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8	STATE OF CALIFORNIA
9	NATURAL RESOURCES AGENCY
10	DEPARTMENT OF CONSERVATION
11	DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES
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14	ORDER TO:
15	STOP INJECTION,
16	REMEDIATE PROJECT ISSUES, AND
17	TAKE PREVENTATIVE MEASURES
18	
19	NO. 1119
20	Dated: DECEMBER 13, 2017
21	Operator: HVI CAT CANYON, INC.
22	(DBA: GREKA OIL & GAS; G3515)
23	(DEIN GREAT OIL & GAS, GSS15)
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26	BY
27	Kenneth A. Harris Jr.
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STATE OIL AND GAS SUPERVISOR

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I. <u>Introduction</u>

The State Oil and Gas Supervisor (Supervisor), acting through the Division of Oil, Gas, and Geothermal Resources (Division) and under the authority of Division 3 of the Public Resources Code (PRC; commencing with PRC section 3000) and title 14 of the California Code of Regulations (Regulations), ensures, among other things, that an oil and gas operator performs the required injection well mechanical integrity tests, submits accurate injection well data, submits accurate Underground Injection Control (UIC) project data, and uses its injection wells at appropriate, approved pressures. These injection wells, and injection project requirements help protect public health, property, and oil and gas deposits from infiltrating injectate. Based on the Division's records, at all times relevant to this order, HVI Cat Canyon, Inc., dba Greka Oil & Gas (G3515) (Greka or Operator) is the current oil and gas operator (as defined in PRC section 3009) who has the Division's approval to operate a subsurface injection project in the Richfield Oil Field (UIC Project No. 598-00-004 [Exhibit A]). As such, Greka must comply with all laws applicable to such projects as well as the conditions of the controlling UIC project approval letter. Fundamental legal requirements of the Division's continuing approval of the project require Greka to maintain accurate project data and establish that no damage to life, health, property, or natural resources is occurring by reason of the project. (See Regulations section 1724.10, subd. (h).) Failing to perform well integrity tests, failing to submit accurate injection well data to the Division, and using injection wells at inappropriate pressures are all actions that run directly counter to the requirements which allow Greka to continue to inject consistent with the Division's approval of Greka's project. As such, based on the Division's records and the allegations below, the Division hereby orders Greka to stop all water injection until it remediates the identified project compliance issues for UIC Project No. 598-00-004.

Within his discretion, the Supervisor is currently considering the relevant circumstances described below to establish and impose civil penalties pursuant to **PRC section 3236.5**.

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Therefore, pursuant to PRC sections 3013, 3106, 3222, 3224, and 3226, Regulations sections 1714, 1722, subdivision (g), 1724.6, 1724.7, and 1724.10, and as set forth below, the Supervisor is ordering Greka to stop all injections approved under UIC Project No. 598-00-004 (as soon as it is safe to do so) and to address the items identified in Section IX below (Operator's Required Actions). As such, Greka is also required to disconnect all injection wells per Regulations section 1777, subdivision (c)(4), unless otherwise directed by the Division.

II. <u>Definitions</u>

PRC section 3008, subdivision (a), defines "Well" to include ". . . any well drilled for the purpose of injecting fluids or gas for stimulating oil or gas recovery. . ."

PRC section 3009 defines "Operator" to mean "a person who, by virtue of ownership, or under the authority of a lease or any other agreement, has the right to drill, operate, maintain, or control a well or production facility."

III. State Oil and Gas Supervisor and Division Authority

PRC section 3013 states that the oil and gas law (Division 3 of the PRC, commencing with section 3000) "shall be liberally construed to meet its purposes" and grants the Supervisor "all powers" that may be necessary to carry out those purposes.

PRC section 3106, subdivision (a), authorizes the Supervisor to "supervise the drilling, operation, maintenance, and abandonment of wells and the operation, maintenance, and removal or abandonment of tanks and facilities attendant to oil and gas production ... so as to prevent, as far as possible, damage to life, health, property, and natural resources[.]"

PRC section 3222 states, in part, that the "operator of any well shall, at the request of the supervisor, demonstrate that water from any well is not penetrating oil-bearing or gas-bearing strata or that detrimental substances are not infiltrating into underground or surface water suitable for irrigation or domestic purposes."

PRC section 3224 mandates that "The supervisor shall order such tests or remedial work as in his judgment are necessary to prevent damage to life, health, property, and natural resources. . ."

PRC section 3226 authorizes the Supervisor, based on the Supervisor's final or affirmed order, to appoint agents who may enter the well premises and perform necessary work if the operator did not complete the work as ordered. Any amount the Supervisor expends to complete the necessary work constitutes a lien against the operator's real or personal property according to PRC section 3423.

PRC section 3236.5 authorizes the Supervisor to impose a civil penalty on a person who violates any provision in Chapter 1 of Division 3 of the PRC or any regulation that implements Chapter 1.

Regulations section 1714, requires "[w]ritten approval of the Supervisor . . . prior to . . . injection. . ."

Regulations section 1722, subdivision (g), demands that Division-approved operations "shall not deviate from the approved program without prior Division approval, except in an emergency."

IV. Operator Requirements for Continued Project Approval

PRC section 3227, subdivision (a)(4), requires an operator to report, among other things, "the amount of fluid or gas injected into each well used for enhanced recovery [of oil.]"

Regulations section 1723.9 requires an operator to test idle wells and notify the appropriate Division district office so a Division inspector may witness the tests.

Regulations section 1724.6 requires Division approval before any subsurface injection project can begin and that "[t]he operator requesting approval for such a project must provide the appropriate Division district deputy with any data that, in the judgment of the Supervisor, are pertinent and necessary for the proper evaluation of the proposed project."

Regulations section 1724.7 describes the subsurface injection project data which operators must file with the District Deputy to get, and maintain, injection project approval.

Regulations section 1724.10 identifies, among other things, an operator's injection project requirements to: (1) notify the Division about injection pressure increases (subd. (a)); (2) file injection reports (subd. (c)); (3) have an accurate pressure gauge or pressure recording

device available (**subd.** (**e**)); (4) determine a maximum allowable surface pressure (**subd.** (**i**)); and (5) perform mechanical integrity testing (**subd.** (**j**)).

Regulations section 1724.10, subdivision (h), requires that "[d]ata shall be maintained to show performance of the project and to establish that no damage to life, health, property, or natural resources is occurring by reason of the project." It also requires that "[i]njection shall be stopped if there is evidence of . . . damage, or loss of hydrocarbons, or upon written notice from the Division. (Emphasis added.)

Regulations section 1777, subdivision (c)(4), requires an operator to disconnect injection lines from injection wells unless there is current approval from the Division to inject.

V. Failure to Accurately Report Injection Pressures

a. False Reporting

While Greka has been timely reporting much of its monthly injection statistics, the Division's forensic analysis of Greka's reports, which includes information from Division project site visits as well as the Division's scientific calculations, indicates that Greka has not been accurately reporting its monthly injection pressures and/or volumes.

The Division's Online Production & Injection (OPI) data (which Greka supplies to the Division) shows a lack of pressure change when the injection volume is decreased to zero. However, Darcy's law demonstrates that pressure and rate are related; when one changes the other should change. The OPI data shows that the injection and gross production volumes have declined over the 13 years of Greka's operation, indicating a loss in reservoir energy that should be reflected in a decline in the reported injection pressures.

Graphs which the Division created during a forensic analysis of 28 of 54 injection wells show that Greka reported no volume injected but a constant pressure for one or more months during the injection well's history. The Division's subsequent search of its OPI database found that since Greka took over on June 17, 2004, there are a total of 1,825 monthly reports where

¹ The pressure to volume relationship is represented in Darcy's equation of fluid flow through porous media as follows: Q = [kA (p2 - p1)] / uL where Q = flow rate, k = permeability, A = cross sectional area of flow, p2 - p1 = pressure drop, u = viscosity of fluid, L = length where pressure drop takes place. Darcy's equation demonstrates that flow rate (Q) and pressure (p) are proportional. When pressure or flow rate (volume/time) changes the other should change and not stay constant as indicated by all of Greka's reported injection pressures.

Greka self-reported that no injection took place but also reported a non-zero constant pressure. Injection pressure should not be a constant non-zero for a well with no fluid injection. As such, Greka's consistent reporting that no injection took place while also consistently reporting constant pressure is an indication of false reporting.

On the other hand, if the pressures Greka reported were accurate, good oil field practice would require a heavy fluid weight to prevent any flow to the surface. And, since Greka's well records do not indicate that Greka used heavy fluids in their wells, it is reasonable for the Division's forensic analysts to conclude that oil reservoir pressures are not consistent with the pressures Greka reported when they also reported that no injection took place. Therefore, there are at least 1,825 months where Greka likely reported false injection pressures.

Additional graphs which the Division created for the subject wells, using data from before Greka became an operator of the project show the correct relationship between pressure and volume which is lacking in Greka's data. That correct relationship is: when the volume of the injected fluids is decreased the injection pressure declines; and when the volume increases the pressure typically responds, at some point, with an increase. Physics and the Division's forensic analysis lead to the inescapable conclusion that Greka must be falsely reporting either the injection pressure and/or the injection rate.

In addition, a November 2005 Netherland, Sewell & Associates, Inc. study of the Richfield East Dome Unit, which Greka supplied to the Division, indicates that the consulting firm discovered "discrepancies. . . between injection data maintained by operations personnel and those data reported to the California Department of Conservation."

Most important, Division field engineers observed false injection reporting during a radioactive injection survey and during injection well inspections.

On or about June 15, 2017, a Division engineer witnessed a radioactive injection survey mechanical integrity test (MIT) for active injection well YW22 (API 05920692). The engineer's inspection report indicated: "Well shut in on arrival. Contractor (WAC) asked operator to turn on injection, and bring pressure to approx. 500 psi. Operator on site (Greka) stated that it would likely not be possible to maintain an injection pressure of 500 psi or above. Survey performed at

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500 psi." For 13 years, the injection pressure Greka had been reporting for that well was 950 psi², yet, Greka's employee stated that it would be difficult to maintain a 500 psi injection pressure. In addition, the Division engineer indicated that the surveying personnel from Greka's contractor (WAC) told him that the well had zero pressure prior to the start of the survey. The statements which Greka's and its agent's personnel made imply that the reservoir was unable to support a column of injection liquid at the time of the June 15, 2017 test because the formation would absorb the liquid faster than it was injected. This suggests that it should take less pressure, over time, to pump fluids away when injecting into the injection wells. This situation (less pressure needed over time) also does not support Greka's reports indicating that pressures have been constant for 13 years. As such, Greka must be reporting false pressures.

In addition, Division engineers were present at Greka's Richfield injection project site on June 27, 28, and July 6,7, and 13, 2017, to record the injection pressures. At those times, the Division engineers found discrepancies between the pressures the engineers observed and the monthly values Greka had been reporting. Compounding the issues, the Division engineers noted that there were no injection flow meters on any of the wells they inspected. Apparently, Greka determines injection volumes by inserting a portable measuring device in the injection lines and taking injection readings. Greka's on-site representative, Dan Boyd, stated that they take volume readings once a week, on Fridays, with this portable measuring device. Even though the injection well readings are weekly, a pressure change month after month should still be captured in these weekly readings. This is yet additional supporting evidence that Greka must be reporting the false pressures.

b. Failure to Report

Based on the Division's records, Greka has not reported any of the required injection data since April 2011 for Well YW25 (API 05906310).

VI. Failure to Comply with Testing and Operating Requirements for UIC Projects

Regulations section 1724.10 contains specific testing and operating requirements for all underground injection wells. These include requirements for mechanical integrity testing,

² Or psig (pounds per square inch, gauge).

accurate operating tubing pressure gauges, and stipulated limits for the maximum allowable surface pressure (MASP) for each injection well. Greka has violated each of these regulatory requirements multiple times, as described below.

a. Failure to Perform Mechanical Integrity Testing

Regulations section 1724.10, subdivision (j), requires a two-part MIT regime designed to ensure that the well is not leaking and that the injected fluid is confined to the appropriate zone(s) and is not contaminating underground sources of drinking water. First, a standard annulus pressure test (SAPT) is required prior to the commencement of injection operations, and it must be repeated at least once every five years. Second, a Radioactive Tracer Survey (RA Survey) must be conducted within three months after injection has commenced, and it must be repeated at least once every two years.

Division records show a total of ninety overdue MIT's, which consist of forty RA Surveys and fifty SAPT's. Of these overdue tests, ten wells have no record of a RA Survey having ever been conducted and twenty-seven wells have never undergone a SAPT. Further, Division records also show that Greka has failed to conduct either of these tests on nine of its injection wells. Greka has repeatedly violated Regulations section 1724.10, subdivision (j), because it has not performed the required tests.

b. Failure to Maintain Accurate, Operating Pressure Gauges

During an inspection of injection wells with questionable historical records on June 27-28, 2017, at Greka's Richfield operation, Division personnel discovered that eight of twenty-eight wells observed either did not have operating tubing pressure gauges or had broken gauges. Because accurate, operating tubing pressure gauges were not available for these eight wells, Greka violated **Regulations section 1724.10**, **subdivision** (e).

c. Failure to Inject at or Below Maximum Allowable Surface Pressure (MASP)

Operators are required to obtain Division approval prior to carrying out changes in the MASP. The MASP is calculated from the approved injection gradient, as determined by a steprate test and stated in the Project Approval Letter (PAL), and is designed to protect the formation and prevent fracturing that could extend to usable drinking waters.

A Division's review of Greka's historical injection pressure dating back to February 2000, revealed that twenty of Greka's injection wells had maintained pressures above the MASP for months at a time, some for years, without Division approval. In June 2014, Division personnel witnessed three RA Surveys during which the wells had an injection pressure higher than the MASP. Finally, in its April 2017 monthly injection report, Greka reported that ten of its wells were injecting above the MASP. Greka did not notify the Division of any anticipated increases in the MASP, and the Division did not approve those increases. Greka has repeatedly violated **Regulations section 1724.10**, **subdivision (a)**, by operating several injection wells above the MASP without Division notification and approval.

VII. Failure to Comply with Project Approval Letter (PAL) Requirements

Each injection project has an associated PAL. In addition to reminding an operator about important statutory and regulatory injection project requirements, the PAL specifies the individualized conditions and specifications within the Division's discretion which the operator must follow for continued injection project approval. Greka has not complied with the requirements specified in PAL items 5, 6, 8, 9 and 11 (Exhibit A). The PAL item deficiencies are detailed as follows:

a. PAL Item 5

This PAL condition requires a fluid injection survey MIT "for each injection well within three months after injection has commenced, at least once every year thereafter, after any significant anomalous rate or pressure change, or as requested by this office to confirm that the injection fluid is confined to the intended zones." (Emphasis added.) The PAL condition also required Greka to file all MIT data with the Division "within two months after being performed." Since Greka took over the project in 2004, Greka repeatedly violated this permit condition because it did not perform and report the required tests at the required intervals. (See also, Section VI, subsection a, above).

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b. PAL Item 6

This PAL condition explains the requirements that an operator needs to meet in order to change its well injection pressure limit (MASP). Before changing (increasing) its well injection pressure limit, an operator must conduct a "step-rate injectivity" test and submit the results of such tests, as well as the proposed method of operations as to input, rate, pressure, and water distribution by subzones, to the Division for approval. As mentioned above in **Section VI**, **subsection c**, above, Greka reported numerous wells with the injection pressure above the MASP yet did not perform and report the required tests. As such, Greka also committed multiple violations of this PAL condition.

c. PAL Item 8

This PAL condition requires that Greka have an accurate, operating pressure gauge or pressure recording device available at all times, and that all injection wells must be equipped for installation and operation of such gauge or device. In addition, a gauge or device used for injection pressure testing, which is permanently affixed to the well or any part of the injection system, shall be calibrated at least every six months. Evidence of such calibration must be available to the Division upon request. As indicated above in **Section V**, **subsection a**, according to Greka's on-site operations representative, Greka's standard operating procedure is that its field staff take pressure and volume readings once a week (on Fridays) with a portable device. However, during Division inspections in June 2017, the Division found that 8 of the 28 wells had either no gauge or a broken tubing gauge and Greka could not furnish the calibration date(s) of the portable pressure device. Broken and missing gauges do not qualify as being compliant with PAL Item 8. Nor does the inability to furnish the calibration date(s) of portable pressure devices.

d. PAL Item 9

This PAL condition requires Greka to file a monthly injection report with the Division listing the amount of fluid injected, pressure required, and source of injection fluid. Based on the Division's records and forensic analysis detailed above in **Section V**, **subsection a**, the Division believes that Greka continuously reported 5,387 false monthly pressures in 37 of its

wells, with false reports in 29 wells going back to the initial date Greka became responsible to operate the project (June 17, 2004). In addition, MITs performed in June 2014 for wells "Redu" YW19 (API 05906112) and "Redu" ZW14 (API 05906232) indicate injection pressures much higher than the monthly reported values for June of 2014. As such, Greka continuously violated this permit condition.

e. PAL Item 11

This PAL condition requires Greka to notify the District Deputy of any anticipated changes in a project resulting in alteration of conditions originally approved such as: increase in size, change of injection interval, or increase in injection pressure. An operator shall not carry out such changes without Division approval. Examples of an alteration of conditions (increased injection pressures) without first notifying the Division are as follows:

- 1. April 2017: 10 wells injecting above MASP.
- 2. Historical injection pressures, from Jun 2004 through June 2017: 20 wells show they have been consistently maintaining pressures above MASP.
- 3. During MIT's in June 2014: 3 wells were noted to have an injection pressure higher than the MASP.

All of the above are evidence that Greka also committed multiple violations of this PAL condition.

VIII. Failure to Provide Required Project Data

As indicated above, **Regulations section 1724.7** describes the injection project data requirements which operators must file with the District Deputy to get, and maintain, injection project approval. From a letter sent December 23, 2015, the Division transmitted to Greka a list of items which the Division needed to complete its review of Greka's injection project. Greka did not provide all the required information for the Division's injection project review. The following deficiencies were noted:

a. Missing Engineering Study Data

i. The reservoir characteristics of each zone.

- An analysis of the reservoir fluid (required by the Notice to Operators "Water Sampling Protocols and Analyses of Injection and Formation Waters" dated May 18, 2015 and amended June 8, 2015.)
- iii. A planned well-drilling and abandonment program.
- iv. Almost all of the required updated casing diagrams.

b. Missing Geologic Study Data

- i. A structural contour map of each zone.
- ii. Legible isopach maps.
- iii. A representative electric log.

c. Missing Injection Plan Data

- i. The operator did not specify the method of injection (e.g. tubing and packer).
- ii. The operator did not provide information for the source of injection fluid and the analysis of the injection fluid required by the NTO "Water Sampling Protocols and Analyses of Injection and Formation Waters" dated May 18, 2015 and amended June 8, 2015.

The Division sent "follow-up" letters requesting the required injection project data on December 23, 2015, and January 20, 2017. As of the date of this Order, Greka has still not complied.

IX. Operator's Required Actions

Based on the above, and pursuant to PRC sections 3013, 3106, 3222, 3224, and 3226, Regulations sections 1714, 1722, subdivision (g), 1724.6, 1724.7, and 1724.10, the Supervisor hereby orders Greka to stop all injections approved under UIC Project No. 598-00-004 (as soon as it is safe to do so) and to address the items identified below. As such, Greka is also required to disconnect all injection wells per Regulations section 1777, subdivision (c)(4), unless otherwise directed by the Division.

Operator is required to:

- 1. Correct all false injection reporting;
- 2. Submit all missing injection reports;

- 3. Bring all injection wells into compliance concerning required RA surveys;
- 4. Bring all injection wells into compliance concerning SAPT's;
- 5. Fit all injection wells with a calibrated, accurate pressure gauge;
- 6. Lower injection pressures to below MASP;
- 7. Supply all data requested for injection project review and approval; and
- 8. Install flow rate meters on all active injection wells.

X. Operator's Appeal Rights

Operator may appeal this Order by filing a timely, written, notice of appeal with the Director as described in Article 6 (Appeals and Review) of Division 3 of the PRC, commencing with PRC section 3350. (PRC, § 3225, subd. (d).) A written notice of appeal may be mailed to the following address:

Department of Conservation Director's Office of Appeals 801 K Street, MS 24-03 (Legal Office, Chief Counsel) Sacramento, California 95814-3530

If Operator does not submit a timely, written, notice of appeal, Operator waives the right to challenge this Order and this Order will become a final order. At such time, pursuant to **PRC** section 3226, the Division may contract for the performance of all work required to disconnect all injection project injection wells if, within 30 days of this Order, Operator has not, in good faith, commenced the disconnection of such wells. Any costs incurred by the Supervisor to obtain compliance with this Order will constitute a lien against Operator's real or personal property per **PRC** section 3423.

If Operator submits a timely, written notice of appeal, it, and interested parties, will receive notice of the appeal hearing date, time, and place. Following the hearing, Operator will receive a written decision that affirms, sets aside, or modifies the appealed order.

XI. Other Potential Actions to Enforce This Order

In addition to the imposition of civil penalties per PRC section 3236.5, failure to comply with Section IX (Operator's Required Actions) of this Order could subject Operator to further enforcement action, including the possibility that the Supervisor may request prosecution of a criminal action under PRC section 3236, which makes failing, neglecting, or refusing to comply with applicable provisions of the PRC, a misdemeanor punishable by a fine of \$100 (one hundred dollars) to \$1,000 (one thousand dollars), imprisonment of up to six (6) months or both.

DATED: December 13, 2017

Kenneth A. Harris Jr.

State Oil and Gas Supervisor

Cert. mail rec. no.: 7015 0640 0000 1482 2264

PROOF OF SERVICE BY CERTIFIED U.S. MAIL

- 1. I am at least 18 years of age and not a party to this action. I am a resident of or employed in the county where the mailing took place.
- 2. My business address is:

State of California Department of Conservation 801 K Street, MS 24-03 Sacramento, CA 95814-3530

3. On (date) December 13, 2017

I served the following document(s) (specify):

ORDER TO STOP INJECTION, REMEDIATE PROJECT ISSUES, AND TAKE PREVENTATIVE MEASURES; ORDER NUMBER 1119; OPERATOR: HVI CAT CANYON, INC. (DBA: GREKA OIL & GAS; G3515)

- 4. I served the documents on the person or persons below, as follows:
 - a) Name and address of person(s) served: Ms. Jeanette Boyer

Greka Oil & Gas, Inc. 1700 Sinton Road Santa Maria, CA 93458

- b) Date of mailing: December 13, 2017
- c) Place of mailing: Sacramento, California
- The documents were served by the following means (specify):
 By United States Certified Mail. I enclosed the documents in a sealed envelope or package addressed to the person(s) at the addresses in item 4 and

a) \square deposited the sealed envelope with the United States Postal Service, with the postage fully prepaid

b) placed the envelope for collection and mailing, following our ordinary business practices. I am readily familiar with this business's practice for collecting and processing correspondence for mailing. On the same day that correspondence is placed for collection and mailing, it is deposited in the ordinary course of business with the United States Postal Service, in a sealed envelope with postage fully prepaid.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date:

(TYPE OR PRINT NAME OF DECLARANT)

(SYGNATURE OF DECLARANT)

CERTIFIED MAIL RECEIPT #: 7015 0640 0000 1482 2264