DAVID Y. IGE
GOVERNOR OF HAWAII

ELIZABETH A. CHAR, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File: SDWB
1529trans

September 20, 2022

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
7003 2260 0003 2851 4326

Mr. Jordan Hara
Plant Manager
Puna Geothermal Venture
P.O. Box 30
14-3860 Kapoho-Pahoa Road
Pahoa, Hawaii 96778
[via jhara@ormat.com]

ATTENTION: Mr. Ron Quesada

Dear Mr. Hara:

SUBJECT: **PUNA GEOTHERMAL VENTURE**
UNDERGROUND INJECTION CONTROL (UIC)
UIC PERMIT NO. UH-1529
PERMIT RENEWAL APPLICATION

The Safe Drinking Water Branch (SDWB) UIC Program has satisfactorily completed the review of the UIC renewal application. Therefore, you are hereby granted approval to operate the six (6) injection wells under the terms and conditions of the enclosed permit, issued on September 20, 2022, expiring on September 19, 2027.

Your facility and injection wells have been retained the following identification numbers:

UIC Permit No. UH-1529
Facility ID No. 8-2883.01
Well Nos. KS-1A, KS-3, KS-11, KS-13, KS-15, and KS-20

Please refer to the UIC permit number in all future correspondence with this office.

Failure to comply with the terms and conditions of the permit will constitute a violation of the permit. Any person who violates the permit's terms and conditions or any provision of Hawaii Administrative Rules, Title 11, Chapter 23, Underground Injection Control, as amended, shall be subject to the penalties provided in Hawaii Revised Statutes, Section 340E-8, as amended.

If you have any questions, please contact Ms. Iris van der Zander of the Safe Drinking Water Branch UIC Program at (808) 586-4258 or by email at sdwb@doh.hawaii.gov.

Sincerely,

JOANNA L. SETO, P.E., CHIEF
Environmental Management Division

IZ:bbe

Enclosure: UIC Permit

c: Ms Theresa McGeehan-Takiue, SDWB, Hilo (w/encl.) [via email only]
Mr. Ronald Quesada, PGV (w/encl.) [via rquesada@ormat.com only]

STATE OF HAWAII
DEPARTMENT OF HEALTH

UNDERGROUND INJECTION CONTROL (UIC)

PERMIT NO. UH-1529

FACILITY IDENTIFICATION NO. 8-2883.01

for

PUNA GEOTHERMAL VENTURE

Operated By
Puna Geothermal Venture

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AUTHORIZATION TO OPERATE UNDER THE
UNDERGROUND INJECTION CONTROL PROGRAM

In compliance with the provisions of the Safe Drinking Water Act, Chapter 340E, Hawaii Revised Statutes (HRS), as amended, and Hawaii Administrative Rules (HAR), Title 11, Chapter 23, Underground Injection Control, as amended;

PUNA GEOTHERMAL VENTURE
Operated by
Puna Geothermal Venture

is authorized to operate a Class V, Subclass E, injection well system consisting of six (6) injection wells as described below and in Figures No. 1, 2, 3, 4, 5 and 6;

TABLE NO. 1

Injection Well No.	Located on Well Pad	Approximate Well Head Elevation Above Mean Sea Level
KS-1A	A	617 Feet
KS-3	E	618 Feet
KS-11	A	617 Feet
KS-13	A	618 Feet
KS-15	B	743 Feet
KS-20	A	617 Feet

to inject the geothermal fluids consisting of geothermal brine, geothermal steam condensate, and geothermal noncondensible gases which are produced during the operation of the well field and power plant, and the intermittent inclusion of injection supplemental water, back into the geothermal reservoir at an interval between the approximate depths of 3,900 feet and 7,300 feet, in reference to the Kelly Bushing;

located at the facility's address of 14-3860 Kapoho Pahoa Road, Pahoa, Hawaii 96778;

at Tax Key Number: 3rd Division, 1-4-01:002 and 019;

at the approximate well pad coordinates: Well Pad A: Latitude 19° 28' 49" N
Longitude 154° 53' 35" W

Well Pad B: Latitude 19° 28' 45" N
Longitude 154° 06' 05" W

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

under Facility Identification Number: 8-2883.01;

in accordance with monitoring conditions, and other terms and conditions set forth in Parts A, B, C, D, and E hereof.

This permit becomes effective upon issuance.

This permit and the authorization to operate the six (6) injection wells will expire at midnight, September 19, 2027.

Issued on September 20, 2022.

(For) Director of Health

A. OPERATING CONDITIONS:

1. Injectant Characteristics

Injectant in this permit is limited to geothermal fluids consisting of geothermal brine, geothermal steam condensate, geothermal noncondensible gases, chemical additives for well casing corrosion, scale and biofouling control, tracers, and injection supplemental water, that may include the chemical parameters in

TABLE No. 1
CHEMICAL ADDITIVES

Note: Some Products may not be currently used but are approved for use if needed.

Product Function	Active Chemical Ingredient	Maximum Injection Concentration (ppm)
Corrosion Inhibitor/Oxygen Scavenger	Sodium Sulfite Salt (10% solution)	15
Corrosion Inhibitor	Filming Amine (<30% solution)	30
Corrosion Inhibitor	Filming Amine Chloride Salt (<30% solution)	30
Corrosion Inhibitor	Filming Amine Acid (<30% solution)	30
Corrosion Inhibitor	Soya Amine Poly (<30% solution)	30
Anti-Scalant/pH adjustor	Sulfuric Acid	3
Anti-Scalant	Phosphonate (<30% solution)	15
pH adjustor and H2S Abator	Sodium Hydroxide	3
Microbiocide	Isothiazoline	1
Barrier Oil	Synthetic Lubricant Oil	1

2. Injection Limitations and Prohibitions

(a) Injectant in this permit is exclusively limited to the injectant described in Part A.1. above; furthermore, any injectant not described in Part A.1. is explicitly prohibited unless the injectant characteristics of this permit are revised accordingly.

(b) No discharge of hazardous wastes as defined by Title 40, Code of Federal Regulations (CFR), Part 261.

(c) Injection Pressure:

The maximum injection pressure as measured at the well head shall not exceed the fracture pressure of the receiving formation or the gauge pressure (psi) as listed in Table No 2, whichever is less.

TABLE No. 2
MAXIMUM WELLHEAD/FRACTURE PRESSURE

Injection Well	psi
KS-1A	500
KS-3	500
KS-11	1,040
KS-13	1,252
KS-15	650
KS-20	520

psi=pounds per square inch

(d) Annular Pressure:

Annular nitrogen pressure for all injection wells shall be constantly maintained to depress the nitrogen/water interface to a depth of at least 2000 feet, relative to the Kelly Bushing, approximately 1975 feet below ground surface.

(e) Concentrations of the Injectant

Chemical and physical analyses are required as detailed in Part B.1.(c) of this permit to determine the chemical concentration levels and/or the physical nature of the injectant. Chemical analyses in Part B.1.(c) may include analyses that are capable of analyzing the injectant for the characteristics of a hazardous waste, for volatile organic compounds, or for dissolved nutrients associated with the processes of eutrophication.

Certain chemical and/or physical parameters may be specified in this permit with an Action Level, a Regulatory Level, or both. Regulatory Levels shall not be exceeded. Chemical and/or physical parameters with or without specified Action Levels or Regulatory Levels may be subject to revised concentration levels pursuant to changing concerns related to public or environmental health, safety, or relevant laws and regulations.

Toxicity Characteristic Leaching Procedure (TCLP) Action Levels are indicated in Table No. 3a. The exceeding of an Action Level shall trigger the activity described in Part B.1.(e).

B. MONITORING AND REPORTING CONDITIONS:

1. Injectant and Injection Well Monitoring

(a) Injectant samples, measurements, and analyses taken or conducted as required by this permit shall be valid and representative of the volume and nature of the injectant. Pursuant to the monitoring and reporting conditions of this permit, detailed records of the operation of the injection wells shall be kept by the permittee. When applicable, records shall include at a minimum the following information:

(1) Type of injectant;
(2) Quantity of injectant;
(3) The method of injection;
(4) Injection pressure;
(5) The rate of injection;
(6) The operational status of the injection well;
(7) The exact date and time of the measurement or sampling;
(8) The person(s) who performed the measurement or sampling;
(9) The dates the analyses were performed;
(10) The person(s) who performed the analyses;
(11) The analytical techniques or methods used;
(12) The results of all required analyses and permit limits; and
(13) Chain of Custody.

(b) A daily record of the injectant quantity (GPD) being discharged into each injection well shall be kept. Injectant quantity recordings shall be continuously made through a direct measurement of the wastestream or by a method approved by the Director. A per month summary giving the daily amounts of injectant for each well shall be submitted every month to the Department.

A continuous recording of the injection pressure (psig) and annular pressure at the well head shall be kept. Pressure recordings shall be documented on a graphical chart, such as a strip chart or circular chart, or log that shows the relationship between pressure and elapse time. A per-month summary giving the daily injection and annular pressures for each well shall be submitted every month to the Department. The annular pressures shall be compared against the calculated required pressure to maintain the proper depth of the nitrogen/water interface.

A daily record of the injectant temperature being discharged into each injection well shall be maintained. Injectant temperature recordings shall be continuously monitored and recorded. A per-month summary giving the daily average injection temperature for each well shall be submitted every month to the Department.

The use of injection supplemental water discharged into the injection wells shall be recorded. The recording shall be directly and continuously made to measure the flow of supplemental water. A per-month summary giving the daily amounts of supplemental water used shall be submitted every month to the Department.

Chemical additions being used for corrosion, scale, and biofouling control shall be recorded. The record shall account for the daily, weekly, and monthly consumptive amounts of each chemical. A per-month summary giving the monthly consumptive amount of each chemical shall be submitted every month to the Department.

(c) Representative grab samples (three types: Types I, III, and IV) of the injectant shall be collected from a collection point to be established by the permittee and approved by the Director. The permittee shall collect and analyze the samples and report the analytical results according to the conditions and the Monitoring and Reporting Schedule of this permit. The collection and analysis of the samples shall be conducted by a laboratory acceptable to the Director. If the laboratory is unable to perform the sample collection, the Director may allow the permittee to collect the sample under the direction of the laboratory.

All samples shall be collected, transported, preserved, stored, documented, analyzed, and reported in accordance with Environmental Protection Agency (EPA) or EPA equivalent methods or standards, and all such activities shall be performed properly and satisfactorily in order to produce valid samples and analytical results. The falsification, fabrication, tampering, or improper handling and management of the samples, chain-of-custody form, or analytical results shall be a violation of this permit.

Methods of analysis shall be as stated herein or approved by the Director. The frequency of sample collection and the type of analyses are as described:

Type I Sample:

(1) Type I sample shall be collected and analyzed at least once every two months. A monitoring and reporting schedule is attached that outlines the schedule of analyses and reportings.

(2) Type I sample shall be analyzed for the test parameters listed in Table No. 3a and Table No. 3b.

(3) Type I sample shall be collected between the hours of 9 a.m. and 3 p.m.

(4) The analytical results (Type I) shall be submitted to the Department and a copy shall be kept on file at the facility. Analytical results are due within 60 days from the sampling date.

TABLE NO. 3a
TEST PARAMETERS FOR TYPE I SAMPLE (WATER)

Parameter	EPA Method	TCLP Related Action Level (mg/l)
Arsenic (As)	6010/206	5.0
Barium (Ba)	6010/208	100.0
Boron (B)	200	
Cadmium (Cd)	6010/213	1.0
Copper (Cu)	6010/220	
Iron (Fe)	6010/236	
Lead (Pb)	6010/239	5.0
Lithium (Li)	6010/7430	
Magnesium (Mg)	6010/242	
Manganese (Mn)	6010/243	
Mercury (Hg)	7470/245	0.2
Nickel (Ni)	6010/200	
Potassium (K)	6010/258	
Selenium (Se)	6010/270	1.0
Silver (Ag)	6010/272	5.0
Sodium (Na)	6010/273	
Vanadium (V)	6010/286	
Zinc (Zn)	6010/289	
Bromide	320	
Bicarbonate (HCC03)	310	
Carbonate (C03)	310	
Chloride	325	
Fluoride	340	
Nitrate (as N)	352	
Nitrite (as N)	354	
Silica, Dissolved (as Si02)	370	
Sulfate (S04)	375	
Total Sulfur (S)	various	

Parameter	EPA Method	TCLP Related Action Level (mg/l)
Total Alkalinity	310	
Total Dissolved Solids (TDS)	160.1	
Total Suspended Solids (TSS)	160.2	
Oil and Grease	1664	
Specific Conductance	120	
Field pH	150.1	≤ 2 or ≥ 12.5
Field Temperature	170	

TABLE NO. 3b
TEST PARAMETERS FOR TYPE I SAMPLE (GAS)

Gas Parameter
Ammonia (NH3)
Argon (Ar)
Carbon Dioxide (CO2)
Hydrogen (H2)
Hydrogen Sulfide (H2S)
Methane (CH4)
Nitrogen (N2)
Oxygen (O2)
Radon
N-Pentane

All methods listed are EPA or EPA equivalent, unless otherwise noted.

Type III Sample:

(1) Type III sample shall be collected and analyzed at least once every six months in conjunction with Type I sample. A monitoring and reporting schedule is attached that outlines the schedule of analyses and reportings.

(2) Type III sample shall be analyzed for Ignitability, Corrosivity, Reactivity, and Method 1311: Toxicity Characteristic Leaching Procedure (TCLP) as described in 40 CFR, Part 261, Appendix II. Refer to Table No. 4 which lists the test parameters for which the analysis shall be conducted under Method 1311. Regulatory levels of the chemical parameters are listed for reference.

(3) Type III samples shall be collected between the hours of 9 a.m. and 3 p.m.

(4) The analytical results (Type III) shall be submitted to the Department and a copy shall be kept on file at the facility. Analytical results are due within 60 days from the sampling date.

TABLE NO. 4
TEST PARAMETERS FOR TYPE III SAMPLE

Parameter	Regulatory Level (mg/L)	EPA Method
Ignitability	As described in 40 CFR (2012), Part 261.21	
Corrositvity	As described in 40 CFR (2012), Part 261.22	
Reactivity	As described in 40 CFR (2112), Part 26.23	
Inorganics:		Method 1311 (TCLP), with appropriate methods of analyses contained in SW-846
arsenic	5	
barium	100	
cadmium	1	
chromium	5	
lead	5	
mercury	0.2	
selenium	1	
silver	5	
Organics:		
benzene	0.5	
carbon tetrachloride	0.5	
chlorobenzene	100	
chloroform	6	
o-cresol	200	
m-cresol	200	
p-cresol	200	
1,4-dichlorobenzene	7.5	
1,2-dichloroethane	0.5	
1,1-dichloroethylene	0.7	
2,4-dinitrotoluene	0.13	
hexachlorobenzene	0.13	
hexachloro-1,3-butadiene	0.5	
hexachloroethane	3	
methyl ethyl ketone	200	
nitrobenzene	2	
pyridine	5	
tetrachloroethylene	0.7	

Parameter	Regulatory Level (mg/L)	EPA Method
trichloroethylene	0.5	
2,4,5-trichlorophenol	400	
2,4,6-trichlorophenol	2	
vinyl chloride	0.2	

Type IV Sample:

(1) Type IV sample shall be collected and analyzed at least once every six months in conjunction with Type I and III sample. A monitoring and reporting schedule is attached that outlines the schedule of analyses and reportings.

(2) Type IV sample shall be analyzed for volatile organic compounds as described in 40 CFR, Part 136, Appendix A, Method 624. Refer to Table No. 5 which lists the test parameters and the analytical methods.

(3) Type IV sample shall be collected between the hours of 9 a.m. and 3 p.m.

(4) The analytical results (Type IV) shall be submitted to the Department and a copy shall be kept on file at the facility. Analytical results are due within 60 days from the sampling date.

TABLE NO. 5
TEST PARAMETERS FOR TYPE IV SAMPLE

Parameter	EPA Method		TCLP Related Action Level (mg/l)
Volatile Organics	524/ 624/ 8240/ 8260		
Acetone			
Benzene			0.5
Bromodichloromethane			
Bromoform			
Bromomethane			
Carbon Tetrachloride			0.5
Chlorobenzene			100.0
Chloroethane			
2-Chloroethylvinyl ether			
Chloroform			6.0
Chloromethane			
Dibromochloromethane			
1,2-Dichlorobenzene			
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			7.5
1,1-Dichloroethane			
1,2-Dichloroethane			0.5
1,1-Dichloroethylene			0.7
Trans-1, 2-Dichloroethene			
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
trans-1,3-Dichloropropene			
Ethyl benzene			
Methylene chloride			
Methyl Ethyl Ketone			200.0

Parameter	EPA Method		TCLP Related Action Level (mg/l)
1,1,2,2-Tetrachloroethane			
Tetrachloroethene			
Toluene			
1,1,1-Trichloroethane			
1,1,2-Trichloroethane			
Trichloroethene			
Trichlorofluoromethane			
Vinyl Chloride			
Xylene			
Semi-Volatile Organics			
o-cresol			200.0
m-cresol			200.0
p-cresol			200.0
hexachlorobenzene			0.13
2,4-dinitrotoluene			0.13
hexachloro-1,3-butadiene	8270		0.5
hexachloroethane			3.0
nitrobenzene			2.0
pyridine			5.0
2,4,5-trichlorophenol			400.0
2,4,6-trichlorophenol			2.0

(d) The collection of Type III and Type IV samples shall be witnessed by DOH personnel unless a waiver to this condition is granted by the Director. The permittee shall notify the DOH at least seven (7) days prior to the date of sample collection for this phase of analysis. Any Type III and Type IV samples that are collected without the acknowledgment and inspection by DOH personnel, unless waived by the Director, will not serve to comply with the monitoring and reporting conditions of this permit.

(e) Every exceeding of a Regulatory Level concentration shall prompt an immediate (within five days from the time of knowledge of the initial analytical results) resampling for and reanalysis of the particular exceeding test parameter. If a TCLP-

related action level is exceeded, the reanalysis shall be conducted by using Method 1311: TCLP as described in 40 CFR, Part 261, Appendix II. If a TCLP regulatory level is exceeded, the reanalysis shall be conducted by using the same method.

The permittee shall immediately notify the Department of Health (DOH) of every exceeding and shall submit the original and follow-up analytical results. The DOH may impose additional conditions.

(f) A periodic recorded inspection of the injection well system at least once every week shall be conducted by the permittee. The inspection shall include the recordation of the operational status of the injection well system to detect any deterioration of the injection well system and associated operations that might lead to an injection well failure, and provide the opportunity to correct any occurrence of prohibited discharge activity. The person conducting the periodic inspection shall be knowledgeable of what is unlawful disposal of chemical compounds, petroleum products and other hazardous substances into the injection well. If such activities are encountered, the permittee shall take immediate action to alleviate, correct, clean up, and record such disposal incidents. The recorded inspection including any disposal incidents shall be kept at the facility and be made available for inspection by DOH personnel.

(g) A periodic status report shall be completed at least once every 3 months regarding the condition and performance of the injection well system. The status report shall be made by a professional consultant, engineer, or geologist proficient in injection well performance. The status report shall document the condition and performance of the injection well system in accordance with the DOH's guidelines for an injection well status report. Field inspections and observations for the status report shall be performed at least during the last month of the 3-month monitoring period. A Monitoring and Reporting Schedule is attached that designates the last months of the monitoring periods. The status report shall be submitted to the DOH for review within one month after the end of the designated monitoring period.

(h) Under applicable conditions, the Director shall have the right to order and direct the permittee to collect and analyze special or unscheduled samples of the injectant or substance in the injection well, or to perform injection well performance or mechanical integrity assessments. Applicable conditions consist of, but are not limited to, accidental discharges, malicious discharges, and undefined discharges into the injection well, as well as indications that the injection well may be under performance or mechanical integrity deterioration. The permittee is required to maintain records of the sample collection, analysis, and assessment in conformance with Part B.1.(a) of this permit.

(i) Summary reports, results of scheduled chemical analyses, results of testing of blow out prevention equipment (BOPE), inspection reports, mechanical integrity reports, or hydrologic monitoring reports shall be submitted to the Department within 60 days after the end of the designated monitoring period for which the submittal applies.

Submittals taking longer than 60 days are noncompliant with the 60 day time limit unless a time extension is granted by the Director based on circumstances for the delay. A request for a time extension shall be made at least 10 days before the submittal is due.

2. Accurate, Current, and Representative Information

The submission of records, analytical results, recorded inspections, status reports, and any other reportings as specified and required by this permit shall be truthful, accurate, current, and representative of the activity being monitored within the specified time frame for monitoring. The submission of false, inaccurate, noncurrent, and/or unrepresentative records, results, inspections, reports, and any other required information, or the nonsubmission of the required materials, is a violation of this permit.

3. Reporting of Noncompliance of Injectant Limitations

The permittee shall notify the DOH of any exceeding of or noncompliance with the concentrations or limitations specified in Part A. 2. Injection Limitations and Prohibitions, as determined by the monitoring and analyses specified in this permit. The notification shall consist of a report that shall include the analytical results and an explanation for the exceeding or noncompliance. The report shall be submitted to the DOH within fifteen (15) days of knowledge of the exceeding or noncompliance.

4. Emergency Operation

(a) In the event of an emergency operation that results in the discharge of geothermal fluids to a holding system, such as a lined surface impoundment, a daily record of the quantity of fluids being discharged into the holding system shall be kept. The discharge quantity shall be determined by flow measurements of the effluent.

(b) The Department shall be notified within 24 hours of any such discharge to a holding system.

(c) A summary report of the daily discharges to the holding system for every emergency operation shall be submitted to the Department within 15 days after the end of the emergency operation.

(d) The Department shall be notified of the intent to discharge the contents of the holding system into the injection well. Discharge into the injection well shall only occur with the approval of the Director.

(e) Discharge of geothermal injectant to a holding system does not preclude the activities all sampling, analyses, and reporting conditions of this permit.

5. Additional Monitoring and Reporting

If the operation of the injection wells is additionally regulated by other pollution control programs, e.g., National Pollutant Discharge Elimination System (NPDES), the adherence to those monitoring and reporting conditions shall not be circumvented by the terms and conditions of this permit.

6. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed, and the calibration and maintenance of applicable facility instrumentation, shall be retained on site for a minimum of three (3) years from the date of procurement and shall be made available for inspection by DOH personnel. This period may be extended by the request of the Director at any time.

7. Anticipated Changes

The permittee shall give notice a minimum of 60 days in advance to the DOH of any planned changes in the facility or facility's activity which may significantly change any operating characteristics or specifications of the injection wells; or which may result in noncompliance with the permit conditions. Advance notice shall be of sufficient time to allow for the DOH's evaluation of planned changes and revision, if necessary, of any term or condition of this permit. Changes, modifications, revisions or construction on the operating characteristics or specifications of the injection wells shall not be implemented unless approved by the Director.

8. Advance Notification of Change in Operator, Ownership, Control, or Facility Name

In the event of a pending change in operator (permittee), ownership, control, or facility name of the injection wells, the permittee shall report the pending change to the DOH in writing at least 30 days prior to the closing. Until such time that this permit is revoked and/or reissued, the permittee of record shall be responsible for the injection wells and injection well operations, and for any damages resulting from the injection wells and operations.

The permittee of record shall notify the pending operator (the new permittee) and/or owner in adequate time in order for the new permittee to apply to the DOH, using a change-of-operator application, to obtain this permit in coordination with transaction closing. Upon satisfactory completion of the change-of-operator application, this permit may be reissued to the new permittee to operate the injection well system.

9. Twenty-Four Hour Reporting

Under any of the following conditions, an oral report is required within 24 hours from the time the permittee becomes aware of the circumstances:

(a) Monitoring, or other information, which indicates that the injection activity is causing or could cause an endangerment to a Underground Source of Drinking Water (USDW);

(b) Malfunction of the injection system which causes or could cause fluid migration into out of, or between geologic formations via the well bore;

(c) Overflow of the injection well;

(d) Discharge into the injection well of prohibited chemical compounds, hazardous wastes, or unauthorized substances;

(e) Impairment of the injection well including and not limited to a collapsed well casing or well bore, well bore obstruction, lost well, or damage to the well resulting in a loss of use; or

(f) Unsafe working or public conditions resulting from the operation of the injection well.

A written report shall also be submitted within five (5) days of the time the permittee becomes aware of the circumstances. The written report shall contain a description of the incident and its cause, including exact dates and times, and if the incident has not been mitigated, the anticipated length of time that it is expected to continue; also, planned or accomplished measures to reduce, eliminate and prevent the reoccurrence of the incident.

Oral reports during the weekday hours of 7:45 a.m. to 4:30 p.m. shall be made to the Safe Drinking Water Branch at (808) 586-4258 or call from Big Island the direct toll-free number (808) 974-4000, ext. 64258. For on-island oral reports, the Safe Drinking Water Branch's inspector may be notified at (808) 933-0407. For evenings, weekends and holidays, all calls shall be made to (808) 247-2191. The Director may waive the written report and/or the 5 day reporting time limit on a case-by-case basis if the oral report proves satisfactory in meeting the reporting requirements of the written report.

A record shall be kept by the permittee of all incidences subject to oral reporting under this section. Record keeping shall minimally include the nature and cause of the incident, date, time, duration, name of reporting person, and mitigative action.

10. Definitions

(a) The "DOH" means the Department of Health, State of Hawaii.

(b) The "Director" means the Director of Health or a duly authorized representative.

(c) "Facility or activity" means any UIC "injection well" or any other facility or activity that is subject to regulation under the UIC Program.

(d) "Fluid" means any material or substance which flows or moves whether in a semisolid, liquid, sludge, gas or any other form or state.

(e) "Injection Pressure" means the head increase in the well bore with respect to static groundwater level.

(f) "Injection Well" means a well into which subsurface disposal of fluid or fluids occurs or is intended to occur by means of injection.

(g) "USDW" means "underground source of drinking water" as defined in HAR, Chapter 11-23.

(h) "Well" means a bored, drilled or driven shaft, or a dug hole, whose depth is greater than its widest surface dimension.

C. MANAGEMENT CONDITIONS:

1. Change in Discharge

All operation of injection wells authorized herein shall be consistent with the terms and conditions of this permit. The operation of any injection well identified in this permit at volumes or concentrations in excess of that authorized shall constitute a violation of the permit conditions. Any anticipated facility changes including expansions, production increases, or process modifications which would result in new, different, or increased discharges of injectant shall be reported by submission of a UIC application. If such changes are not expected to violate the injection limitations specified in this permit, such changes may be submitted to the DOH in writing instead of a UIC application, whereby the DOH will determine if a UIC application would be necessary. Following the written submission of anticipated changes or the submission of a UIC application, this permit may be revoked or modified to specify and limit any injectant not previously authorized by this permit.

2. Signatory Statement

All reports or information submitted to the DOH pursuant to this permit shall be signed by the permittee.

3. Availability of Reports

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

4. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all systems of treatment and control, and related appurtenances, which are installed or used by the permittee to operate the injection wells and to achieve compliance with the conditions of this permit. Proper operation and maintenance include and are not limited to sound engineering principles and practices, effective performance, adequate funding, adequate operator staffing and training, adequate laboratory and process controls, and appropriate quality assurance procedures. Furthermore, effective performance means and is not limited to preventing contamination of a USDW, unintended subsurface fluid migration, injection well overflow, prohibited discharges, loss or excessive sedimentation of the injection well, and creation of unsafe working or public conditions.

5. Permit Reapplication

   UIC permit renewal, modification, change of operator, facility name change, or termination (injection well abandonment) requires a permit reapplication. Permit reapplication shall solely be the permittee's responsibility regarding accuracy, completeness, tracking, and timely submittal. The appropriate UIC application form shall be used for the type of permit reapplication being sought. A permit reapplication filing fee, unless exempted, shall be made payable to the State of Hawaii.

   A permit reapplication for a UIC permit renewal shall be made at least 180 days prior to the permit's expiration date.

6. Permit Extension

   The Director may grant an administrative extension to this permit to authorize the continued operation of the injection wells beyond the permit's expiration date. The administrative extension will at a minimum describe the duration of the administrative extension and the conditions under which the administrative extension is granted.

7. Injection Well Abandonment

   Every injection well that is not performing its intended purpose or is determined to be a threat to the groundwater resource shall be abandoned when ordered by the Director.

   The permittee who wishes or is ordered to abandon an injection well shall submit an application containing the details of the proposed abandonment at least 60 days before the anticipated start of backfilling work. The DOH will review the application and may specify that the injection well be backfilled in a manner which would not allow the infiltration or movement of fluid into, out of, or throughout the well bore. The DOH will specify abandonment procedures and provide information for the permittee to complete the Abandonment of Injection Well Summary Report upon completion of backfilling. Abandonment procedures shall also comply with any other applicable regulations including those of the Hawaii Department of Land and Natural Resources.

D. GENERAL CONDITIONS

1. Operating Conditions

(a) No injection well shall be operated, kept, or otherwise utilized without an active UIC permit issued by the DOH.

(b) No person shall construct, operate, maintain, convert, backfill, seal, abandon or conduct any other injection activity in a manner which allows the movement of fluid containing a contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water rule or may otherwise adversely affect the health of one or more persons.

(c) The injection wells shall be operated in such a manner that they do not violate any of HAR, Title 11, regulating various aspects of water quality and pollution, and statutes, HRS Chapters 340E and 342D. The rules include:

(1) Chapter 11-20, Public Water Systems
(2) Chapter 11-54, Water Quality Standards
(3) Chapter 11-55, Water Pollution Control
(4) Chapter 11-62, Wastewater Systems

(d) If at any time the DOH learns that an injection well may cause a violation of primary drinking water rules, the Director shall order the permittee to take such actions as maybe necessary to prevent the violation, including, where required, cessation of operation of the injection well.

(e) Notwithstanding any other condition of this section, the Director will issue an order to immediately cease and desist injection upon receipt of factual information that the injectant has caused or is likely to cause imminent and substantial danger to the health of a person or persons due to contamination of a drinking water source.

2. Permit Issuance

A copy of this permit shall be retained by the permittee and shall be made available for inspection by DOH personnel.

The UIC permit is not automatically transferable from the permittee to any other person or entity. Transfer of the UIC permit to another person or entity (a new permittee) may only occur and be valid through the UIC Change-of-Operator application process which must be initiated by the new permittee.

This UIC permit shall be subject to revocation, suspension or revision by the Director if, after notice and opportunity for a contested hearing, it is determined that:

(a) There is a violation of any term or condition of the UIC permit; or

(b) The UIC permit was obtained by misrepresentation, or failure to fully disclose all relevant facts; or

(c) The UIC permit was willfully defaced, altered, forged or falsified; or

(d) There exists a legal, environmental, or public health condition that requires either a temporary or permanent reduction or elimination of the permitted injection; or

(e) There is a failure to comply with HAR, Chapter 11-23, or any other applicable rules or laws.

All permit conditions will remain in effect despite the filing of a request by the permittee for a permit revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance.

3. Permit Modification

Any modification, alteration, or change to this permit shall be made only by written supplement or reissuance of the permit by the DOH.

4. New Rules and Regulations

The occurrence of new rules and regulations affecting underground injection, typically occurring as amendments to existing rules and regulations, may require that limitations or conditions within the permit be revised accordingly. Revisions to the permit, depending on the nature of the revision, may occur as a written supplement or an administrative reissuance of the permit, or it may require that the permit be reopened, via an application, before reissuance is accomplished.

Existing limitations and conditions within the permit shall not be grounds for superseding new rules and regulations that would otherwise warrant a revision of the permit. The responsibility for knowing about and understanding new, as well as existing, rules and regulations that affect the permit is upon the permittee.

5. Investigative and/or Mitigative-action Work

Public health or environmental concerns that may arise from the construction, operation, or management of the injection wells may warrant appropriate investigative and/or mitigative-action work under the responsibility and at the expense of the permittee. Public

health or environmental concerns may result from, but are not limited to, relevant complaints, requirements from other regulatory programs, reevaluations of tests, assessments or projections, unforeseen impacts or reactions, or events or projects that change the environmental setting in which the injection wells operate.

The DOH may directly bring concerns to the attention of the permittee for required action. If, however, concerns are brought to the attention of the permittee from either an employee, the public, third-party, or another agency, the permittee shall within 10 days inform the DOH of the concern, upon which investigative and mitigative-action work may transpire and be required. The objective of the investigative and mitigative-action work is to resolve concerns that are valid, relevant, and within the permittee's/facility's responsibility.

6. Duty to Mitigate

   The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

7. Property Rights

   The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

8. Right of Entry

   DOH personnel shall have the right to enter premises on which any injection well system is located; to inspect any equipment, operation, or sampling of any injection well system; to take effluent or injectant samples from any injection well system; and to have access to and copy any record required to be kept pursuant to this permit.

9. Need to Halt or Reduce an Activity Not a Defense

   It shall not be a defense for a permittee to claim 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.

10. Penalties

    It shall be a violation of HAR, Chapter 11-23, for any person, owner or operator of an injection well to construct, operate, maintain or abandon that injection well unless authorized in writing by the Director. It shall also be a violation of HAR, Chapter 11-23, for any permittee to fail to comply with the terms and conditions of this permit including those relating to inspection, monitoring, record keeping, and reporting. Compliance with

a corrective order shall not excuse the basic violation. Any person who violates any provision of HAR, Chapter 11-23, or the terms and conditions of this permit shall be subject to the penalties provided in HRS, Section 340E-8, or HAR, Section 11-23-22.

11. Severability

The conditions of this permit are severable; if any condition of this permit or the application of any condition of this permit to any circumstance is held invalid, the application of such condition to other circumstances and the remainder of this permit shall not be affected thereby.

E. OTHER CONDITIONS:

1. Hydrologic Monitoring Program

   The permittee shall implement the Hydrologic Monitoring Program (HMP) dated June 2021 or as modified with the written approval of the Director. The HMP is described in Appendix A. Monitoring results shall be submitted within 60 days after the end of the designated monitoring period.

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

   The permittee shall implement the Program for Mechanical Integrity Testing and Monitoring of Injection Wells, dated July 29, 1996, as described in Appendix B or as modified with the written approval of the Director. This program shall be implemented for all injection wells, including active, inactive, and injection wells converted to monitoring wells.

   The permittee shall notify the Department at least forty-five (45) days prior to performing the annual mechanical integrity tests. For mechanical integrity tests resulting from well repair,the permittee will notify the Department as soon as possible to give the Department the option of witnessing the mechanical integrity tests. Test results, findings, and conclusions shall be submitted within 60 days after the end of the designated monitoring period.

3. Modifications to Monitoring and Reporting

   This permit herein acknowledges that environmental and facility operating conditions affecting the monitoring and reporting conditions of this permit could warrant the Department's reevaluation of permit conditions in order to address changing concerns and to establish relevant analyses. Modifications to the monitoring and reporting conditions, resulting from reevaluations, shall be approved by the Director before implementation.

MONITORING AND REPORTING SCHEDULE

UIC PERMIT NO.:
UH-1529

PERMIT ISSUED
9/20/2022

PERMIT EXPIRES:
9/19/2027

☒ **SCHEDULED**

☒ **COMPLETED**

MONTH	TYPE I	TYPE III	TYPE IV	REPORT OF ANALYTICAL RESULTS *	STATUS REPORT	MONTH	TYPE I	TYPE III	TYPE IV	REPORT OF ANALYTICAL RESULTS *	STATUS REPORT
09/22	\			\	\	09/25	\			\	\
10/22						10/25					
11/22	\			\		11/25	\			\	
12/22					\	12/25					\
01/23	\	\	\	\		01/26	\	\	\	\	
02/23						02/26					
03/23	\			\	\	03/26	\			\	\
04/23						04/26					
05/23	\			\		05/26	\			\	
06/23					\	06/26					\
07/23	\	\	\	\		07/26	\	\	\	\	
08/23						08/26					
09/23	\			\	\	09/26	\			\	\
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04/24						04/27					
05/24	\			\		05/27	\			\	
06/24					\	06/27					\
07/24	\	\	\	\		07/27	\	\	\	\	
08/24						08/27					
09/24	\			\	\	09/27	\			\	\
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11/24	\			\							
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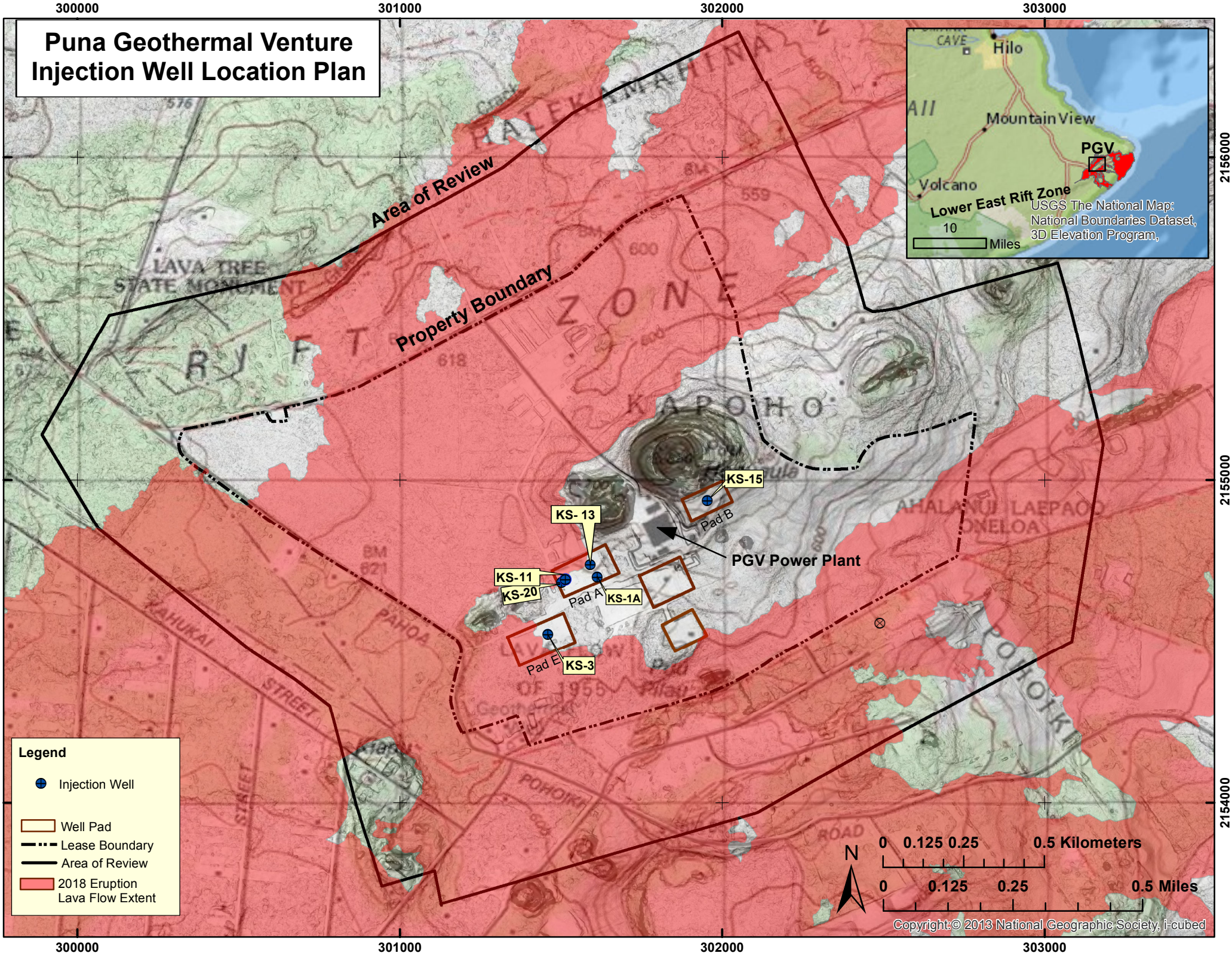
01/25	\	\	\	\							
02/25											
03/25	\			\	\						
04/25											
05/25	\			\							
06/25					\						
07/25	\	\	\	\							
08/25											

* Submit the laboratory results and the chain-of-custodies. When applicable, also submit the prior month's unsubmitted results, thus representing a group-of-months submittal.

Puna Geothermal Venture Injection Well Location Plan



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APPENDIX A

PUNA GEOTHERMAL VENTURE

HYDROLOGIC MONITORING

PROGRAM (JUNE, 2021)

PUNA GEOTHERMAL VENTURE

HYDROLOGIC MONITORING PROGRAM

June 2021

Sampling Locations: The following wells will be monitored.

Well Name	Elevation (MSL)	Completion Depth (MSL)
MW-4	716.93	-3.42
MW-5	716.93	-3.42
MW-6 (Lippe Well)	300	-2

Frequency: Regular sampling shall occur twice a year, once in January and once in July.

Water Level Measurements: Prior to bailing or pumping the well and sampling, water level measurements will be taken and recorded. The permittee can use an Echo Meter or similar device, or an electronic direct contact detection probe with a calibrated cable/tape for direct measurement at the top of the well casing. Calibrated cable/tape length shall be sufficient to measure water levels in the deepest wells. The metering device shall be equipped with an audible signal and light to indicate water level contact.

Quality Assurance/Quality Control: Quality assurance/quality control procedures will follow standards of practice for similar programs relative to the acquisition, reduction, verification, and validation of the site data. At each location, standardized equipment cleaning will be conducted prior to obtaining each sample.

Prior to ground water sampling, the well will be bailed or pumped at least three times the wellbore volume.

All samples will be taken, and field analyses conducted in accordance with standard protocols approved by the EPA. An EPA or State of Hawaii certified laboratory will be used to conduct the analyses for samples submitted. Samples will be transferred from the sampling device directly to appropriately prepared containers supplied by the laboratory. Samples will be labeled, stored, and transported in a chilled state in insulated containers to the laboratory.

In the analyses, detection limits will be used that are below maximum contaminant levels. If they are not, the sampling and analyses will be repeated using the proper detection limits.

The contractor will provide a copy of their Quality Assurance program to DOH and EPA for review and approval.

Physical and Chemical Parameters:

Field analyses will include:

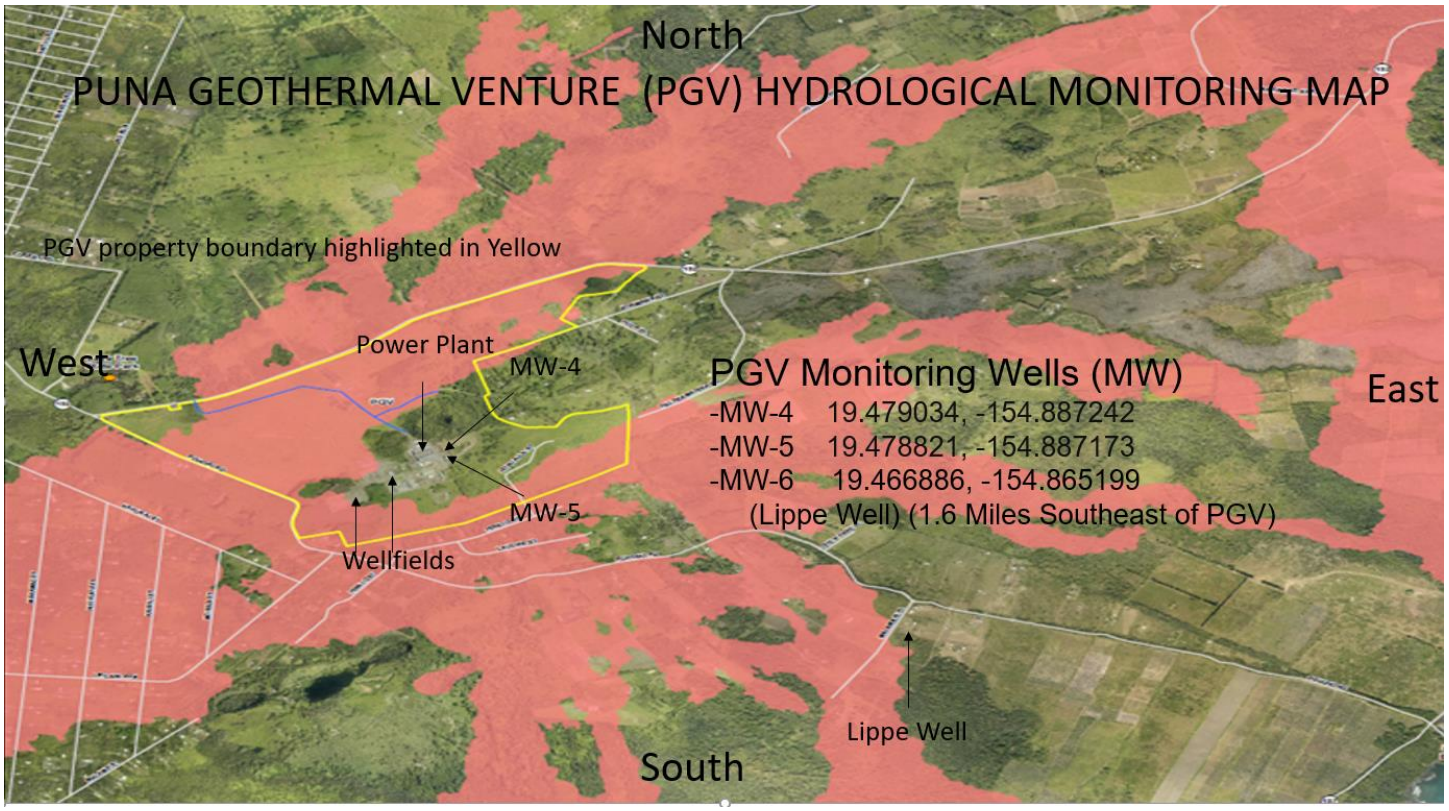
General and Physical Parameters
Temperature
Salinity
Bicarbonate
Inorganic Compounds
Arsenic
Barium
Alkalinity
Boron
Bromide
Cadmium
Calcium
Chloride
Chromium
Copper
Cyanide
Fluoride
Iron
Lead
Lithium
Magnesium
Mercury
Nickel
Nitrate Nitrogen
Potassium
Selenium
Silica
Silver
Sodium
Sulfate
Sulfur, Total
Sulfide, Reactive
Vanadium
Zinc
Conductivity (µS/cm)
Ignitability (°F)
pH (units)
TDS
Organic Compounds
Benzene
Carbon Tetrachloride
Chlorobenzene
1,2-Dichloroethane
Cis-1,2 Dichloroethene
Trans-1,2 Dichloroethene
1,2 Dichloropropane
1,1-Dichloroethylene
Ethylbenzene
hexachlorobenzene
Pentane
Isopropanol

These measurements will be obtained by using calibrated instruments specifically designed to directly measure these physical and chemical parameters within the operational constraints dictated by site conditions.

Reporting: Sampling results and measurements will be submitted during the February following the January sampling, and the August following the July sampling. Original laboratory reports will be included with a cover letter. Reporting units shall be specified. The laboratory shall not use text descriptions, such as Below Regulatory Limits" or "BRL", in its reporting, but rather, the actual numerical results will be reported. If the actual numerical results are not reported, the sampling and analysis will be redone until numerical results are reported.

Further Monitoring: If leakage of the injectate into the USDW is suspected, the ground water sampling may be modified and sampling for certain analytes and more frequent sampling will be performed.

PGV Map of Monitoring Wells



APPENDIX B

PUNA GEOTHERMAL VENTURE

PROGRAM FOR MECHANICAL INTEGRITY TESTING AND MONITORING OF INJECTION WELLS

July 29, 1996

1. INTRODUCTION

1.1 Background

Pursuant to Underground Injection Control (UIC) Permit No. HI596002, the U.S. Environmental Protection Agency requires that Puna Geothermal Venture (PGV) comply with this Testing and Monitoring Program (TMP) for injection wells. Monitoring and testing provisions in this TMP are similar in most respects to those in the "Casing Monitoring Program," April 26, 1993 version, which is referenced by title in PGV's current UIC Permit No. UH-1529. {The Casing Monitoring Program related to Hawaii UIC Permit No. UH-1529 was originally dated 11/21/1991 and amended later dated 4/26/1993.} It is anticipated that this same TMP will be approved and adopted by the Hawaii Department of Health as a replacement for the 1Q93 "Casing Monitoring Program." Revisions to testing and monitoring provisions in the 1993 "Casing Monitoring Program" have been made as a result of a joint review of PGV's injection well monitoring and testing involving EPA, BLM (as advisor to EPA), HDOH and PGV. The purpose of these revisions is to better accomplish the goal of protecting the groundwater aquifer under the PGV project site, which is considered to be a USDW. The principle changes in the monitoring and testing procedures are as follows:

- As described in Section 3.1 of this TMP for wells in injection service, the annulus nitrogen pressure will be maintained to keep the nitrogen/water interface at a depth of at least 2000 ft.

The 1993 CMP requires that the nitrogen/water interface be maintained more than half-way down the annulus." Based on a nominal casing depth of 4000 ft., the two criteria are effectively the same.

- In accordance with Section 3.2.1, the annual casing pressure test of each well will be done by depressing the water level to 3000 ft. with nitrogen while the well is on injection. Annulus pressure drop exceeding 10% in five hours will be considered indicative of a leak requiring diagnosis and repair.

  The 1993 CMP specifies that the pressure test be done by depressing the water level to the shoe of the 9-5/8-inch casing with nitrogen (while, by practical necessity, the well is shut in.). An annulus pressure drop exceeding 8% in 30 minutes was considered indicative of a leak requiring diagnosis and repair. The principle difference is the increase in length of the test period from 30 minutes to five hours, which makes the nitrogen pressure test equivalent to a 30-minute test with water.

1.2 Purpose

The purpose of this TMP is to specify the observations, tests, drilling operations and, if necessary, remedial actions required to ensure that the mechanical integrity of injection well casing and cement is maintained through the drilling, testing and operation of PGV wells. The cemented and hung casing strings that are used in the PGV wells are designed to prevent contamination of any underground source of drinking water (USDW) by injected fluids. Contamination of the USDW's might occur if the casing strings are breached due to corrosion or mechanical failure or if there is a failure of the cement to seal the casing/borehole annulus between the casing shoe and the lowermost USDW. The testing and monitoring program described below is designed to detect and diagnose a loss of mechanical integrity in the casing or cement.

Remedial actions required to restore mechanical integrity are also described.

1.3 Scope

This TMP covers all injection wells on the 500-acre PGV site.

2. TESTING DURING DRILLING AND COMPLETION

2.1 Pressure Testing During Drilling

Each injection well is completed with three casing strings (not including the 30-inch conductor pipe) cemented to the surface (Figure 1). Upon completion of cementing each casing string and prior to drilling out the cement shoe, the casing well be pressure tested. The DLNR will be notified at least 24 hours before each test for the opportunity to witness it. The test will consist of pressurizing the casing with water or drilling mud to a specified test pressure and monitoring the pressure for 30 minutes with the well shut-in. The minimum casing test pressure shall be approximately one-third of the internal yield pressure rating, provided that the test pressure shall not be less than 600 psig nor greater than 2500 psig. In cases where combination strings or liners are involved, the above test pressures shall apply to the lowest pressure-rated casing. The pressure drop during the 30-minute period shall not exceed 10% of the test pressure.

In the event of a pressure loss exceeding the above criterion, one or more of the following diagnostic methods will be used to locate the leak:

Temperature log while injecting
Shut-in temperature survey
Casing inspection logs with multi-arm caliper and/or magnetic inspection tools
Pressure testing with a packer(s) on drillpipe
Other applicable methods

After identification of the point of leakage, a cement squeeze job will be performed and the casing retested.

After a successful pressure test of each casing string, drilling will proceed to a point at least one foot below the casing shoe, and a pressure leak-off test will be performed to test the integrity of the annular cement. Each test will be performed at a pressure approaching the fracturing pressure of the exposed formation. If there is excessive leak-off, a squeeze cement job will be performed, the cement will be drilled out and the test will be repeated. Drilling will not proceed until an effective cement seal is established in the casing/borehole annulus above the casing shoe. In some situations, such as the case where there is natural formation permeability immediately below the casing shoe, it may not be practical to prove cement integrity with the pressure test described above. As an alternative, a standard water shutoff test (WSO) may be done above the shoe, or shut-in temperature surveys may be run.

2.2 Logs and Surveys During Injection Testing

Upon completion of drilling and prior to installation of the hangdown liner, a water injection test may be performed, if needed, to obtain a preliminary evaluation of the well. During such a test, one or more of the following logs or surveys may be run:

TPS or T/P logs through the open hole and cased intervals within the well on injection; or

Shut-in temperature survey(s) before and/or after injection.

If any of these logs or surveys indicates a loss of mechanical integrity, the problem will be diagnosed, and repair procedures will be performed in accordance with Section 2.3.

2.3 Casing Repair

Once a loss of mechanical integrity is identified and approximately located, casing repair procedures will be initiated. These procedures may include any or all of the following activities:

2.3.1 Shut in well and run magnetic and multi-arm casing inspection logging tools to locate the leak and to evaluate the casing condition.

2.3.2 Rig up workover rig on well. Run packer(s) on drillpipe and pressure test to confirm suspected leaking interval.

2.3.3 Execute cement squeeze job to se l casing leak or stop interzonal flows behind casing.

2.3.4 Perform casing pressure test and other diagnostic tests as necessary to confirm success of the remedial work. If good, move rig off well and return well to injection service.

2.3.5 In the event of major casing failure, a cemented liner may be installed through the damaged interval.

2.3.6 Prior to drilling out the liner shoe, the liner will be pressure tested as described in Section 2.1.

2.3.7 If mechanical integrity cannot be restored satisfactorily, the well will be plugged and abandoned.

3. MONITORING AND TESTING AFTER WELL IS PLACED IN SERVICE

3.1 Continuous Monitoring During Routine Injection Operations

During routine injection well operations, including brief periods when well(s) may be temporarily out of service, the following conditions will be maintained:

3.1.1 A continuous recording of the following parameters will be maintained for each well:

* Injection wellhead pressure,
* Annulus (nitrogen) pressure, and
* Injection flow rate.

These parameters shall be recorded on a graphical chart which shows their relationship to elapsed time. Plant operators will take daily readings at each well.

3.1.2 The annular space between the hangdown liner and cemented casing will be pressurized with nitrogen, and the pressure will be monitored and recorded in accordance with Section 3.1.1. above. The annulus will be repressurized with nitrogen as necessary to maintain the nitrogen/water interface at a depth of 2000 ft KB (1975 ft below ground level) or deeper. some loss of nitrogen pressure is normal, and occasional re-pressurization will be required. If the rate of nitrogen pressure decline is such that it is impractical to maintain the required minimum pressure, it will be considered indicative of a leak requiring diagnosis and repair.

3.2 Annual Testing

Once annually, tests and surveys will be conducted to verify mechanical integrity of the hangdown liner. The casing and hangdown liner will be tested for leaks by one of the following procedures, or a combination thereof.

3.2.1 Perform a pump-down test on the annulus between the hangdown liner and the cemented casing. The test will be done with the well on injection at normal operating flow rate and wellhead pressure, or higher.

3.2.2 If the hangdown liner is pulled, the casing may be pressure tested above a bridge plug or packer set near the shoe following the basic procedure outlined in Section 2.1. Integrity of the hangdown liner may be verified by inspection on the surface, by a pressure test (with nitrogen) after it is run in the hole, or by a TPS log with the well on injection.

Integrity of the cement (external mechanical integrity) will be checked during each workover by one or more of the following procedures:

3.2.3 One or more shut-in static temperature surveys will be run. Shut-in time will be at least 12 hours, or longer if necessary to obtain meaningful results.

or

3.2.4 Other logs or surveys may be run, at the discretion of PGV, if static temperature surveys are not definitive.

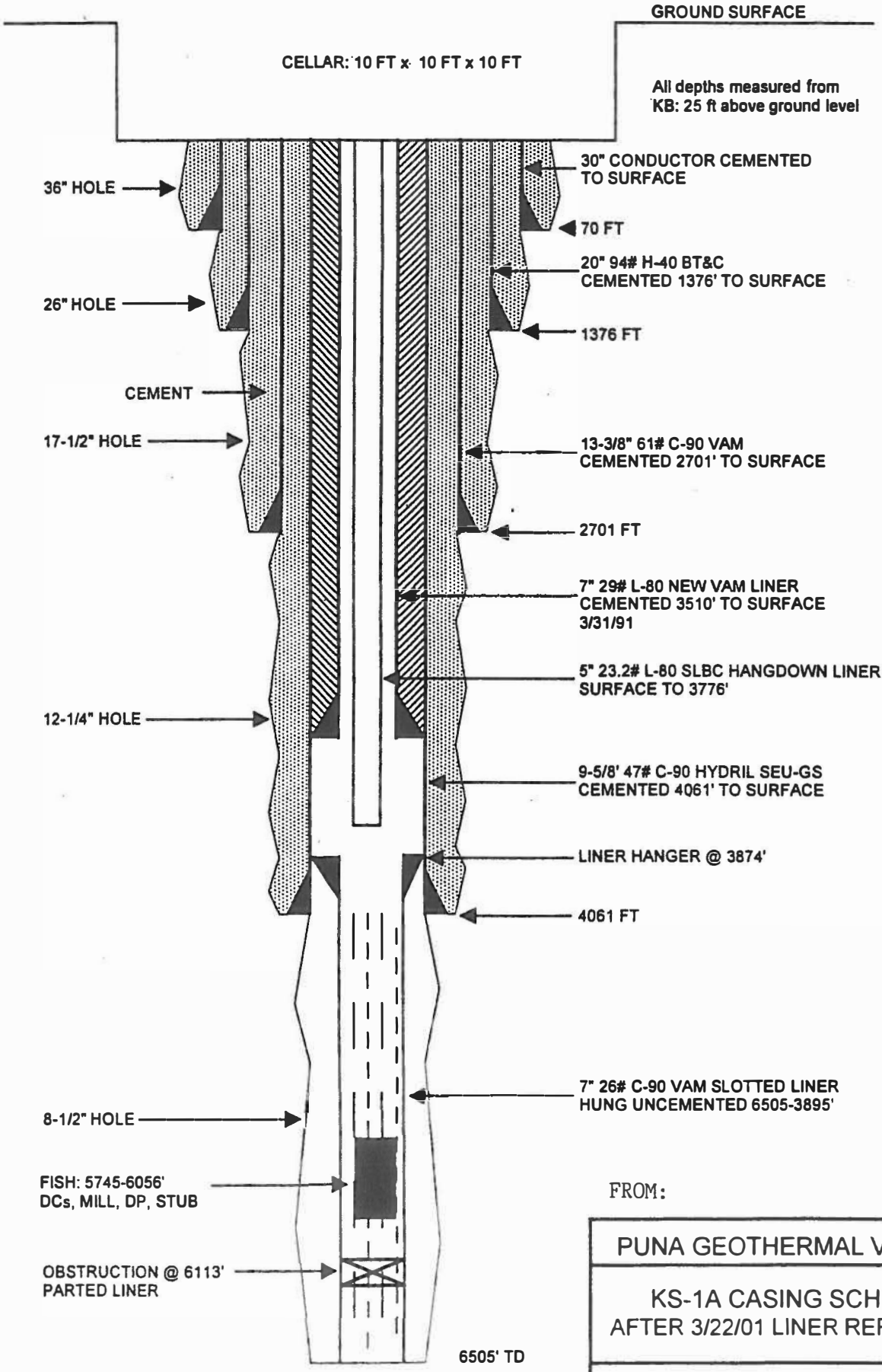
3.3 Restoration of Mechanical Integrity or Abandonment

In the event that the diagnostic procedures indicate a loss of mechanical integrity, remedial or abandonment procedures will be carried out as specified in Section 2.3.

APPENDIX C

FIGURES

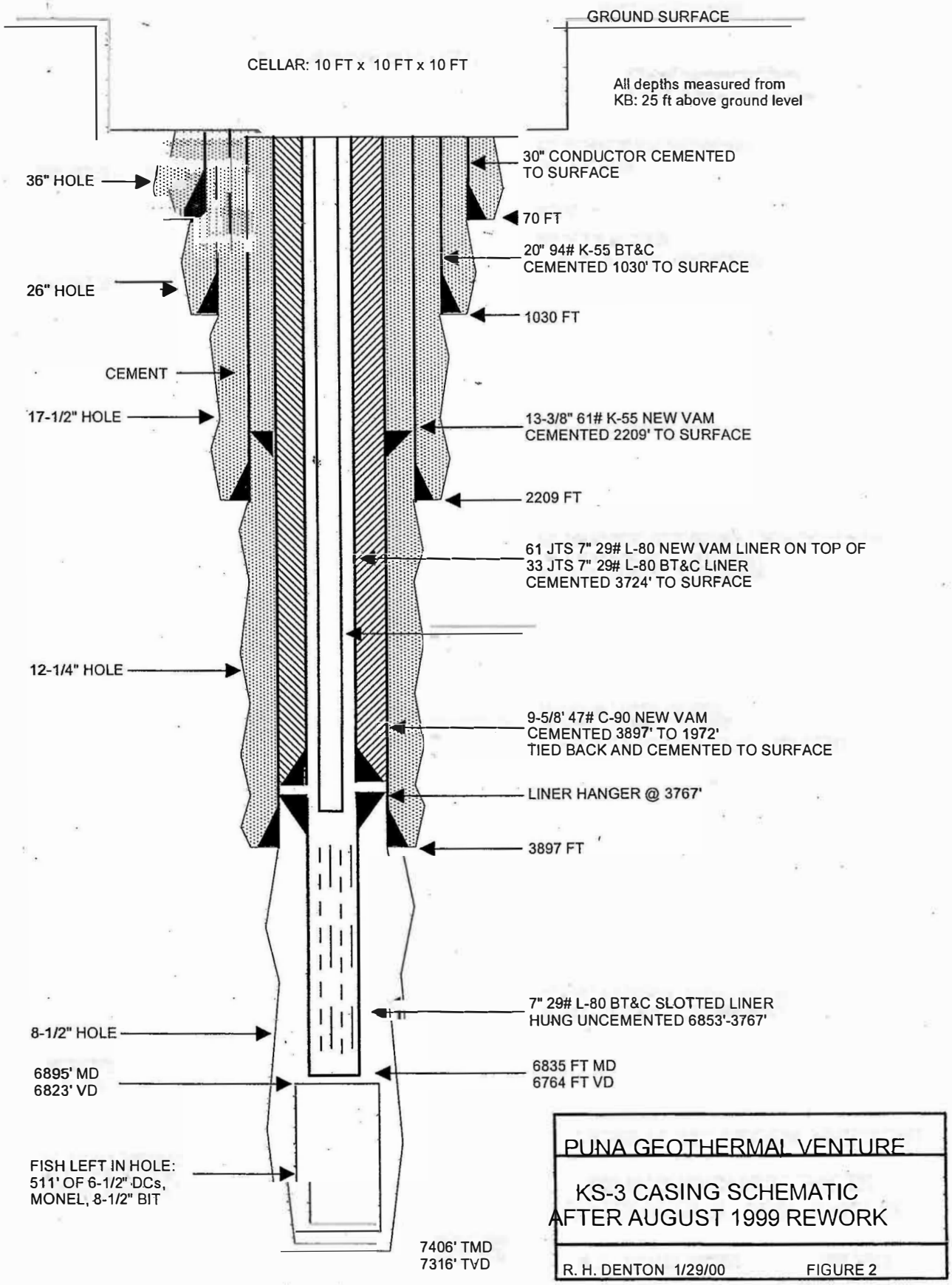
UIC Permit No.
UH-1529



FROM:

PUNA GEOTHERMAL VENTURE
KS-1A CASING SCHEMATIC AFTER 3/22/01 LINER REPLACEMENT
GOLDER ASSOCIATES 4/9/01 FIGURE 1

UIC Permit No.
UH-1529



PUNA GEOTHERMAL VENTURE

KS-3 CASING SCHEMATIC
AFTER AUGUST 1999 REWORK

R. H. DENTON 1/29/00 FIGURE 2

KS 11 RD2 & RD3 COMPLETION WELL BORE SCHEMATIC as on 12/19/09

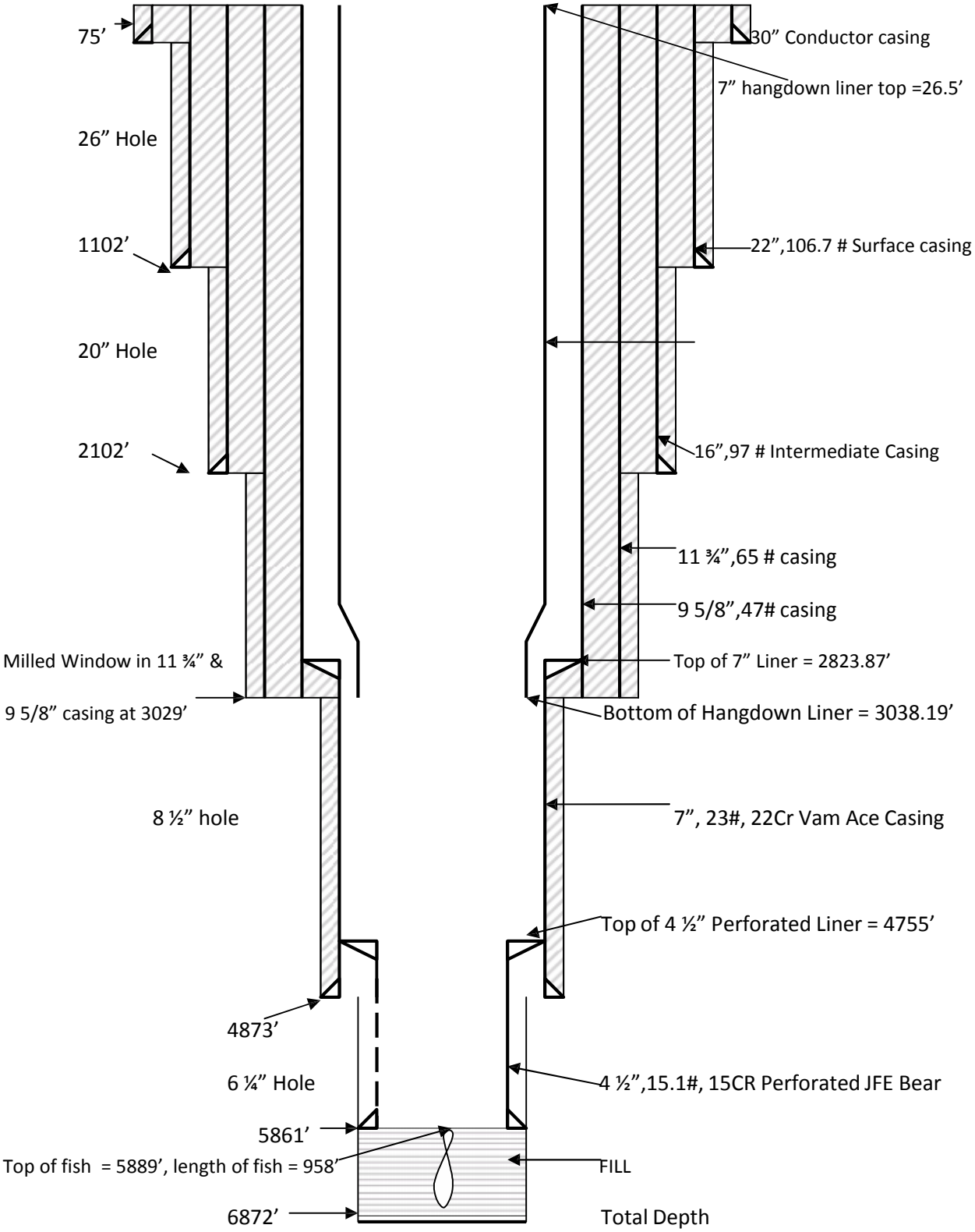


Figure 3

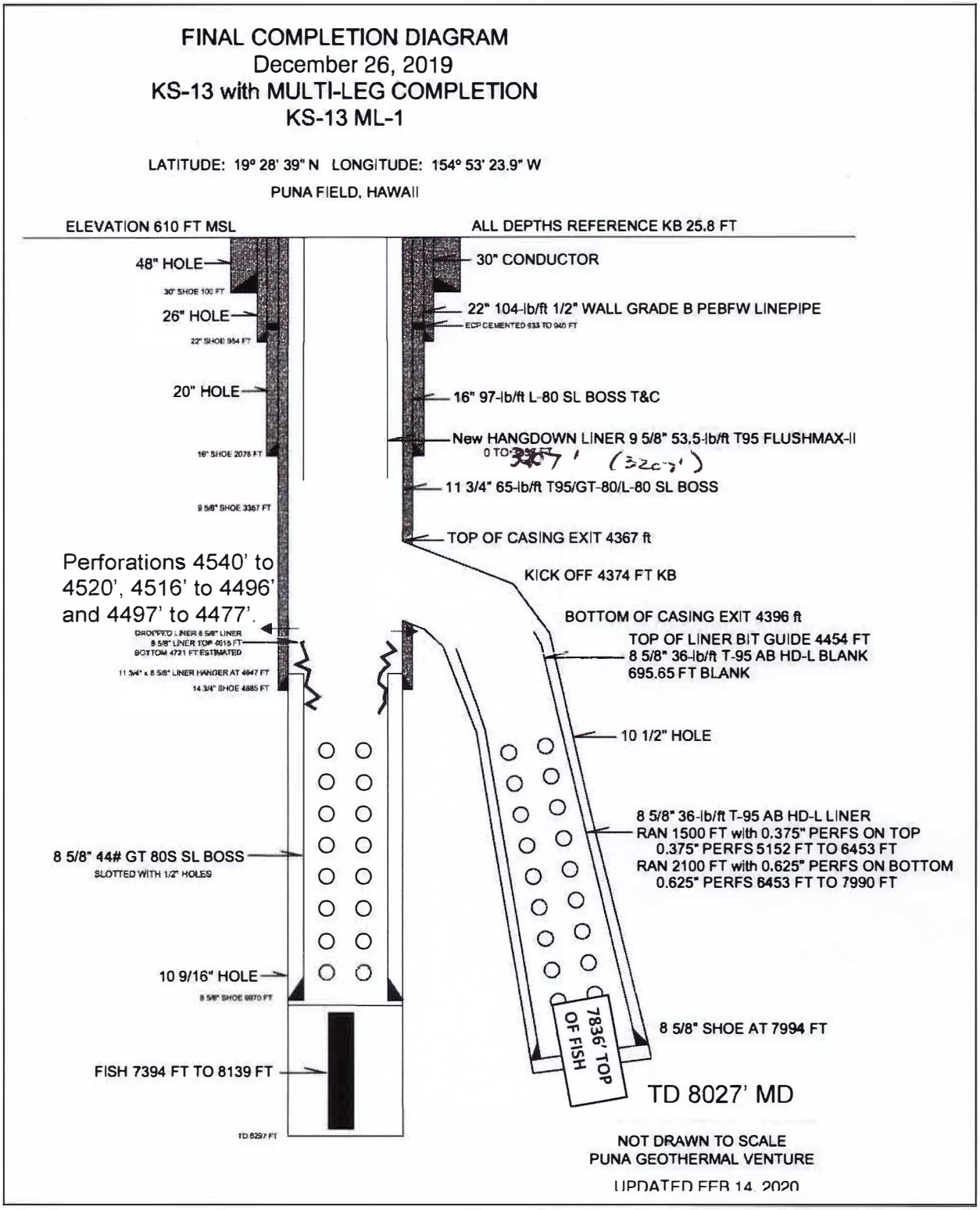


Figure 4. KS-13ML1 wellbore diagram after cleanout, redrill and perforation.

FINAL WELL DIAGRAM
PGV KAPOHO STATE KS-15

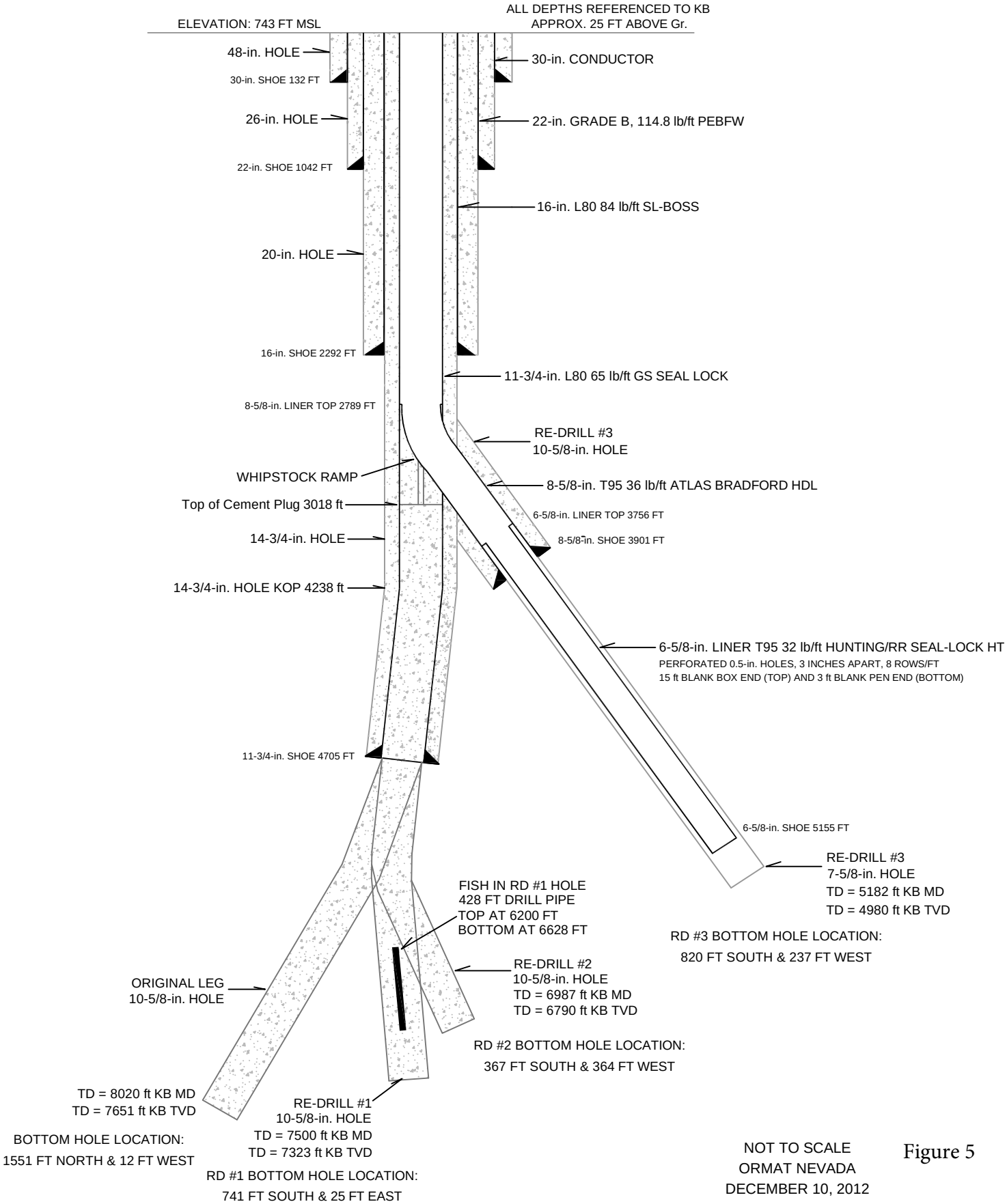
UIC Permit No.
UH-1529

Hawaii County, Puna District, HI

Kilauea East Rift Zone

UTM COORDINATES (NAD83): E301953.733 N2154935.556

LAT/LONG: LATITUDE: 19º 28' 45" N LONGITUDE: 154º 28' 45" W



NOT TO SCALE
ORMAT NEVADA
DECEMBER 10, 2012

Figure 5

KS 20 COMPLETION WELL BORE SCHEMATIC 3-26-2021

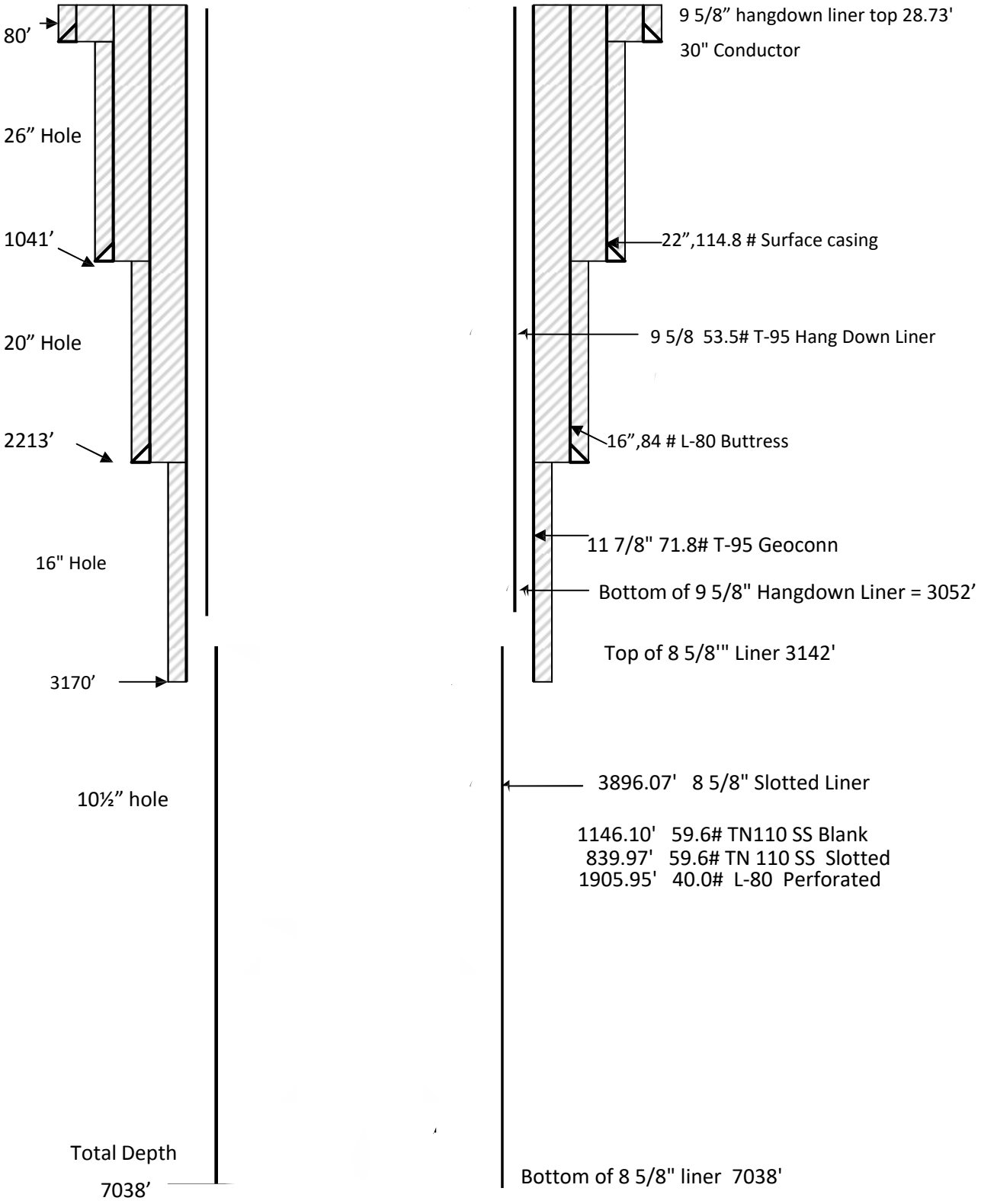


FIGURE 6