimentary units with localized zones of diabase and granite. The two geothermal aquifers identified within the Soda Lake KGRA include a shallow aquifer from 500-1000 ft bgs and a deep aquifer from 2,500-4,500 ft bgs. From the surface to 500 ft, temperature increases to ~350°F, and ranges between 350° and 400°F between 500 and 4000 ft bgs.

E. Discharges to Surface Basins

The surface infiltration basin covers 193,600 sqft (~4.4 acres). Depth to water table is ~25 ft with a northeast-trending hydraulic gradient. Cooling tower blow-down is discharged to the basin at a rate of <350 gallons per minute (gpm); geothermal fluids produced during well testing and maintenance procedures are discharged on an infrequent, intermittent basis. Cooling tower water is produced from a well located on-site and meets all drinking water quality standards. Bermed infiltration basins are adjacent to each injection well and used only during workovers, well or pipeline maintenance, and well startups. Only non-toxic fluids are discharged to mud pits.

F. Receiving Water Characteristics

Analysis of waters from geothermal wells in the area indicates TDS ranging from 4,500-6,500 mg/L, Chloride of 3,000 mg/L, Arsenic of 0.094 mg/L, and Boron of 10.9 mg/L.

Groundwater sample well (SL 1063R) NW Section 34, 36 feet deep, screen from 20-35 ft, depth to water 24’6” on 8/20/87. TDS – 6,996 ppm, pH 7.35.

Cooling tower mak-up well, 400 ft deep, sample 09/18/87: TDS 348 ppm, silica 51.9 ppm.

G. Procedures for Public Comment

Pursuant to NAC 445A.890.7, public notice of proposed permit drafts and issuance of temporary permits is provided to (1) solicit written comments or objections to determinations of the Administrator regarding the application or permit and (2) provide the opportunity for a public hearing. Any person wishing to submit comments or request a hearing must do so by email/mail that must be sent/postmarked or hand delivered within thirty (30) days to:

Department of Conservation & Natural Resources
Nevada Division of Environmental Protection
Bureau of Water Pollution Control | Permits Branch
Attn: Underground Injection Control Permit Writer
901 S. Stewart Street, Suite 4001
Carson City, NV 89701

A public hearing on the proposed determination can be requested by the applicant, any affected state, any affected interstate agency, the regional administrator, or any interested agency, person, or group of persons. All comments or objections received within thirty (30) days of public notice will be considered in any final determinations regarding the permit. The Administrator shall notice a public hearing not less than thirty (30) days prior to the scheduled hearing date.

The application, comments received, and other information on file may be copied at the office of the Division of Environmental Protection, or copies may be requested at the above email/physical address or calling (775) 687-9418.

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 and will be conducted in accordance with NAC 445A.238.

The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to NRS 445.274.

H. Proposed Effluent Limitations and Special Conditions
See Section I. of the permit.

I. Rationale for Permit Requirements
This permit will help to ensure that the fluid discharged to the injection well(s) does not adversely affect the existing hydrologic regime or degrade the groundwater/aquifer.

Created: 1995, Russ Land
Last Updated: December 2024, Andrew Kowler