United States Environmental Protection Agency

Underground Injection Control Program

DRAFT PERMIT

Class V Geothermal Injection

Permit No. R9UIC-HI5-FY16-1R (the Permit)

Issued to:

Puna Geothermal Venture (PGV)
14-3860 Kapoho-Pahoa Road
Pahoa, Hawaii 96778

TABLE OF CONTENTS

PART I. JURISDICTION AND AUTHORIZATION TO OPERATE

Pursuant to the Underground Injection Control (UIC) regulations of the U.S. Environmental Protection Agency (EPA) codified at Title 40 of the Code of Federal Regulations (CFR) Parts 124, 144, 145, 146, 147, and 148:

Puna Geothermal Venture (PGV or the Permittee)
14-3860 Kapoho Pahoa Road
Pahoa, Hawaii 96778

is hereby authorized, as owner and operator, and contingent upon Permit conditions, to operate five (5) existing Class V geothermal injection wells, known as geothermal wells Kapoho State 1A (KS-1A), Kapoho State 3 (KS-3), Kapoho State 11 (KS-11)**,** Kapoho State (KS-13), and Kapoho State 15 (KS-15) (the Existing Wells), described as the Existing Wells in the location map presented in Appendix A.

Pursuant to this Permit, the Permittee is authorized to inject into the Existing Wells geothermal fluids, detailed in II.D.4.(a), into the geothermal reservoir at an interval between the approximate depths of 3,900 feet and 7,300 feet (the Injection Zone). Authorization to inject these fluids is granted in accordance with monitoring requirements and other conditions set forth in Parts I, II, and III of this Permit.

Pursuant to this Permit, the Permittee is also authorized to construct and operate up to eleven (11) converted[1] Class V geothermal production wells (the Proposed Wells), contingent on the Permittee meeting the requirements and conditions set forth in Parts I, II, and III of this Permit. As specified in Part II.A.2. of this Permit, the locations of Proposed Wells are included in Appendix A and described as the Proposed Wells. Should the Proposed Wells be approved by EPA pursuant to the requirements of Parts I, II, and III of this Permit, the Permittee may inject the same materials into the Proposed Additional Wells as the materials authorized to be injected into the Existing Wells.

This Permit further authorizes PGV to conduct well modification or workover operations on the Existing and Proposed Wells, as well as authorizing scale control maintenance and removal operations (see Appendix C for a description of these approved activities), as appropriate, for the development of PGV's geothermal field, in order to efficiently generate electrical power. Implementation of any of these construction activities will be incorporated into this Permit as a minor modification pursuant to 40 CFR 144.41(f), after review and written approval by EPA, and shall require pre-notification by EPA to the Permittee of approval of the minor modification. Any such modification will not change the Permittee’s obligations to adhere to all other terms and conditions of the Permit.

[1] The term "converted," as used in this Permit, refers to the Permittee converting an existing production well to an injection well.

All conditions set forth herein are based on the regulations at Title 40 of the CFR Parts 124, 144, 145, 146, 147, and 148, which are regulations that are in effect on the date this Permit is effective.

This Permit consists of thirty-three (33) pages, as well as the Appendices, and includes all items listed in the Table of Contents. Further, it is based upon representations made by PGV and on other information contained in the administrative record. It is the responsibility of the Permittee to read, understand, and comply with all terms and conditions of this Permit.

This Permit is issued by the EPA for a period of ten (10) years unless the Permit is terminated under the conditions set forth in Part III.B.1., or administratively extended under the conditions set forth in Part III.E.12.

This Permit is issued on _____ and becomes effective on _____.

_____

Tomás Torres, Director
Water Division, EPA Region 9

PART II. SPECIFIC PERMIT CONDITIONS

A. LOCATION OF EXISTING AND PROPOSED INJECTION WELLS

1. Existing Injection Well Locations

The Permittee is authorized to operate the following five (5) Existing Wells as Class V injection wells: Kapoho State 1A (KS-1A), Kapoho State 3 (KS-3), Kapoho State 13 (KS-13), Kapoho State 11 (KS-11), and Kapoho State 15 (KS-15).

Table 1 – Status of Existing Wells

Injection Well No.	Operational Status	Located on Well Pad	Approximate Well Head Elevation Above Sea Level
KS-1A	Primary Injector	A	618 feet
KS-3	Primary Injector	E	617 feet
KS-13	Primary Injector	A	617 feet
KS-11	Primary Injector	A	618 feet
KS-15	Primary Injector	B	743 feet

The wells are located at the facility's address: 14-3860 Kapoho Pahoa Road, Pahoa, Hawaii 96778, at Tax Key Number, 3rd Div. 1-4-01:2 and 19. The five (5) Existing Wells are located at one of the following three (approximate) well pad coordinates:

Well Pad A: Latitude 19: 28' 49" N and
Longitude 154: 53' 35" W;

Well Pad E: Latitude 19: 28' 41" N and
Longitude 154: 53' 40" W;

Well Pad B: Latitude 19: 28’ 45” N and
Longitude 154: 53’ 12.07” W.

The exact locations of the Existing Wells are depicted in the map shown in Appendix A.

2. Proposed Injection Well Locations

The Permittee is authorized by the EPA to convert and operate up to eleven (11) geothermal injection wells, which were formerly permitted by the Hawaii Department of Land and Natural Resources (DLNR) as production wells. Such authorization is contingent upon the Permittee

meeting the conditions of this Permit and receiving written permission from EPA to convert each of the Proposed Wells, as outlined in this Permit.

The Proposed Wells will be located on currently existing well pads within the PGV Power Plant boundary. The Proposed Wells are specifically named: KS-17, KS-18, KS-19, KS-20, KS-21, KS-22, KS-23, KS-24, KS-25, KS-26, and KS-27. The location of each of the Proposed Wells are depicted on the map in Appendix A.

B. WELL CONSTRUCTION AND RELATED CONDITIONS

The following Permit conditions related to construction and operation of any Existing Wells or Proposed Wells are developed by EPA pursuant to 40 CFR § 144.52(a)(1) and (3).

1. Conversion of the Proposed Wells

   (a) At the PGV Power Plant, wells are typically first constructed as production wells, which are permitted by the Hawaii DLNR Administrative Rule, Title 13, Chapter 183.

   The Permittee plans to submit to EPA applications to individually convert up to eleven (11) production wells into injection wells, which are identified as the Proposed Wells in this Permit.

   For the conversion of a DLNR-permitted production well to an injection well that is authorized by EPA to inject pursuant to this Permit, the Permittee shall submit for EPA's review and written approval an application for such a conversion, which must include detailed conversion plans (the Proposed Well Application). The Proposed Well Application must also include an explanation of operations and procedures for the proposed action, including, but not limited to, a complete set of drilling and construction records and reports pertaining to the DLNR Permit to establish that the Permittee will be able to comply with requirements at II.B.2. EPA reserves the right to request additional information from the Permittee if the information provided in the Proposed Well Application is not adequate to approve conversion of an existing production well to an injection well. If the Permittee has obtained EPA written approval of the conversion, the Permittee shall give advance notice of sixty (60) days to the EPA of the expected date when construction to achieve

conversion will commence. Any changes in the well construction plan requires prior written approval by EPA and shall be considered a minor Permit modification, in accordance with CFR 144.41 (f). In addition, the Permittee shall provide a formal compendium containing all records, including the daily Rig Engineer's report, and other records and subsequent test data to the EPA within sixty (60) days of completion of the construction activity by submitting a completed EPA Form 7520-19 (hereinafter the Workover Report). Refer to Appendix J and II.B.1.(c) for additional information to be included in the Workover Report.

(b) Once the conversion process described in II.B.1.(a) has been completed, the Permittee shall not commence injection until it receives authorization from EPA to do so. The Permittee will not be granted permission to inject into any Proposed Well until the Permittee shows to the satisfaction of the EPA under 40 CFR §146.8 that the well has mechanical integrity (MI). Review of the well will be based on the information in II.B.1.(c) and II.B.6. Authorization to commence operation will not be granted until:

(i) Construction is complete and the Permittee has submitted a notice of completion of construction within seven (7) days of such completion to the EPA;

(ii) The EPA has received and reviewed the well information in II.B.1.(c) and confirms in writing that follows the conditions of the Permit; and

(c) The Permittee shall provide EPA with the following information to be included with the Workover Report as required by II.B.1.(a) for Proposed Wells that have been converted from production to injection wells:

(i) The latitude, longitude, and well pad of the Proposed Well and a map similar to the one in Appendix A with the location of the Existing Wells and the Proposed Wells;

(ii) A detailed, complete schematic diagram showing the total depth of the Proposed Well(s), and depths

of casing, tubing, and slotted liners, as outlined in Appendix B;

(iii) The lithologic log (for all wells within the PGV Power Plant) and injectivity test results (for the Existing Wells and the Proposed Wells);

(iv) Mechanical integrity test (MIT) results for any Proposed Wells being converted pursuant to the Proposed Well Application, including the results of a static temperature test and pressure test confirmed with fluid level shots from sonic device equipment such as an Echo Meter; and

(v) A Plugging and Abandonment Plan and EPA-approved Financial Assurance in accordance with the requirements of this Permit, see II.F. and G.

2. Final Well Construction Report and Completion of Construction Notice

(a) In the event a Proposed Well is approved to be converted pursuant to this Permit, the Permittee must submit a final well construction report, including logging, coring, and other results, with a schematic diagram and detailed description of construction, including driller's log, materials used (i.e., tubing tally, and particulate filters, if any), and cement (and other) volumes, to EPA within sixty (60) days after well construction completion.

(b) The Permittee must also submit a notice of completion of construction to EPA (Form 7520-18 listed in Appendix C). Injection operations may not commence until EPA has inspected or otherwise reviewed the injection wells and notified the Permittee that they are authorized to commence injection, in accordance with the conditions of the Permit.

3. Casing and Cementing

The specifications in Appendix B (Injection Well Schematics) apply to the Existing Wells, e.g. KS-1A, KS-3, KS-11, KS-13, and KS-15, respectively. The specifications in Appendix B will also apply to the Proposed Wells that may be converted to injection wells (provided they have been authorized by EPA in writing to be converted to injection wells according to Part II.B.1.). The Permittee must notify EPA of any changes to the construction plans during construction. EPA must approve any changes to the construction plans in writing; such changes

may require a modification of the Permit, as determined by EPA pursuant to the requirements of 40 CFR § 144.39 or 144.41(f). Within sixty (60) days of completing the conversion of a DLNR-permitted production well to a Proposed Well, as part of the Workover Report required in II.B.1.(a) and described in II.B.1.(c), Permittee shall provide to EPA the well schematic for any Proposed Well(s), which will be included in Appendix B. The Permittee shall case and cement all wells to prevent the movement of fluids behind the casing, and the casing shall be maintained until the plugging and abandonment of the well has been completed.

4. Tubing

   For all Existing Wells and any approved Proposed Wells, Permittee shall utilize injection tubing (hangdown liner) within the long string casing and shall extend it to the depths indicated on the well schematics. The hangdown liner shall extend to below 3,000 feet KB (from the elevation of the KB when the well was drilled). The casing/tubing annulus of all injection wells shall be filled with nitrogen gas down to a depth of at least 1,975 feet below ground surface (bgs). The final depth of the nitrogen gas shall be the base of the lowermost Underground Source of Drinking Water (USDW).

5. Injection Intervals

   For all Existing Wells and any approved Proposed Wells, the Permittee shall inject into the Injection Zone only. Alteration of the injection perforations and other rework operations must be reported within 60 days of completion of the well, using EPA Form 7520-19. Injection between the outermost casing and the well bore is prohibited.

6. Monitoring Devices

   For all Existing Wells and any authorized Proposed Wells, pursuant to 40 CFR §§144.51(h) and 144.52(a)(9), to prevent the migration of injected fluids into a USDW and to adequately characterize the injectate, the Permittee shall maintain, in accurate and good operating condition, the following:

   (a) A sampling port on the injection line between the injection common header and an active injection well for the purpose of obtaining representative samples of the injected fluids;

(b) Injection Pressure indicator:

(i) An accurate injection pressure indicator and a continuously-recording injection pressure recorder on the injection line immediately upstream of each well;

(ii) A local indicator and a remote pressure transmitter on the combined flow injection line that provides information directly to the control room at the PGV Power Plant; and

(iii) An injection pressure switch that triggers a computer printout in the control room for instances including those pertaining to mechanical integrity, as discussed in II.D.;

(c) A continuously recording pressure recorder at each well to measure annular nitrogen pressure;

(d) Flow metering:

(i) A flow metering orifice on the injection line immediately upstream of each injection well;

(ii) A flow transmitter at each injection well that provides information directly to the control room of the PGV Power Plant;

(iii) A flow totalizer on the injection line immediately upstream of each well;

(iv) A flow transmitter on the combined flow injection line that provides information directly to the control room of the PGV Power Plant.

(e) Temperature indicator:

(i) A temperature indicator located on the injection line immediately upstream of each well;

(ii) A local indicator and a remote temperature transmitter on the combined flow injection line that provides information directly to the control room at the PGV Power Plant.

(f) A device on the line between the Emergency Steam Release Facility (ESRF) and the combined flow injection line for measuring the quantity of supplemental water going to the wells; and

(g) A sonic device such as an Echo Meter to measure the fluid level in the annulus of the injection wells.

7. Proposed Changes, Workovers, Redrills/Sidetracks and Downhole Work

(a) The Permittee shall give advance notice to EPA, as soon as possible, pursuant to and in accordance with 40 CFR § 144.51(l), of any planned physical alterations or additions to any permitted injection wells, including sidetracking and deepening or perforating additional intervals. Any changes in well construction, including changes in casing, tubing, packers, and/or perforations other than minor changes, require prior written approval by EPA and may require a permit modification application under the requirements of 40 CFR § 144.39 or 144.41. Modifications that are considered routine in well construction details, such as tubing dimensions and strengths, packer models, types and setting depths, and perforation interval changes within the permitted Injection Zone, may be processed by EPA as minor permit modifications, consistent with 40 CFR § 144.41 and Section III.B.1.

(b) For any permitted injection wells, the Permittee shall provide all records of well workovers, logging, or other subsequent test data to EPA within sixty (60) days of completion of the activity.

(c) The Permittee shall submit all reports required by this Permit using the appropriate reporting forms contained in Appendix C.

(d) For all wells, the Permittee shall perform a MIT, using the procedures set forth in Sections II.D.1.(a) and II.D.2., within thirty (30) days of completion of workovers or alterations and prior to resuming injection activities, in accordance with Section II.D.1. The Permittee shall provide results of the MIT to EPA within sixty (60) days of completion.

C. CORRECTIVE ACTION

The Permittee is not required to conduct any corrective action, in accordance with 40 CFR §§ 144.55, 146.6, and 146.7, prior to EPA granting initial authorization to inject under this Permit.

1. Area of Review

   The area of review (AOR) consists of the boundary of the PGV Power Plant, plus an additional ¼ mile strip around the perimeter, which is determined pursuant to 40 CFR § 146.6(b) for a fixed radius AOR.

2. Implementation of Corrective Actions

   (a) If any wells requiring corrective action, in accordance with 40 CFR §§ 144.55 and 146.7, are found within the AOR referenced above, a list of the wells along with their locations and construction data shall be provided to EPA within thirty (30) days of their identification. EPA will determine whether corrective action is required pursuant to 40 CFR §§ 144.55 and 146.7.

   (b) The Permittee may not commence future corrective action activities without prior written approval from EPA. Unless corrective action has been taken, the conversion of a production well to injection well is prohibited until all abandoned, improperly sealed, or improperly completed wells that are located within the AOR and penetrate the Injection Zone are properly plugged and abandoned.

D. WELL OPERATION

Any operating requirements discussed in this section are developed by EPA pursuant to 40 CFR § 144.52(3) and (8).

1. Mechanical Integrity

   (a) All injection wells, including active, temporarily abandoned, and injection wells no longer serving their original function (e.g. injection wells used for monitoring purposes and other conversions) must have and maintain mechanical integrity consistent with 40 CFR §146.8.

   Within ninety (90) days of the effective date of this Permit, the Permittee shall conduct an MIT to demonstrate that all injection wells have mechanical integrity consistent with 40

CFR § 146.8 and with Section II.D.1.(a). The Permittee shall demonstrate that there are not significant leaks in the casing and hangdown liner, and that there is not significant fluid movement into or between USDWs through the casing wellbore annulus or vertical channels adjacent to the injection wellbore. Refer to the "Program for Mechanical Integrity Testing and Monitoring of Injection Wells", dated July 29, 1996, found in Appendix F.

(b) In addition, an annulus pressure increase or decrease of more than ten (10) percent in five (5) hours would represent a significant leak, unless it occurs during the normal shut-in of a well for repair, wellhead changeout, annual maintenance, outage, or other normal operation and maintenance situation. When an annulus pressure increase or decrease of more than ten (10) percent in five (5) hours occurs or at any time the gas/fluid interface cannot be maintained at a depth of at least 2,000 feet KB (1,975 feet bgs), as measured by a sonic device such as an Echo Meter, the Permittee is required to inspect the wellhead for leaks, repair any wellhead leaks found, and resume monitoring. If either one of the aforementioned conditions persists, then the Permittee is required to shut in and secure the well, submit an action plan to EPA for locating and repairing the leak, repair the leak, and satisfactorily demonstrate in a report for EPA approval that mechanical integrity is restored for the well before it can be returned to operation. In the event of a mechanical integrity failure, and pursuant to 40 CFR 144.52(a)(8), the Permittee must cease injection into the well(s) with failed mechanical integrity, until such time as the Permittee demonstrates to the satisfaction of EPA under the satisfaction of EPA that the well has achieved mechanical integrity pursuant to § 146.8.

(c) If a lack of mechanical integrity and/or significant leaks are detected and confirmed in two or more injection wells, flow into these two or more wells will be stopped, and if necessary, the control operator will reduce the incoming flow from the production well(s). If all injection wells incur mechanical failures and/or significant leaks at the same time, all injection wells shall be shut in.

2. Injection Pressure Limitation

(a) Injection pressure shall not exceed the injection pressures for the Existing Wells, as listed below:

Well	Maximum Injection Wellhead Pressure (psig)
KS-1A	500
KS-3	500
KS-11	1,040
KS-13	1,252
KS-15	650

The Permittee shall propose for EPA review and approval the maximum injection wellhead pressure limitation for any Proposed Well. EPA must approve any such pressure limitation in writing and the limitation shall be incorporated into this Permit as an attachment.

(b) All piping, valves and facilities associated with injection operations shall meet or exceed API standards for the injection pressure and shall be maintained in a safe and leak-free condition.

3. Injection Rate Limitation

The injection rate shall not cause an exceedance of the injection pressure limitation in Part II.D.2.(a).

4. Injection Fluid Limitation

(a) Injectate into the Existing Wells and any authorized Proposed Wells covered by this Permit is limited to the following materials: geothermal fluids consisting of geothermal brine, geothermal steam condensate, and geothermal non-condensable gases that are produced during the operation of the well field and the geothermal power plant located on the Permittee's property (the PGV Power Plant); chemical additives for process system and well casing biofouling, corrosion, and scale control; and supplemental water. These materials are listed in Appendix H and described in II. D. 4 (a), (b).

(b) Supplemental water may consist of steam turbine seal water, rinsate from the water softener system, sulfatreat heat exchanger cooling water, raw/quench water,

production well bleed system, abatement fluids, sulfatreat system vacuum pump seal water, condensate from the sulfatreat system, periodic produced drilling fluids, and fluids from the plant water storage tank and the emergency steam release facility (ESRF). Some of these fluids may contain the additives listed or described in Appendix H.

(c) Chemical additives for process system and well casing biofouling, corrosion, scale control and tracers must be in accordance with the Chemical Additives list in Appendix H. The Permittee shall notify the EPA of any new chemical additive prior to its use and shall provide the EPA with a copy of its Material Safety Data Sheet (MSDS).

(d) To inject fluids other than those described in paragraphs (a)-(d) above, the Permittee must receive prior written approval from the EPA and the change may require a modification to the Permit pursuant to 40 CFR § 144.41(e).

5. Upset Conditions

In the event of an upset of facility operations where the injection wells cannot be used, injectate shall not be discharged on the ground. Additionally, there shall be no overflow of fluids from the Emergency Steam Release Facility (ESRF) to the ground. If there is an upset of facility operations, the Permittee shall contact the EPA and other appropriate federal, state, and local agencies as specified in this Permit (Parts III.E.11. and 13.).

E. MONITORING, RECORDKEEPING, AND REPORTING OF RESULTS

The following permit conditions are developed by EPA in accordance with 40 CFR §§ 144.52(b)(1) and 146.8.

1. Hydrologic Monitoring Program

The Permittee shall implement the Hydrologic Monitoring Program dated December 2005, in Appendix G, or as modified with the written approval of the EPA.

2. Program for Mechanical Integrity Testing and Monitoring of Injection Wells

EPA may require MITs be conducted within thirty (30) days of a written request from EPA during the permitted life of any injection

wells under this Permit. The Permittee shall also arrange and conduct MITs according to the following requirements and schedule:

(a) The Permittee shall implement the Casing Monitoring Program in Appendix D on an annual basis, or as modified with the prior written approval of the EPA. This program shall be implemented for all injection wells on the PGV Power Plant, including active, temporarily abandoned (idle), and any former injection wells converted to monitoring wells.

(b) The Permittee shall implement the "Program for Mechanical Integrity Testing and Monitoring of Injection Wells", dated July 29, 1996, in Appendix F on an annual basis, or as modified with the written approval of the EPA. This program shall be implemented for all injection wells, including active, temporarily abandoned (idle), and injection wells converted to monitoring wells.

(c) The Permittee shall notify the EPA at least sixty (60) days prior to performing the annual MITs. For MITs performed as a result of well repair, the Permittee will notify the EPA as soon as possible to give the EPA the option to attend the MIT in person.

(d) Annual MITs for all Existing Wells and approved Proposed Wells shall be conducted within the same test period, to allow EPA to attend the MITs at the PGV Power Plant.

(e) The Permittee shall continuously record the injection wellhead pressure, injection rate, and annulus pressure, and maintain records of these measurements. Injection wellhead pressure, injection rate and annulus pressure shall be visually checked daily. Pressure recordings shall be documented on a graphical chart, such as a strip chart or circular chart that shows the relationship between pressure and elapsed time. The pressure recordings shall be maintained whether or not the injection well is in use. The pressure recordings shall distinguish between the time periods of use and nonuse, if any. A summary report that contains the daily maximum injection pressure shall be submitted to the EPA per II. E. 9. e (i). Any increase or decrease in the annulus pressure of ten (10) percent or greater over a continuous five (5) hour period or any rise in the gas/brine interface above 2,000 feet KB (1,975 feet bgs)

in the tubing/casing annulus shall be reported per II. E.12, and in the quarterly report with an explanation.

3. Injection Fluid Monitoring Program

(a) The Permittee shall share with EPA for review, duplicates of the analytical and reporting conditions of the facility's Chemical and Physical Analysis Plan for Injectate Testing, adopted from the requirements in HI Department of Health UIC Permit No.UH-1529, in Appendix E, or as amended with prior written approval from the EPA.

(b) The Permittee shall utilize the applicable analytical methods described in Tables IA-IE of 40 CFR §136.3, or in Appendix III of 40 CFR §261, or in certain circumstances, other methods that have been approved by the EPA.

(c) Samples and measurements taken for monitoring shall be representative of the monitored activity. Injectate fluid samples shall be taken at the injection line sampling port between the injection common header and any active injection well. Injectate gas samples shall be taken from the noncondensable gas line prior to mixing with the injectate fluid flow.

(d) The following shall be monitored and recorded daily: quantity (in gallons, etc.) of total injectate, quantity of geofluids, quantity of supplemental water, chemical additions, and injectate temperature.

(e) Under applicable conditions, the EPA may direct the Permittee to collect, analyze, and report on special or unscheduled samples of the injectate. Applicable conditions consist of, but are not limited to, accidental discharges, malicious discharges, and undefined discharges into the injection well. The Permittee is required to follow such direction from EPA and maintain records of the sample collection and analysis in conformance with Part II.E.4. of this Permit.

4. Monitoring Information

Permittee shall record any monitoring activity required under this Permit, including the following information:

(a) Date, exact location, and time of sampling or field measurements;

(b) Name of the individual(s) who performed the sampling or measurements;

(c) Exact sampling method(s) used;

(d) Date(s) laboratory analyses were performed;

(e) Name of the individual(s) who performed the analyses;

(f) Analytical techniques or methods used by laboratory personnel;

(g) Results of such analyses, including reporting units; and

(h) Chain of custody records.

5. Calibration of Monitoring Equipment

Permittee shall calibrate all monitoring and recording equipment on a regular basis. Within 180 days of permit issuance, the Permittee shall submit to the EPA for prior written approval a one-time report describing the calibration procedures and the frequency at which the equipment will be calibrated.

6. Automatic Alarms and Shut-Off Devices

(a) Permittee shall monitor the injection pressure in the control room and shall maintain an automatic computer printout system to notify operators when the injection pressure switch in the combined flow injection line has been activated.

(b) Permittee shall maintain in good working order the pressure switch on the combined flow injection line and the relief valves on the individual injection wells and shall set the switch to not cause an exceedance of the maximum injection wellhead pressure limitations for the individual wells in Part II.D.2.(a) and any Proposed Wells approved to inject by EPA at a later date.

(c) Permittee shall maintain in good working order the two manual block valves on each injection and production well.

7. Recordkeeping

   (a) The Permittee shall retain the following records and shall have them available at the facility at all times for inspection by EPA or other authorized personnel, in accordance with the following:

      (i) The origin, physical properties, and chemical composition of all injected fluids until three (3) years after the wells have been plugged and abandoned**;** and

      (ii) All monitoring information, including all calibration and maintenance records and recordings used for continuous monitoring and copies of all reports required by this Permit for a period of at least five (5) years from the date of the sample, measurement, or report until the well has been plugged and abandoned.

   (b) The Permittee shall continue to retain such records after the retention periods specified in paragraph (a) unless it delivers the records to the EPA or obtains written approval from the EPA to discard the records.

   (c) The Permittee shall maintain copies (or originals) of all pertinent observation records available for inspection at the facility, unless the Permittee has sent the records to the EPA or has obtained permission from the EPA to discard the records.

8. Accurate, Current, and Representative Information

   The submission of records, analytical results, recorded inspections, status reports, and any other reporting as specified and required by this Permit shall be accurate, current, and representative of the activity being monitored within the specified time frame for monitoring.

9. Reporting

   The Permittee shall submit (in hard copy and in electronic form such as CD or via email) the following information, by the following deadlines, to the EPA:

(a) Groundwater monitoring data as required by Appendix G - Hydrologic Monitoring Program, to be submitted semi-annually, in February and August;

(b) Annual MIT results and monitoring data as required by the Program for Mechanical Integrity Testing and Monitoring, Part II.E.2. of this Permit. MIT results shall be provided to EPA within sixty (60) days of the tests;

(c) All records of MIT results, monitoring data, workovers, well conversions, logging or other subsequent test data generated by the workover, alteration, or repair of a well as required by Parts II.B.1., II.B.6., and II.D.1.

(d) The one-time calibration report describing the calibration procedures and frequency for monitoring equipment as required by Part II.E.5., in addition to calibrations required for the other reports in II.E.9.

(e) Quarterly injection well performance status reports (herein referred to as quarterly reports) shall document the performance of the injection wells and shall share duplicates from the same format that has been used for the HI DOH's UIC Permit No. UH-1529. The reports shall be made by a professional consultant, engineer, or geologist proficient in injection well performance. These reports shall include:

(i) Daily maximum and average injection pressures;

(ii) The average daily minimum annulus pressure and calculated minimum annulus pressure required to depress the nitrogen/brine interface below 2,000 feet;

(iii) Daily average injection rate;

(iv) Total daily quantity, including the breakdown of geofluids and supplemental water quantities;

(v) Daily injection fluid temperature;

(vi) Any increase in pressure that has triggered the pressure switch on the combined flow injection line; and

(vii) Narrative descriptions and explanations of any incidence of noncompliance that has occurred.

(f) Quarterly reports shall be submitted for the reporting periods by the respective due dates as listed below:

Reporting Period	Report Due
Jan, Feb, Mar	May 1
Apr, May, June	Aug 1
July, Aug, Sept	Nov 1
Oct, Nov, Dec	Feb 1

Copies of the quarterly reports, all other reports, and monitoring and test results required by this Permit shall be submitted at the following address:

U.S. Environmental Protection Agency, Region 9
Ground Water Protection Section (WTR-4-2)
75 Hawthorne St.
San Francisco, CA 94105

and by e-mail to: albright.david@epa.gov.

10. Modifications to Monitoring and Reporting

If environmental and facility operating conditions affecting the monitoring and reporting conditions, including the Hydrologic Monitoring Program and Casing Monitoring Program, change, EPA will reevaluate those conditions to establish relevant analyses. EPA will require modifications resulting from reevaluations to the monitoring and reporting conditions.

11. Additional Monitoring and Reporting

If the operation of the injection wells is additionally regulated by other pollution control programs, e.g. Clean Air Act, the adherence to the monitoring and reporting conditions of such other pollution control programs shall not be modified or circumvented by the terms and conditions of this Permit.

12. Twenty-Four Hour Reporting

The Permittee shall report any noncompliance in accordance with III. 10.(e).

13. Reporting of Noncompliance of Permit Limitations

The Permittee shall notify the EPA of any exceedances of or noncompliance with limitations or requirements contained in this Permit. Permit limitations in this Permit refer to, and are not limited to, injectate pressure, annulus pressure, physical parameters, chemical additives, and scheduled events such as analyses, evaluations, and reports. The notification shall consist of a report that shall include: a description of the noncompliance and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue and the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance. The report shall be submitted to the EPA with the next quarterly monitoring report.

F. PLUGGING AND ABANDONMENT

1. Notice of Plugging and Abandonment

The Permittee shall notify EPA no less than sixty (60) days before abandonment of any well permitted under this Permit, and, shall not perform the plugging and abandonment activities until the Permittee receives written notice of approval by EPA.

2. Plugging and Abandonment Plan

For any well that Permittee abandons, it must do so in accordance with the detailed plan of procedure for plugging and abandonment in Appendix I, in compliance with 40 CFR 146.10(c), and must also comply with any abandonment conditions required by the State of Hawaii and the County of Hawaii (the Plugging and Abandonment Plan). The Permittee shall submit any proposed plugging for EPA's review and approval. The EPA reserves the right to change the manner in which a well will be plugged if and for reasons including that the well is modified during its Permitted life or if construction, or mechanical integrity of the well is discovered to be not consistent with EPA requirements. The EPA may ask the Permittee to estimate and to update the estimated plugging cost periodically. Such estimates shall be based upon the detailed list of operations and their costs which an independent third party would incur to plug the well according to the plan.

3. Cessation of Injection Activities

After a cessation of injection operations for two (2) years for any wells authorized by this Permit (either Existing Wells or any Proposed Wells

approved by EPA), a well is considered inactive. In this case, the Permittee shall plug and abandon the inactive well in accordance with the approved Plugging and Abandonment Plans, contained in Appendix I, unless the Permittee:

(a) At least annually, conducts an injection profile survey MIT in accordance with 40 CFR § 146.8 and Section II.D.1.(a), above;

(b) Has demonstrated that the well(s) will be used in the future;

(c) Has described actions or procedures, satisfactory to EPA and approved in writing by EPA, which will be taken to ensure that the well(s) will not endanger USDWs during the period of inactivity, including annually demonstrating external mechanical integrity of the well(s); and

(d) Conducts an initial MIT and every two (2) years thereafter while the well remains inactive, demonstrating no loss of mechanical integrity. Note that the Permittee must restore mechanical integrity of the inactive well if the well fails the MIT.

4. Plugging and Abandonment Report

Within sixty (60) days after plugging the well, the Permittee shall submit a report on EPA Form 7520-19 in Appendix J, as well as the detailed procedural activity of engineer's log and daily rig log to EPA. The report shall be certified as accurate by the person who performed the plugging operation, and the report shall consist of either: (1) a statement that the well was plugged in accordance with the Plugging and Abandonment Plan, or (2) a statement and documents supporting EPA's approval specifying the different procedures followed where actual plugging differed from the plan.

G. FINANCIAL ASSURANCE REQUIREMENTS

1. Demonstration of Financial Responsibility

The Permittee shall maintain financial responsibility and resources sufficient for a third-party entity to close, plug, and abandon all injection wells, including active, temporarily abandoned (idle), and injection wells no longer serving their original function (e.g. injection wells used for monitoring purposes), as provided in the Plugging and Abandonment Plans in Appendix I and in accordance with the requirements of 40 CFR §§ 144.51(o) and 146.10(c). The Permittee's

plugging and abandonment cost estimate and chosen financial assurance mechanism for the Existing Wells meets the requirements of 40 CFR § 144.52(a)(7)(ii). Prior to authorization for constructing, drilling, or injecting into any of the Proposed Wells, the Permittee shall submit to EPA, and receive EPA's approval in writing, for the plugging and abandonment cost estimate and chosen financial assurance mechanism covering the Proposed Wells. Should EPA approve the construction of Proposed Wells, the approved financial mechanism shall be added as an addendum to this Permit

The Permittee is required to demonstrate and maintain and resources sufficient to close, plug, and abandon any Existing Wells or Proposed Wells approved pursuant to this Permit, as provided in the Plugging and Abandonment Plans contained in Appendix I and consistent with 40 CFR § 144 Subpart D and E.

(a) Financial Assurance for Existing Wells. The Permittee provided a Standby Trust Agreement, dated November 11, 2009, as well as an Assumption Agreement, dated July 23, 2018, which names a new Trustee of the financial assurance funds. The Permittee also provided a Standby Letter of Credit, labeled as No. 777020010882-L, dated July 29, 2015, which covers the five Existing Wells in the amount of $6,454,080.

(b) Copies of currently active documents pertaining to the existing demonstration of financial responsibility must be provided to the EPA when the Permit is issued, and every year by June 1.

(c) EPA may periodically require the Permittee to update the Plugging and Abandonment Plans and/or the cost associated with them, and, may adjust the required financial assurance amount as warranted.

(d) Financial Assurance for Proposed Wells. Permittee shall not commence construction of or conversion to any Proposed Well until the financial assurance amount outlined in Part II.F.1.a. is modified to address additional costs of plugging any Proposed Well(s) authorized by EPA in the future pursuant to the requirements of the Permit, using information provided by the Permittee as described in Part II.F.1.. The Permittee must receive approval in writing from EPA of any such additional financial assurance evidence prior to commencing construction or conversion.

2. Insolvency of Financial Institution

The Permittee must notify EPA as soon as possible and submit a revised and/or new instrument of financial responsibility consistent with the terms of this Permit within sixty (60) days after any of the following events occurs:

(a) The institution issuing the irrevocable standby trust agreement, letter of credit, or other applicable financial instrument files for bankruptcy; or

(b) The authority of the trustee institution to act as trustee, or the authority of the institution issuing the financial instrument, is suspended or revoked; or

(c) The institution issuing the financial instrument lets it lapse or decides not to extend it.

3. Insolvency of Owner or Operator

The owner or operator must notify EPA by certified mail of the commencement of voluntary or involuntary proceedings under U.S. Code Title 11 (Bankruptcy), naming the owner or operator as debtor, within ten (10) business days after such an event occurs. A guarantor of a corporate guarantee must make such a notification if he/she is named as debtor, as required under the terms of the guarantee.

PART III. GENERAL CONDITIONS

A. EFFECT OF PERMIT

The Permittee is allowed to engage in underground injection well construction and operation in accordance with the conditions of this Permit. The Permittee shall not construct, operate, maintain, convert, plug, abandon, or conduct any injection activity not otherwise allowed by this Permit, as such activities may allow the movement of fluid containing any contaminant into USDWs (as defined by 40 CFR §§ 144.3 and 146.3).

Any underground injection activity not specifically authorized in this Permit is prohibited. 40 CFR § 144.11. The Permittee must comply with all applicable provisions of the Safe Drinking Water Act (SDWA) and 40 CFR §§ 124, 144, 145, and 146, 147 and 148. Such compliance does not constitute a defense to any action brought under Section 1431 of the SDWA, 42 U.S.C. § 300(i), or any other common law, statute, or regulation other than Part C of the SDWA. Issuance of this Permit does not convey property rights of any sort or any exclusive privilege,

nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Nothing in this Permit shall be construed to relieve the Permittee of any duties under all applicable, including future, laws or regulations.

B. PERMIT ACTIONS

1. Modification, Revocation and Reissuance, or Termination

   EPA may, for cause or upon request from the Permittee, modify, revoke and reissue, or terminate this Permit in accordance with 40 CFR §§ 124.5, 144.12, 144.39, 144.40, and 144.51(f). The Permit is also subject to minor modifications for cause as specified in 40 CFR § 144.41. The filing of a request for a Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance by the Permittee, does not stay the applicability or enforceability of any Permit condition. EPA may also modify, revoke and reissue, or terminate this Permit in accordance with any amendments to the SDWA if the amendments have applicability to this Permit.

2. Transfers

   This Permit is not transferable to any person unless notice is first provided to EPA and the Permittee complies with requirements of 40 CFR § 144.38. See also 40 CFR § 144.51(l)(3). EPA may require modification or revocation and reissuance of the Permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the SDWA.

C. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 CFR §§ 2 and 144.5, any information submitted to EPA pursuant to this Permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures contained in 40 CFR

§ 2 (Public Information). Claims of confidentiality for the following information will be denied:

1. Name and address of the Permittee; or

2. Information dealing with the existence, absence, or level of contaminants in drinking water.

E. GENERAL DUTIES AND REQUIREMENTS

The provisions of 40 CFR § 144.51 are incorporated by reference into this Permit, except as modified by specific provisions in this Permit. In addition, the following general duties and requirements apply to this Permit and the Permittee.

1. Duty to Comply

   The Permittee shall comply with all applicable UIC Program regulations and all conditions of this Permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit issued in accordance with 40 CFR § 144.34. Any Permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, Permit termination, revocation and reissuance, or modification, or denial of a Permit renewal application. Such noncompliance may also be grounds for enforcement action under the Resource Conservation and Recovery Act (RCRA).

2. Penalties for Violations of Permit Conditions

   Any person who violates a Permit requirement is subject to civil penalties, fines, and other enforcement action under the SDWA and may also be subject to enforcement actions pursuant to RCRA or other actionable authorities. Any person who willfully violates a Permit condition may be subject to criminal prosecution.

3. Need to Halt or Reduce Activity Not a Defense

   It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit.

4. Duty to Mitigate

   The Permittee shall take all reasonable steps to minimize and correct any adverse impact on the environment resulting from noncompliance with this Permit.

5. Proper Operation and Maintenance

   The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operations and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Permit.

6. Property Rights

   This Permit does not convey any property rights of any sort, or any exclusive privilege.

7. Duty to Provide Information

   The Permittee shall furnish to EPA, within a time specified, any information which EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit. The Permittee shall also furnish to EPA, upon request, copies of records required to be kept by this Permit.

8. Inspection and Entry

   The Permittee shall allow EPA, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

   (a) Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Permit;

   (b) Have access to and copy, at reasonable times, any records that are kept under the conditions of this Permit;

   (c) Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

(d) Sample or monitor at reasonable times, for the purposes of assuring Permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any location.

9. Submittal Requirements

The Permittee shall follow the procedures set forth below for all submittals made to EPA under this Permit, including all notices and reports:

(a) All submittals to EPA shall be signed and certified by a responsible corporate officer or duly authorized representative consistent with the requirements of 40 CFR §§ 122.22, 144.32, and 144.51(k).

(b) Unless otherwise required by this Permit or rule, all submissions (including correspondence, reports, records and notifications) required under this Permit shall be in writing and mailed first class mail to the following address:

U.S. Environmental Protection Agency, Region 9
Groundwater Protection Section (WTR-4-2)
75 Hawthorne St.
San Francisco, CA 94105-3901

and emailed to: albright.david@epa.gov.

(c) The compliance date for submittal of a report is the day it is mailed.

10. Additional Reporting Requirements

(a) Planned Changes

The Permittee shall give notice to EPA as soon as possible of any planned physical alterations or additions to the permitted facility.

(b) Anticipated Noncompliance

The Permittee shall give advance notice to EPA of any planned changes in the permitted facility or activity which may result in noncompliance with Permit requirements.

(c) Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Permit shall be submitted to EPA no later than thirty (30) days following each schedule date.

(d) Monitoring Reports

Monitoring results shall be reported at the intervals specified elsewhere in this Permit.

(e) Twenty-four Hour Reporting

(i) The Permittee shall report any noncompliance which may endanger health or the environment, including:

a. Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or

b. Any noncompliance with a Permit condition, or malfunction of the injection system, which may cause fluid migration into or between USDWs; or

.

c. Any wellhead leaks or overflows from the Emergency Steam Release Facility (ESRF) pond.

(ii) Any information shall be provided orally within twenty-four (24) hours from the time the Permittee becomes aware of the circumstances. A written submission of all noncompliance as described in Part III.E.10.(e)(i) above, shall also be provided to EPA within five (5) days of the time the Permittee becomes aware of the circumstances. The written submission shall contain: a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

(f) Other Noncompliance

At the time monitoring reports are submitted, the Permittee shall report in writing all other instances of noncompliance not otherwise reported pursuant to other reporting requirements outlined in this Permit.

(g) Other Information

If the Permittee becomes aware that it failed to submit all relevant facts in the Permit application, or, submitted incorrect information in the Permit application or in any report to EPA, the Permittee shall submit such facts or information within two (2) weeks of the time such facts or information becomes known.

11. Requirements prior to commencing injection, Plugging and abandonment report, Duty to establish and maintain mechanical integrity.

The Permittee shall comply with all applicable requirements set forth at 40 CFR § 144.51(m)-(q) and as outlined throughout this Permit.

12. Continuation of Expiring Permit

(a) Duty to Reapply

If the Permittee wishes to continue an activity regulated by this Permit after the expiration date of this Permit, the Permittee must submit a complete application to EPA for a new permit at least one hundred and eighty (180) days before this Permit expires.

(b) Permit Extensions

The conditions and requirements of an expired permit continue in force and effect in accordance with 5 U.S.C. § 558(c) until the effective date of a new permit, if:

(i) The Permittee has submitted a timely and complete application for a new permit; and

(ii) EPA, through no fault of the Permittee, does not issue a new permit with an effective date on or before the expiration date of the previous permit.

13. Records of Permit Application

The Permittee shall maintain records of all data required to complete the Permit application and any supplemental information submitted with the Permit application.

14. Availability of Reports

All reports prepared in accordance with the conditions of this Permit shall be available for public inspection at appropriate offices of the EPA. Permit applications, Permits, and well operation data shall not be considered confidential.