AUTHORIZATION TO OPERATE AN UNDERGROUND INJECTION CONTROL (UIC) CLASS II INJECTION WELL PERMIT NUMBER # UIC 2D08701056002

ISSUE DATE: July 21, 2020 EXPIRATION DATE: July 21, 2025

In compliance with provisions of the West Virginia Code, Chapter 22, Article 6, Article 11 and Article 12, as well as Legislative Rules, Title 47, Series 13, Series 55 and Series 58, and Title 35 Series 1 and Series 4,

PERMITTEE / OPERATOR	FACILITY TYPE	Non-Commercial
NAME HG ENERGY, LLC		Waste Disposal
ADDRESS 5260 Dupont Road	WELL API #	<u>47-087-01056</u>
ADDRESS Parkersburg, WV 26101	WELL NAME	WM Kaufman W-19

is authorized by this permit to inject Class II fluids that are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection into the **Big Injun** formation in accordance with the conditions set forth herein. The permitted injection depth shall be **2,202** feet to **2,235** feet. The injection well is located in **Smithfield** District, **Roane** County, **Spencer** 7.5' Quadrangle. The coordinates for this injection well are: UTM NAD 83 (meters) Northing **4289969.6** and Easting **477119.8**; Latitude **38.758131** Longitude **-81.263337**.

The maximum permitted wellhead injection pressure is established as **883** psi. Calculated per Step-Rate Test completed on well 47-087-00985 on 12/16/1987. The actual maximum wellhead injection pressure may be lower based on the most recent Pre-Operation Certificate (WR-37 Form).

All references to West Virginia regulations are to those that are in effect on the date that this permit becomes effective. Any person who holds a permit shall pay an annual permit fee in accordance with the provisions of Legislative Rule Title 47 Series 9 Section 7. The first annual permit fee shall be remitted to the Office of Oil and Gas one (1) calendar year from the date of permit issuance. Subsequent annual permit fees shall be remitted on or before the anniversary date of the permit issuance. The annual permit fee for a Class II disposal well is twenty-five dollars (\$25). The permit becomes void if the annual permit fee has not been paid within one hundred and eighty (180) days of the due date. The Chief shall not reissue a permit until all annual permit fees due during prior terms have been paid in full. Failure to pay the annual groundwater fee of seventy-five dollars (\$75) for Class II disposal as required by the West Virginia Code, Chapter 22, Article 11 and/or Article 12, shall be cause for revocation of this permit.

Non-compliance with the terms of this permit shall be cause for revocation of Certification under the terms of Chapter 22, Article 12, and revocation of the permit under Chapter 22, Article 11 of the West Virginia Code.

This permit and its authorization to inject shall remain in effect for five (5) years from the date of issuance of the final permit provided all terms of the permit are met.

James Martin, Chief

Office of Oil and Gas

PART I

A. SPECIAL PERMIT CONDITIONS

- 1. **Injectate Samples.** The Permittee shall sample, analyze and record the nature of all the injected fluid for the parameters listed in TABLE 1 (Part III.B.13) within thirty (30) days of the permit issuance date. The sampling shall continue on a six (6) month schedule so that sampling will be completed at least twice per year. Sampling could be required more frequently upon request of the Chief, or whenever the Operator observes or anticipates a change in the injection fluid, to yield representative data on their physical, chemical, or other relevant characteristics. New facilities shall submit a representative sample prior to the initiation of injection operations. The Permittee shall take samples at or before the wellhead for analysis. Samples and measurements shall be representative of the monitored activity. The Permittee shall utilize applicable analytical methods and test results shall be submitted to the Office of Oil and Gas with complete laboratory analysis data sheets (report). Any analysis of injectate with a specific gravity result greater than 1.2 shall be reported to the Chief within twenty-four (24) hours of the results.
- 2. **Stream Samples.** Within thirty (30) days of the permit issuance date, the Permittee shall conduct stream monitoring at two (2) locations along **Millstone Run** adjacent to the facility. These monitoring points, one (1) upstream and one (1) downstream of the injection well location, shall be sampled and analyzed for the parameters listed in TABLE 2 (Part III.B.14) within thirty (30) days of the permit issuance date. The sampling shall continue on a nine (9) month schedule. The results will be reported to the Office of Oil and Gas. Submission shall include a cover letter, all analytical results, a map with sampling points labeled including coordinates of the facility location for reference.

PART II

A. REAPPLICATION

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

B. IMMEDIATE REPORTING

The Permittee shall report any noncompliance which may endanger human health or the environment immediately after becoming aware of the circumstances by using the **WVDEP Emergency Spill line number 1-800-642-3074**. Written submission shall also be provided 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, and if the noncompliance has not been corrected, Permittee shall provide the anticipated time it is expected to continue; and the steps taken or planned to be taken to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported immediately:

- 1. Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water (USDWs); and
- 2. Any non-compliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between the USDWs, or failure of mechanical integrity test demonstrations.

C. RIGHT OF APPEAL

Notice is hereby given of your right to appeal the terms and conditions of this permit by which you are aggrieved to the State Environmental Quality Board by filing a NOTICE OF APPEAL on the form prescribed by such Board for this purpose, with the Board, in accordance with the provisions of West Virginia Code, Chapter 22, Article 11, Section 21 (WV Code §22-11-21) within thirty (30) days after the date of issuance of this permit.

D. EFFECT OF PERMIT

The Permittee is allowed to engage in underground injection in accordance with the conditions of this permit based on an approved permit application. The Permittee shall not allow the underground injection activity authorized by this permit to cause or allow the movement of fluid containing any contaminant into underground sources of drinking water and may not cause a violation of any primary drinking water regulation or any health-based limit promulgated under Code of Federal Regulations, Title 40, Chapter I, Subchapter D, Part 142 (40 CFR §142) or of any water quality standard promulgated by the West Virginia Department of Environmental Protection/Division of Water and Waste Management. Any underground injection activity not authorized in this permit is prohibited. Compliance with the terms of this permit does not constitute a defense to any action brought under Part C and the imminent and substantial endangerment provisions in Part D of the Safe Drinking Water Act (SDWA) or any other common or statutory law for a breach of another applicable legal duty.

E. PERMIT ACTIONS

- Permit Status Change. This permit can be modified, revoked and reissued or terminated for
 cause specified in West Virginia Code, Chapter 22, Article 11 (WV Code §22-11), and Chapter
 22, Article 12 (WV Code §22-12), and Legislative Rule, Title 47, Series 13 (Legislative Rule 47
 CSR 13). The filing of a request by the Permittee for a permit modification, revocation and
 reissuance, suspension or revocation, or notification of planned changes or anticipated
 noncompliance, does not stay any permit condition.
- 2. Transfer of Permits. This permit is not transferable to any person unless notice is first provided to the Office of Oil and Gas and the Permittee complies with requirements of Legislative Rule 47 CSR 13-13.17. The Office of Oil and Gas 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.

F. SEVERABILITY

The provisions of this permit are severable, and if any condition of this permit or the Permittee's application of any provision of this permit to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of other provisions of the permit and the remainder of this permit shall not be affected.

G. DURATION OF PERMIT

This permit and the authorization to inject are issued for a period of five (5) years unless terminated under Part II Section H paragraph 11 of this permit. However, when through no fault of the Permittee the Office of Oil and Gas does not issue a new permit with an effective date on or before the expiration date of the previous permit and the Permittee has submitted a timely

administratively complete application as required in Part II Section A of this permit, which is a complete application for a new permit, the expired permit shall continue to remain fully effective and enforceable.

H. GENERAL REQUIREMENTS

- 1. Duty to Comply. The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the SDWA and the State Act and is grounds for enforcement action; for permit suspension or revocation, revocation and reissuance, or modification; or for denial of a permit renewal application. (Legislative Rule 47 CSR 13-13.12.a) Copies of UIC Program regulations (WV Code §22-11) may be obtained from the West Virginia Legislature's Website http://www.legis.state.wv.us/WVCODE/Code.cfm, and (Legislative Rule 47 CSR 13) may be obtained from the West Virginia Secretary of State's Website at http://www.sos.wv.gov/.
- 2. **Duty to Reapply.** If the Permittee wishes to continue activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit as required in Part II Section A of this permit at least one hundred and eighty (180) days before this permit expires.
- 3. **Duty to Halt or Reduce Activity Not a Defense.** It shall not be a defense for a 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 or correct any adverse impact on health of persons or 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, systems of treatment and control, and related equipment which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operating staffing and training, adequate security at the facility to prevent unauthorized access, adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facility or similar systems only when necessary to achieve compliance with the conditions of this permit.
- 6. **Duty to Provide Information.** The Permittee shall furnish to the Chief within a reasonable time, any information which the Chief may request to determine whether cause exists for modifying, revoking and reissuing, or revoking this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Chief, upon request, copies of records required to be kept by this permit. If the Permittee becomes aware of any incomplete or incorrect information in the permit application or subsequent report(s), the Permittee shall promptly submit information addressing these deficiencies to the Chief.
- 7. **Inspection and Entry.** The Permittee shall allow the Chief, 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 must be kept under the conditions of this permit;
 - b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

- c. Inspect 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 for any substances or parameters at any location.
- 8. **Penalties.** Any person who violates a permit requirement is subject to civil penalties, criminal penalties, fines and other enforcement actions under WV Code §22-11 and WV Code §22-12.
- 9. **Signatory Requirements.** Only a duly authorized person may sign documents and reports associated with this permit.
 - a. All reports required by this permit and other information requested by the Chief shall be signed as follows:
 - i. For a corporation, by a responsible corporate officer of at least the level of vice-president;
 - ii. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
 - iii. For a Municipality, State, Federal, or other public agency by either a principal executive or a ranking elected official.
 - b. A duly authorized representative of the official designated in paragraph a. above may also sign only if:
 - i. The authorization is made in writing by a person described in paragraph a. above:
 - ii. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity; and
 - iii. The written authorization is submitted to, and approved by, the Chief.
 - c. If an authorization under paragraph (b) of this section is no longer accurate because a different individual has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Chief prior to or together with any reports, information or applications to be signed by an authorized representative.
 - d. Any person signing a document under paragraph (b) of this section shall make the following certification: (Legislative Rule 47 CSR 13-13.11.d). "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

- 10. **Property Rights.** Issuance of this permit does not convey property rights or mineral rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, any infringement of Federal, State or local law or regulations, or any exclusive privilege.
- 11. **Permit Actions.** This permit may be modified, revoked and reissued, suspended, or revoked for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, suspension or revocation, or notification of planned changes or anticipated noncompliance, does not stay any permit condition.
- 12. **Confidentiality of Information.** In accordance with Legislative Rule 47 CSR 13-13.21, any information submitted to the State pursuant to this rule may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions, or in the case of other submissions, by stamping the words "CONFIDENTIAL BUSINESS INFORMATION" on each page containing such information. An affidavit or written request stating the need for requested confidential documents to remain confidential must also be submitted with the documents.
 - a. If no claim is made at the time of submission, the State may make the information available to the public without further notice.
 - b. Claims of confidentiality for the following information will be denied:
 - i. The name and address of any permit applicant or Permittee; or
 - ii. Information which deals with the existence, absence, or level of contaminants in drinking water.
- 13. **Monitoring Reports.** Monitoring results shall be reported at the intervals specified under Part III Section B of this permit.
- 14. **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 no later than thirty (30) days following each schedule date.
- 15. **Other Information.** Where a Permittee becomes aware that he/she failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Chief, he/she shall promptly submit such facts or information.
- 16. **Prohibited Activity.** It shall be unlawful for any person, unless an authorization has been issued by a groundwater regulatory agency, to allow crude oil, or any petroleum product derived from crude oil, or seepage, or natural gas, or condensate, or salt water, or any chemical mixture which may impact groundwater quality to escape from any well, pump line, impoundment, storage tank, treatment unit, or storage container, or be allowed to flow onto or under the land surface or in such a manner that could impact surface or groundwater quality.
- 17. **State or Federal Laws.** Nothing in this permit shall be construed to preclude the institution on any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any State or Federal law or regulation.

PART III

A. RECORD RETENTION

Required Records. The Permittee shall retain all records concerning the permitted underground injection well until three (3) years after completion of any plugging and abandonment. The Chief may require the Permittee/Operator to deliver the records to the Chief at the conclusion of the retention period.

B. MONITORING REQUIREMENTS

- 1. **Sampling and Measurement.** Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the fluid to be analyzed and the procedure for analysis of the sample shall be in accordance with test procedures approved under 40 CFR §136.3, unless otherwise approved by the Chief. The Permittee shall identify the types of tests and methods used to generate the monitoring data.
- 2. **Monitoring Devices.** The Permittee shall install and maintain in good operating condition:
 - a. A tap on the discharge line between the injection pump and the wellhead for obtaining representative samples of injection fluids;
 - b. Devices to continuously measure and record injection pressure, flow rates, injection and production volumes;
 - c. Pressure gauges shall be of a design that provides a full pressure range of at least fifty (50) percent (%) greater than the anticipated operating pressure and a certified deviation accuracy of five (5) percent (%) or less throughout the operating pressure range; and
 - d. Flow meters shall measure cumulative volumes and be certified for a deviation accuracy of five (5) percent (%) or less throughout the range of rates allowed by the permit.
- 3. **Wellhead Pressure Gauge.** A wellhead pressure gauge shall be installed and maintained on the injection tubing to facilitate inspection and ensure compliance of the maximum wellhead injection pressures as approved on Office of Oil and Gas WR-37 Form. A daily reading of the maximum wellhead injection pressure shall be taken and reported on WR-40 Form.
- 4. **Daily Monitoring.** The Permittee shall daily monitor all the casing annuli with pressure sensitive devices or with such a method as approved or required by the Office of Oil and Gas to allow early detection of any leaks from the packer, injection zone or casing. The Permittee shall also monitor the daily maximum injection pressure, volume, and rate daily. This information shall be reported monthly using the Office of Oil and Gas electronic WR-40 Form. Submittal shall be through the WVDEP Electronic Submittal System (ESS): https://apps.dep.wv.gov/eplogin.cfm.
- 5. **Monitoring Records.** Records of monitoring information shall include:
 - a. The date, exact place, and time of sampling or measurements;
 - b. The individual(s) who performed the sampling or measurements;

- c. The date(s) analysis(es) were performed;
- d. Individual(s) who performed the analyses;
- e. The analytical techniques or methods used; and
- f. The results of such analyses.
- 6. **Injection Well Mechanical Integrity Testing (MIT).** The Permittee shall conduct a mechanical integrity test of the injection well at a minimum frequency of once every five (5) years per Legislative Rule 35 CSR 4-7.7.b. The Permittee shall notify the Chief of his or her intent to conduct a mechanical integrity test of the well no less than twenty-four (24) hours prior to such test. The pressure requirement of a mechanical integrity test on a well is a pressure of at least one hundred and fifty (150) percent (%) or 1.5 times the maximum injection pressure. The pressure must be held for a period of at least twenty (20) minutes with no more than five (5) percent (%) pressure loss to be approved for injection operations. The Permittee must submit a WR-37 Form with the pressure recording graph/chart as an attachment to the Office of Oil and Gas within thirty (30) days of each mechanical integrity test conducted. Upon failure of a mechanical integrity test or expiration of the five (5) year mechanical integrity test regulatory period, the Permittee shall cease operation/injection and shut-in the well immediately until successfully repaired, tested or permanently plugged and abandoned per regulation. Any MIT test that fails must be documented on a separate WR-37 Form. All repairs shall be completed by the Permittee within ninety (90) days of the failure date and approved by the Office of Oil and Gas prior to resuming operations. If repaired, the well must be re-tested and an updated WR-37 Form with pressure recording graph/chart must be submitted to the Office of Oil and Gas for approval.
- 7. **Pump Line Mechanical Integrity Testing (MIT).** The Permittee shall conduct a mechanical integrity test of all pump line(s) from the holding tanks to the injection well at a minimum frequency of once every five (5) years. The Operator has the option of testing the pump line simultaneously with well or separately. The Permittee shall notify the Chief of his or her intent to conduct a mechanical integrity test of the pump line(s) no less than twenty-four (24) hours prior to such test. The pump line integrity test shall pressurize the injection pump line(s) to at least one hundred (100) psi greater than the maximum permitted wellhead injection pressure for a minimum of twenty (20) minutes, allowing for no more than five (5) percent (%) loss after completion. The Permittee must submit a WR-37 Form with the pressure test recording graph/chart as an attachment to the Office of Oil and Gas within thirty (30) days of each mechanical integrity test conducted. Upon failure of a mechanical integrity test or expiration of the five (5) year mechanical integrity test regulatory period, the Permittee shall cease operation/injection and shut-in the well immediately until successfully repaired or replaced and then tested. Any MIT test that fails must be documented on a separate WR-37 Form with pressure recording graph/chart. All repairs shall be completed by the Permittee within ninety (90) days of the failure date and approved by the Office of Oil and Gas prior to resuming operations. If repaired, the line must be re-tested and an updated WR-37 Form with pressure recording graph/chart must be submitted to the Office of Oil and Gas for approval. Any change made to the pump line fittings or piping will require integrity pressure testing. All Office of Oil and Gas forms, including the WR-37 Form can be found on the Office of Oil and Gas webpage: http://www.dep.wv.gov/oil-and-gas/GI/Forms/Pages/default.aspx.
- 8. Additional MIT Requirements. In addition to the above requirement, a mechanical integrity test demonstration shall be conducted whenever protective casing or tubing is removed from the well, the packer is replaced or reseated, if a well failure is likely, or as requested by the Chief. The Permittee may continue operation only if they have successfully demonstrated to the Chief the mechanical integrity of the permitted well. The Permittee shall cease injection operations if a loss of mechanical integrity becomes evident or if mechanical integrity cannot be demonstrated. The Permittee must submit a written notification to Office of Oil and Gas within twenty-four (24) hours if mechanical integrity of the well is lost. The notification must

include a plan to repair and retest of the well within ninety (90) days of the failure date.

- 9. **Environmental Measurements**. All environmental measurements required by the permit, including but not limited to, measurements of pressure, temperature, mechanical, and chemical analyses shall be done in accordance with state guidance on quality assurance. All analysis must be performed by a West Virginia certified laboratory. Certified laboratories can be found on the WVDEP webpage at http://www.dep.wv.gov/WWE/Programs/lab/Pages/default.aspx.
- 10. **Authorized Injection Fluids.** The Permittee shall not inject any hazardous substances, as defined by 40 CFR §261, or any other fluid, other than the Class II fluids produced solely in association with oil and gas production operations. This permit is for authorization of injection of only fluids as defined for Class II wells in Legislative Rule 47 CSR 13-4.2. The fluids to be injected shall only be from those sources listed in Appendix G of the permit. The Permittee may add additional sources of fluids with written approval. The request must be submitted with an updated Appendix G. Injection Fluid analysis may be necessary to prove compatibility. However, Permittee's acceptance of additional sources of fluid(s) may be deemed approved provided that such fluid(s) meet all Class II injection standards and the Permittee reports within five (5) business days the source, API number and formation(s) for the sources added during the previous week. Accepting any fluid that does not meet Class II injection standards is grounds for enforcement action and/or revocation of this permit.
- 11. **Manifest Records.** The Permittee shall maintain a record (manifest) of every load of fluid received. The record shall include the hauler's name and signature, the Operator's name and signature, API number for the well the fluid was collected, the location from where the load was obtained and the volume of the load and whether the load of fluid delivered was a split load. If the load was a split load, each Operator's name and location shall be listed and, if possible, the volumes of fluid received from each Operator documented. This information shall be maintained on the Class II disposal Manifest Document attached to this permit.
- 12. **Contract Haulers.** No hauler whose trucks do not belong to the UIC Operator shall be permitted without approval by the Office of Oil and Gas. For approval, the Permittee shall designate by letter to the Office of Oil and Gas, any third-party hauler proposed to be used for the transportation of fluids to the facility. The third-party hauler may not commence transportation of fluids to the facility until approved by the Office of Oil and Gas. All delivery manifest requirements must still be met.
- 13. **Injectate Samples.** The Permittee shall sample, analyze and record the nature of all the injected fluid for the parameters listed in TABLE 1 below within thirty (30) days of the permit issuance date. The sampling shall continue on a six (6) month schedule so that sampling will be completed at least twice per year. Sampling could be required more frequently upon request of the Chief, or whenever the Operator observes or anticipates a change in the injection fluid, to yield representative data on their physical, chemical, or other relevant characteristics. New facilities shall submit a representative sample prior to the initiation of injection operations. The Permittee shall take samples at or before the wellhead for analysis. Samples and measurements shall be representative of the monitored activity. The Permittee shall utilize applicable analytical methods and test results shall be submitted to the Office of Oil and Gas with complete laboratory analysis data sheets (report). Any analysis of injectate with a specific gravity result greater than 1.2 shall be reported to the Chief within twenty-four (24) hours of the results.

TABLE 1

Chloride	TPH-GRO
Bromide	TPH-DRO
Strontium	TPH-ORO
Barium	Benzene (B)
Iron	Ethylbenzene (E)
Manganese	Toluene (T)
Aluminum	Total Xylenes (X)
Arsenic	Total Dissolved Solids (TDS)
Sodium	Total Organic Carbon (TOC)
Calcium	Total Suspended Solids (TSS)
Sulfate	Radium-226 and Radium 228
Specific Gravity	Gross Alpha and Gross Beta
pН	

14. **Stream Samples.** Within thirty (30) days of the permit issuance date, the Permittee shall conduct stream monitoring at two (2) locations along **Millstone Run** adjacent to the facility. These monitoring points, one (1) upstream and one (1) downstream of the injection well location, shall be sampled and analyzed for the parameters listed in TABLE 2 (Part III.B.14) within thirty (30) days of the permit issuance date. The sampling shall continue on a nine (9) month schedule. The results will be reported to the Office of Oil and Gas. Submission shall include a cover letter, all analytical results, a map with sampling points labeled including coordinates to the facility location for reference.

TABLE 2

Chloride	TPH-GRO
Bromide	TPH-DRO
Strontium	TPH-ORO
Barium	Benzene (B)
Iron	Ethylbenzene (E)
Manganese	Toluene (T)
Aluminum	Total Xylenes (X)
Arsenic	Total Dissolved Solids (TDS)
Sodium	Total Organic Carbon (TOC)
Calcium	Total Suspended Solids (TSS)
Sulfate	рН

C. REPORTING AND NOTIFICATION REQUIREMENTS

- 1. **Anticipated Noncompliance.** The Permittee shall give advance notice to the Chief of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- 2. **Other Noncompliance.** The Permittee shall report any other instances of noncompliance not reported under paragraphs Part II Section B, and Part III Section C Paragraph 3 of this permit, at the time monitoring reports are submitted. The report shall contain the information listed in Part II Section B of this permit. The Permittee shall report all other instances of noncompliance in

writing within ten (10) days of the time the Permittee becomes aware of the circumstances. The reports shall contain the information listed in this permit.

- 3. **Planned Changes.** The Permittee shall give notice to the Chief as soon as possible of any planned physical alterations, additions to the permitted facility, and/or any changes planned in the operation of the facility.
- 4. **Conversion and Abandonment Notification.** The Operator shall provide written notification to the Chief prior to conversion or abandonment of the well or in the case of area/enhanced recovery permits before closure of the project, per Legislative Rule 47 CSR 13-13.6.e. A well work permit from the Office of Oil and Gas is needed for well conversion. Notice should be given at least thirty (30) days prior to any conversion, abandonment or alteration. Notice shall also be given prior to the addition, reduction or conversion of wells within an area/enhanced recovery permit.
- 5. Cessation of Injection Activity. Any well which is not in use for a period of twelve (12) consecutive months shall be presumed to have been abandoned and shall promptly be plugged by the Operator in accordance with the provisions in West Virginia Code, Chapter 22, Article 6, Section 24 (WV Code §22-6-24) unless the Operator furnishes satisfactory proof to the Chief that there is a bona fide future use for such well. All lines shall be completely drained of all fluids and the wellhead shut-in anytime injection operations cease for a period of greater than ninety (90) days. The Office of Oil and Gas must be contacted at least twenty-four (24) hours prior to the cessation shut-in process.
- 6. **Certification of Permit Review.** Within thirty (30) days of receipt of this permit, the Permittee shall report to the Chief that he or she has read and understands and accepts all terms and conditions of the permit. The Certification Document that is included as an attachment of this permit must be signed, dated and submitted to the Office of Oil and Gas in order to certify this permit. If the Certification Document is not received by the Office of Oil and Gas then this permit will be deemed invalid.
- **7. Duty of Owner/Operator to Report Discharges.** The Owner or Operator or person in charge of a facility subject to this rule from which a reportable discharge, as described in Legislative Rule 35 CSR 1-3.3, occurs shall notify the Office of Oil and Gas by calling **1-800-642-3074** immediately; but in no case, later than twenty-four (24) hours after becoming aware of the discharge.

PART IV

A. OPERATING REQUIREMENTS

- 1. **Permit Documents On-Site.** The UIC Permit with all attachments, including well records and the most recent WR-37s, must be kept on location at all times. Copies are acceptable.
- 2. **Required Barrel Counter.** The Permittee shall install and maintain a barrel counter, or other means of flow volume metering, on the injection line. The results are to be recorded and reported on the WR-40 Form.
- 3. **Annulus Injection Prohibited.** Injection between the outermost casing protecting underground sources of drinking water and the wellbore is prohibited, as is injection into any USDW.

- 4. **Duty to Monitor or Plug Non-Cemented Wells That Penetrates the Injection Zone Within the AOR.** Any well that penetrates the injection zone with an inactive and/or abandoned status within the permitted Area of Review (AOR), that does not have cement casing throughout the entire injection zone, shall be monitored immediately by a method approved by the Office of Oil and Gas, as well as properly plug and abandon such wells, as necessary.
- 5. **Corrective Action.** The applicant must satisfy the requirements of the Office of Oil and Gas regarding any corrective action needed on all known wells penetrating the injection zone within the permitted AOR. This must be done in a manner which satisfies the requirements of Legislative Rule 47 CSR 13-13.9.
- 6. **Cement Evaluation Analysis.** After conducting a cement squeeze job in an open hole, or after any well cement repair for the well constructed under this permit, the Permittee shall submit cementing records and cement evaluation logs that demonstrate the isolation of the injection interval(s). The analysis shall include a spherically-focused tool, run after the long-string casing is set and cemented, which enables the evaluation of the bond between cement and casing as well as of the bond between cement and formation. The Permittee may not commence or recommence injection until it has received written approval from the Office of Oil and Gas that such a demonstration is satisfactory.
- 7. **Loading/Unloading Stations.** Loading and unloading stations shall have spill prevention and control facilities and procedures as well as secondary containment. Spill containment and cleanup equipment shall be readily accessible.

8. Above Ground Storage Tanks.

- a. The Permittee shall ensure that secondary containment for existing above ground storage tank(s) shall be adequately designed and constructed to be sufficiently impervious to prevent the released substance from penetrating the containment structure until the release can be detected and recovered, but in no case, shall that time be less than seventy-two (72) hours. The secondary containment structure shall have capacity to contain at least one hundred and ten (110) percent (%) volume of the largest tank. If tank batteries or tanks are connected in series by manifold, the combined volume of the tanks must be considered if the tanks are capable of simultaneous release. The combined capacity of the tanks connected by manifold shall be considered unless the tanks are operated in a manner that prevents fluids from flowing from one tank to another under any conditions.
- b. Above ground tanks connected in series by a manifold shall utilize a system where valves are closed and locked to isolate tanks when their combined volume exceeds the secondary containment capacity. At no time, shall the combined volume of the tanks be accessible through the manifold system exceed the capacity of the secondary containment without someone being on site to monitor.
- c. All above ground storage tanks within the floodplain, as defined by the Federal Emergency Management Agency "FEMA" 100-year floodplain map, shall be anchored significantly enough to prevent movement in the case of a high-water flood event. The Permittee should contact the county floodplain manager to confirm the floodplain status of the tank(s) location(s).
- 9. **Wellhead Reinforcement.** All wellheads shall be reinforced or otherwise armored to protect against accidental collisions, if so positioned where collision could be possible.
- 10. **Pumps and Ancillary Equipment.** Pumps and ancillary equipment (e.g. valves, flanges, filters,

- condensate lines and instrumentation) handling materials that have the potential to contaminate groundwater shall be selected and installed to prevent or contain any spills or leaks.
- 11. **Sumps.** Sumps containing materials which may have the potential to contaminate groundwater shall be designed, constructed and operated utilizing secondary containment, or other appropriate controls that will prevent groundwater contamination.
- 12. **Facility Security.** All valves, water drains, containment areas, and storage areas shall be secured and locked utilizing locking devices and/or plugs. All gates and access points shall be secured and locked while no representative is at the facility.
- 13. **Duty to Drain Injection Pump Lines.** All lines shall be completely drained of all fluids and the wellhead shut-in anytime injection operations cease for a period of greater than ninety (90) days. The Office of Oil and Gas must be contacted at least twenty-four (24) hours prior to the cessation shut-in process.
- 14. **Non-Commercial Permits.** This injection facility is permitted as a Non-Commercial operation and can only accept Class II fluids from wells owned and operated by the Permittee. The list of designated wells is included with this permit as Appendix G (Wells serviced by injection well). The Office of Oil and Gas will allow the Permittee to amend the Appendix G by submitting an updated Appendix G for verification of well ownership and possible fluid analysis to confirm compatibility and proper classification as Class II fluids.

B. PLUGGING AND ABANDONMENT

- 1. Any well which is not in use for a period of twelve (12) consecutive months shall be presumed to have been abandoned and shall promptly be plugged by the Operator in accordance with the provisions of WV Code §22-6, unless the Operator furnishes satisfactory proof to the Chief that there is a bona fide future use for such well.
- 2. Plugging and abandonment shall be conducted in a manner to prevent movement of fluids into or between USDWs (underground sources of drinking water).
- 3. Pursuant to Legislative Rule 47 CSR 13-13.7.f, the Permittee's plugging and abandonment plan shall be incorporated into the UIC permit. See Attachment 1.
- 4. Prior to well plugging, the Permittee shall apply for and receive a plugging permit from the Office of Oil and Gas to plug and abandon the well in accordance with an approved plugging and abandonment plan.

PART V

A. SITE SPECIFIC CONDITIONS

- 1. Appendix A: Injection Well Form / Well Construction / Well Records
- 2. Appendix G: Wells Serviced by Injection Well
- 3. Appendix H: Groundwater Protection Plan (GPP)
- 4. Appendix I: Requirement for Financial Responsibility to plug/abandon an injection well

- 5. Attachment 1: Plugging and Abandonment Plan
- 6. Attachment 2: Site/Facility Diagram
- 7. Class II Manifest Listing Form
- 8. Right of Appeal
- 9. UIC Certification of Review

APPENDIX AInjection Well Form

1) GEOLOGIC TARGET FORMATION Big Injun
Depth 2202 Feet (top) 2235 Feet (bottom)
2) Estimated Depth of Completed Well, (or actual depth of existing well): 2277 Feet
3) Approximate water strata depths: Fresh 200-400 Feet Salt 1245 Feet
4) Approximate coal seam depths: None None
5) Is coal being mined in the area? Yes No
6) Virgin reservoir pressure in target formation 960 psig Source Estimated
7) Estimated reservoir fracture pressure 2455 psig (BHFP)
8) MAXIMUM PROPOSED INJECTION OPERATIONS:
Injection rate (bbl/hour)
Injection volume (bbl/day)50
Injection pressure (psig) 686
Bottom hole pressure (psig) 2400
9) DETAILED IDENTIFICATION OF MATERIALS TO BE INJECTED, INCLUDING ADDITIVES:
Produced water, bactericides, and other chemicals as may be necessary to maintain water quality.
Temperature of injected fluid: (°F)
10) FILTERS (IF ANY)
Cartridge filters at injection pump and well head.
11) SPECIFICATIONS FOR CATHODIC PROTECTION AND OTHER CORROSION CONTROL
No cathodic protection is utilized at this time. Internal corrosion protection through chemical corrosion inhibitors.



APPENDIX A (cont.)

12. Casing and Tubing Program

ТҮРЕ	Size	New or Used	<u>Grade</u>	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	10 3/4	NA	NA	NA	9	9	NA
Fresh Water	8 5/8	N	H-40	28	466	466	CTS
Coal							
Intermediate 1							
Intermediate 2							
Production	4 1/2	N	J-55	9.5	2272	2272	53
Tubing	2 3/8	N	J-55	4.6	2103	2103	
Liners							

TYPE	Wellbore Diameter	Casing Size	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./sk)	Cement to Surface? (Y or N)
Conductor	drive	10 3/4	NA	NA	NA	NA	N
Fresh Water	10	8 5/8	.264	2950	Reg Neat	1.18	Y
Coal							
Intermediate 1							
Intermediate 2							
Production	7 7/8	4 1/2	.205	4380	50/50 Poz	1.26	N
Tubing		2 3/8	.167	6770	NA	NA	N
Liners							

PACKERS	Packer #1	Packer #2	Packer #3	Packer #4
Kind:	tension			
Sizes:	4" x 2"			
Depths Set:	2103			



		APPENDIX G		
API#	Operator	Farm Name	Well No	Producing Formation
47-087-03022	H G Energy LLC	Bays, J. H.	1	Big Injun
47-087-01955	H G Energy LLC	Bays, J. H.	6	Big Injun
47-087-04492	H G Energy LLC	Bays, J. H.	601	Big Injun
47-087-02435	H G Energy LLC	Chambers, C. B.	4	Devonian Shale
47-087-03050	H G Energy LLC	Chambers Heirs	1	Big Injun
47-087-02436	H G Energy LLC	Chambers Heirs	5	Big Injun
47-087-02994	H G Energy LLC	Chambers Heirs	6	Big Injun
47-087-03032	H G Energy LLC	Chambers Heirs	7	Big Injun
47-087-03247	H G Energy LLC	Chambers Heirs	8	Big Injun
47-087-03035	H G Energy LLC	Chambers Heirs	10	Big Injun
47-087-03033	H G Energy LLC	Chambers Heirs	11	Big Injun
47-087-02993	H G Energy LLC	Chambers Heirs	15	Big Injun
47-087-02438	H G Energy LLC	Chambers Heirs	17	Big Injun
47-087-02439	H G Energy LLC	Chambers Heirs	18	Big Injun
47-087-00913	H G Energy LLC	Chambers Heirs	21	Big Injun
47-087-01076	H G Energy LLC	Chambers Heirs	23	Big Injun
47-087-03076	H G Energy LLC	Douglas, Cynthia (TR #1)	2	Big Injun
47-087-02980	H G Energy LLC	Douglas, Cynthia (TR #2)	3	Big Injun
47-087-03075	H G Energy LLC	Douglas, Cynthia (TR #3)	4	Big Injun
47-087-02995	H G Energy LLC	Harris, J.A.	14	Big Injun
47-087-01872	H G Energy LLC	Harris, J.A.	16	Big Injun
47-087-01927	H G Energy LLC	Harris, J.A.	17	Big Injun
47-087-01962	H G Energy LLC	Harris, J.A.	18	Big Injun
47-087-01953	H G Energy LLC	Harris, J.A.	19	Big Injun
47-087-00970	H G Energy LLC	Kaufman, Wm.	W-2	Big Injun
47-087-00971	H G Energy LLC	Kaufman, Wm.	W-3	Big Injun
47-087-00978	H G Energy LLC	Kaufman, Wm.	W-4	Big Injun
47-087-00984	H G Energy LLC	Kaufman, Wm.	W-5	Big Injun
47-087-00987	H G Energy LLC	Kaufman, Wm.	W-6	Big Injun
47-087-00988	H G Energy LLC	Kaufman, Wm.	W-8	Big Injun
47-087-00992	H G Energy LLC	Kaufman, Wm.	W-10	Big Injun
47-087-00993	H G Energy LLC	Kaufman, Wm.	W-11	Big Injun
47-087-00994	H G Energy LLC	Kaufman, Wm.	W-12	Big Injun
47-087-00995	H G Energy LLC	Kaufman, Wm.	W-13	Big Injun
47-087-00996	H G Energy LLC	Kaufman, Wm.	W-14	Big Injun
47-087-01004	H G Energy LLC	Kaufman, Wm.	W-15	Big Injun
47-087-01032	H G Energy LLC	Kaufman, Wm.	W-16	Big Injun
47-087-01053	H G Energy LLC	Kaufman, Wm.	W-17	Big Injun
47-087-01055	H G Energy LLC	Kaufman, Wm.	W-18	Big Injun
47-087-01068	H G Energy LLC	Kaufman, Wm.	W-20	Big Injun

47-087-01079	H G Energy LLC	Kaufman, Wm.	W-21	Big Injun
47-087-02981	H G Energy LLC	Kaufman, Wm.	4	Big Injun
47-087-00894	H G Energy LLC	Kaufman, Wm.	5	Big Injun
47-087-00909	H G Energy LLC	Kaufman, Wm.	6	Big Injun
47-087-00963	H G Energy LLC	Kaufman, Wm.	7	Big Injun
47-087-01923	H G Energy LLC	Kaufman, Wm.	29	Big Injun
47-087-04489	H G Energy LLC	Kaufman, Wm.	604	Big Injun
47-087-04490	H G Energy LLC	Kaufman, Wm.	605	Big Injun
47-087-04491	H G Energy LLC	Kaufman, Wm.	606	Big Injun
47-087-02578	H G Energy LLC	Kincaid, S. B.	3	Devonian Shale
47-087-03040	H G Energy LLC	Lewis, Asbury	1	Big Injun
47-087-00027	H G Energy LLC	Lewis, Asbury	2	Big Injun
47-087-03041	H G Energy LLC	Lewis, Asbury	3	Big Injun
47-087-01026	H G Energy LLC	Lewis, Asbury	5	Big Injun
47-087-01095	H G Energy LLC	Lewis, Asbury	6	Big Injun
47-087-01096	H G Energy LLC	Lewis, Asbury	7	Big Injun
47-087-04493	H G Energy LLC	Lewis, Asbury	602	Big Injun
47-087-00565	H G Energy LLC	Simmons, David	2	Big Injun
47-087-02743	H G Energy LLC	Simmons, David	3	Big Injun
47-087-03061	H G Energy LLC	Simmons, David	6	Big Injun
47-087-03030	H G Energy LLC	Simmons, David	10	Big Injun
47-087-03047	H G Energy LLC	Simmons, David	11	Big Injun
47-087-02988	H G Energy LLC	Simmons, David	12	Big Injun
47-087-03013	H G Energy LLC	Simmons, David	13	Big Injun
47-087-03053	H G Energy LLC	Simmons, David	14	Big Injun
47-087-03048	H G Energy LLC	Simmons, David	15	Big Injun
47-087-03045	H G Energy LLC	Simmons, David	17	Big Injun
47-087-03029	H G Energy LLC	Simmons, David	19	Big Injun
47-087-03031	H G Energy LLC	Simmons, David	23	Big Injun
47-087-02986	H G Energy LLC	Simmons, David	24	Big Injun
47-087-00889	H G Energy LLC	Simmons, David	26	Big Injun
47-087-01027	H G Energy LLC	Simmons, David	27	Big Injun
47-087-01072	H G Energy LLC	Simmons, David	28	Big Injun
47-087-01086	H G Energy LLC	Simmons, David	29	Big Injun
47-087-01873	H G Energy LLC	Simmons, David	31	Big Injun
47-087-01954	H G Energy LLC	Simmons, David	32	Big Injun
47-087-02082	H G Energy LLC	Simmons, David	33	Big Injun

APPENDIX H

GROUNDWATER PROTECTION PLAN

Facility Name: Clover Produced Water Disposal						
County: Roane						
Facility Loc						
Postal Serv	ice Ad	dress: 	Kaufman Rd, S	pencer, WV 252	76	
Latitude:	38 D	egrees 4	45' 32"	Longitude:	81 Degrees 15' 45"	
Contact Info	ormatio	on:				
Person: R	oger l	Heldma	an			
Phone Num	ber:	304-4	20-1107			
E-mail Add	ress:	rheldr	man@hgen	ergyllc.com	300 W = 400	
Date: 5/21/	18					
1. A list of	fall op	erations ———	that may cont	aminate the gr	oundwater.	
Tank fail						
Pipeline			arraeian inhih	itor, etc) tran	efer	
Stuffing !				iloi, elc / liai	15101	
well com	pletior	ı / work	over activitie	s		
			edures and faction		protect groundwater quality from t	he
Secondar	v cont	ainmen	t is installed a	round tanks ac	lequate to hold the volume of	
the larges	t tank.	. Pipelir	nes are routine	ely monitored a	and patroled for leaks.	
					e possibility of being damaged	
by others. Pressure monitoring / shut down controls on pump. Workover fluids are properly contained and disposed of. The injection well is monitored for						
mechanical integrity failures and is pressure tested every five years.						
2. I let procedures to be used when designing and adding new equipment or acceptions						
3. List procedures to be used when designing and adding new equipment or operations.						
Non corrosive materials are utilized as much as possible. Shut down						
controls installed on injection pump.						



4.	Summarize all activities at your facility that are already regulated for groundwe protection.	ater
	This facility is currently covered by an existing UIC permit No. 2D0871056. Storage tanks are registered uder WV tank regulations. Any spills / leaks are reported to WVDEP /EPA.	
5.	Discuss any existing groundwater quality data for your facility or an adjacent property	/ •
	There are no know ground water quality issues in this area. Only two of the residences with in the AOR utilize water wells for domestic use. The analytical results from these two wells are enclosed with this application.	
6.	Provide a statement that no waste material will be used for deicing or fill material on property unless allowed by another rule.	the
	No waste material are or will be used for deicing or fill material.	
7.	Describe the groundwater protection instruction and training to be provided to employees. Job procedures shall provide direction on how to prevent groundwater contamination.	
3	The operators of this facility are instructed to routinely monitor tank conditions, secondary containment conditions, and patrol injection lines. They are trained yearly regarding ground water protection. Part of this training involves prevention of oil & chemical spills and the prompt clean up / remediation of any spill. Prior to the release of any storm water from secondary containment it is tested to assure that it meets guidelines for discharge.	



8. Include provisions for inspections of all GPP elements and equipment. Inspections must be made quarterly at a minimum.

Secondary containment, pipelines, and injection equipment are inspected and documented a minimum of every 90 days. The injection well and producing wells are visited several times weekly. The wellheads are inspected for any indication of mechanical integrity. Any issues are addressed when discovered. The majority of the production pipelines and the injection line are located parallel to roadways which are traveled several times weekly.

Signature:

Date: 5/21/18



APPENDIX I

Requirement for Financial Responsibility to Plug/Abandon an Injection Well

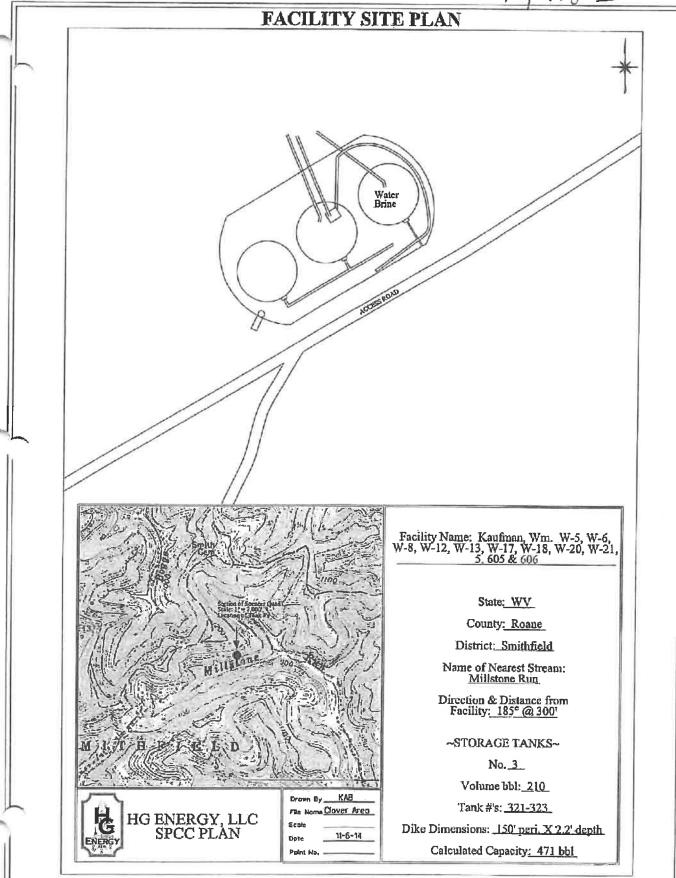
То:	WV Department of Environmental Protection Office of Oil and Gas
	601 57 th Street, SE
	Charleston, West Virginia 25304-2345
	ATTN: Underground Injection Control Program
From:	H G Energy LLC
	5260 Dupont Rd
	Parkersburg, WV 26101
Date:	5/21/18
Subject:	Underground Injection Control (UIC) Permit Application # 200871056
	Requirement for Financial Responsibility
	in financial responsibility and resources to close, plug, and abandon d injection wells(s) in a manner prescribed by the Chief of the Office
Name:	Eric Grayson
Signature:	Ew Theyro
Date:	5/21/18

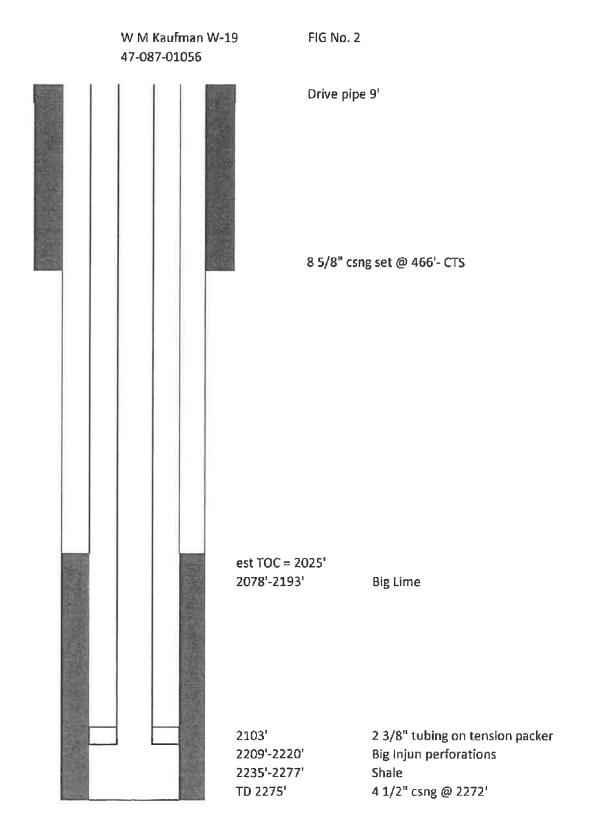


SECTION No. 12

This injection well has surface casing set at 172' and cemented to surface. The 4 1/2" long sting is set at 2219' and cemented to approximately 1933'. The well will be plugged to the standards set by the WVDEP at the time it is plugged. If the well were to be plugged today the cement plugs would be set as follows:

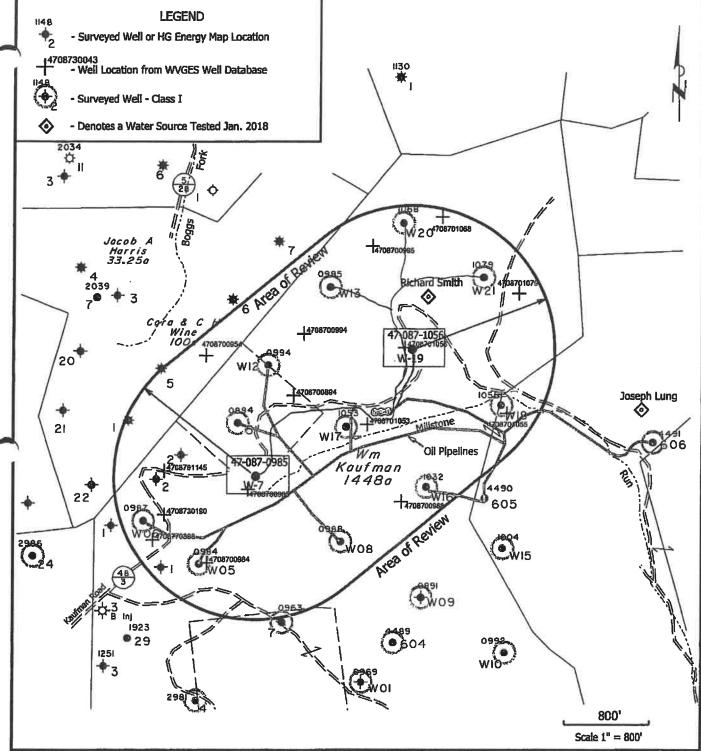
Plug No 1 - 2150'-2050 Free point, cut and POH w/ 4 ½" casing – est 1875' Plug No 2 – 1925'-1825' Plug No 3 – 1100'-1000' Plug No 4 – 225'-125' (base of surface casing) Plug No 5 – 100'-0 6 % gel between cement plugs.





5/24/2018 Not to scale

Fig No \$ Joseph Lung 4490 605 W₁₅ 800' Scale 1" = 800'



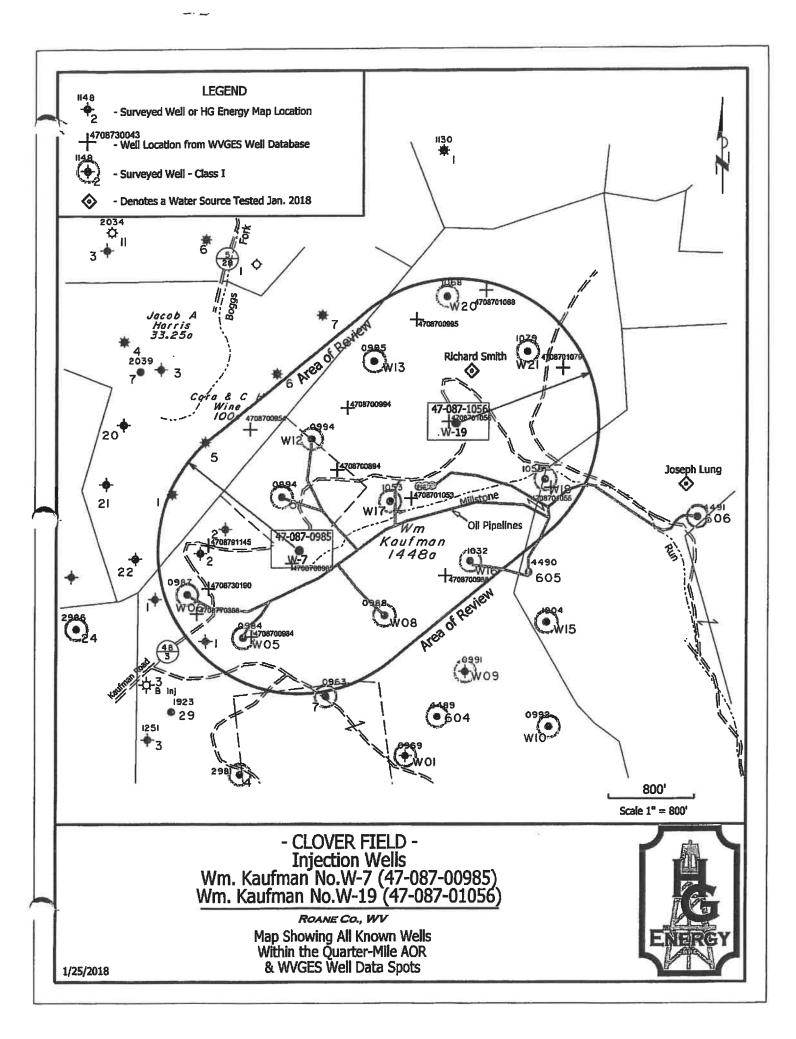
- CLOVER FIELD -Injection Wells Wm. Kaufman No.W-7 (47-087-00985) Wm. Kaufman No.W-19 (47-087-01056)

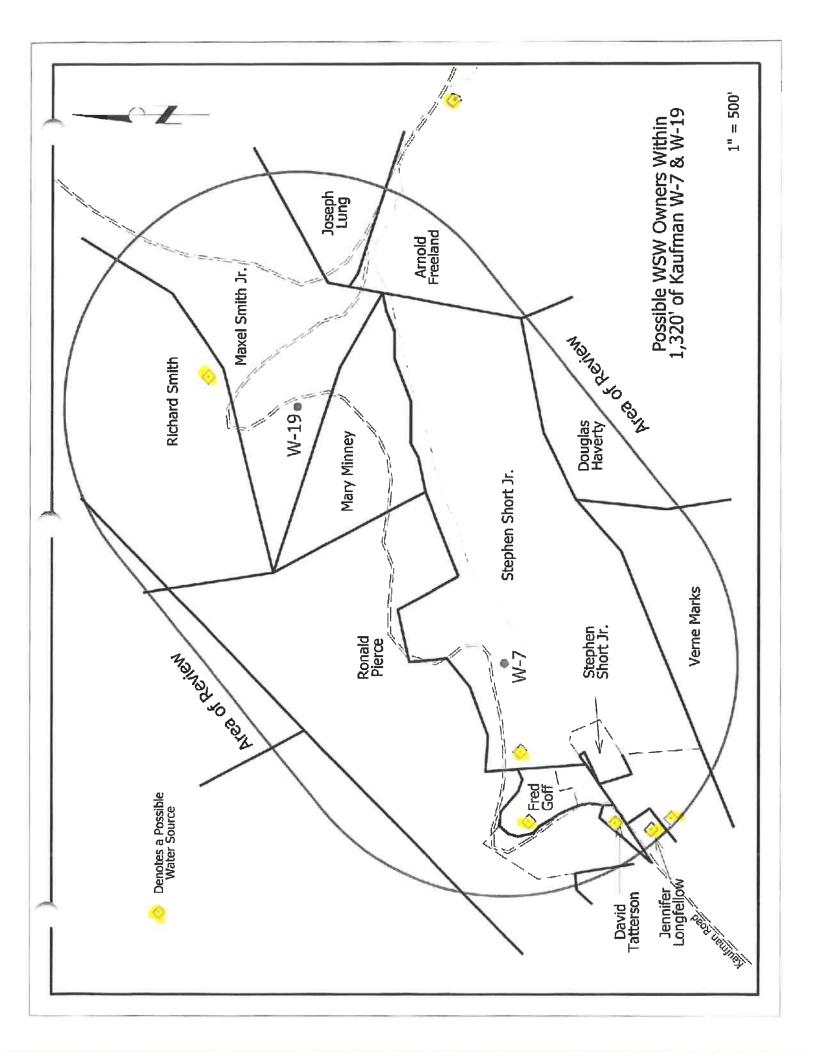
ROANE CO., WV

Map Showing All Known Wells Within the Quarter-Mile AOR & WVGES Well Data Spots



1/25/2018







STATE OF WEST VIRGINIA. DEPARTMENT OF MINES

OIL AND GAS DIVISION /6. Quadrangle SPENCER WELL RECORD Permit No. ROA-1056

Elev 1060, 85

Roane

Address Spencer, W. Va.

June 12, 1964

June 19, 1964

Company WOLF'S HEAD OIL REFINING COMPANY, INC. Address P. O. Box 1588, Parkareburg, W. Va.

The surface of tract is owned in fee by Maxel Smith

From

/10ths Water in

/10ths Merc; in

Volume Drilled w/Rotary (Show Only)

Rock Pressure No Test

Mineral rights are owned by Alfred M. Oppenheimer, II. 300 South Lang Avenue Address Pittsburgh 8, Pa.

Wm, Kaufman Location (waters) Millatone Run

Well No W-19

Drilling commenced

Drilling completed

Date Shot_

Open Flow

With_

OB

District Smithfield

Oil or Gas Well Oil & C Packers Size 10_3/4"OD 81 5/8 OD 466 S L M. 2 3/8"OD 2251.83 Liners Used: Perf. top. Perf. better CASING CEMENTED 8 5/8"SIZE 454

COAL WAS ENCOUNTERED AT ... WELL ACIDIZED. FEET. INCHES FEET_ INCHES WELL FRACTURED 6/27/64 - Used: 1.050 Bbls, Water, 46,900 # Sand, 300 Gal. 350# J-84, 20 Gal, Deterger and 35 Gal, Freflo RESULT AFTER TREATMENT. BDA Acid, 175# . ROCK PRESSURE AFTER TREATMENT___ 400 Lbs

Inch

Inch

hrs.

Cu. Ft.

Red Rock Hate		eet	Salt Water		Feet	
Conductor Red Rock Slata Slata Sand Slate Red Rock Slate Red Rock Slate Red Rock Slate Red Rock Slate	m Color Hard Soft	or Top	Bottom	Oil, Gas :	Depth	Remark
Conductor Red Rock Slata Slata Sand Slate Red Rock Slate Red Rock Slate Red Rock Slate Red Rock Slate	· .		10 1		•	
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State Sand 1570 1520	Pormation	Color	Hard or Boft	Top //	Bottom	OIL Gas or Water	Depth Found	Remarks
Big Line Reenar Big Injun Pay Slate 44" Casing TOTAL EFTE 2078 2193 2202 2215 2206 2216 2235, 2277 2272 2277 2277 2277	Sand Slate Sand Slate Sand Slate Slate		,	1570 1620 1730 1760 1805 1920 1990 2027	1620 1730 1760 1805 1920 1990 2027 2062	01.6.00		
	Keener Big Injun Pay Siate			219 <u>3</u> 2202 2206	2202 2235 2216 2277	OII & GES	2115-2120	
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APPROVED WOLF'S HEAD OIL REFINING COMPANY, ING.

By W. W. George W. Wiffsman, (Title) Agent

Page	of	
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Class II Manifest

UIC#

*I hereby certify that the contents of this shipment are Class II fluids that were brought to the surface in connection with oil or natural gas production.

Hauler' Name	*Signature	Receiver's Name	*Signature	API or Other	Volume of Load (Barrels)	Was the Load Split (Y/N)	Date
	-						
		- 	· · · · · · · · · · · · · · · · · · ·		 		

RIGHT OF APPEAL

Notice is hereby given of your right to appeal the terms and conditions of this permit of which you are aggrieved to the Environmental Quality Board by filing a NOTICE OF APPEAL, on the form prescribed by such Board for this purpose, in accordance with the provisions of Section 21, Article 11, Chapter 22 of the Code of West Virginia within thirty (30) days after the date of receipt of this permit.

Underground Injection Control Permit

CERTIFICATION DOCUMENT

West Virginia Department of Environmental Protection Office of Oil and Gas

Permit Id: 2D08701056002

Permit Name: HG Energy, LLC

In accordance with Part II, Reporting and Notification Requirements, I hereby certify that I have read and am personally familiar with all the terms and conditions of this permit.

I understand that the underground injection of any waste streams other than those provided for in this permit is strictly prohibited. I understand that failure to pay the Annual Permit Fee or any other associated fees required by West Virginia Code, Chapter 22, Articles 11 and 12 shall be cause for revocation of this Permit. I further understand that reporting is required, and noncompliance with the terms of this permit will be cause for revocation of the permit and subject me to significant penalties including the possibility of fines and imprisonment.

-	Signature
N	Name and Title (Type or Print)
-	Date



STATE OF WEST VIRGINIA DEPARTMENT OF MINES OIL AND GAS DIVISION /6

Quadrangle SPENCER

Permit No ROA-1056

WELL RECORD

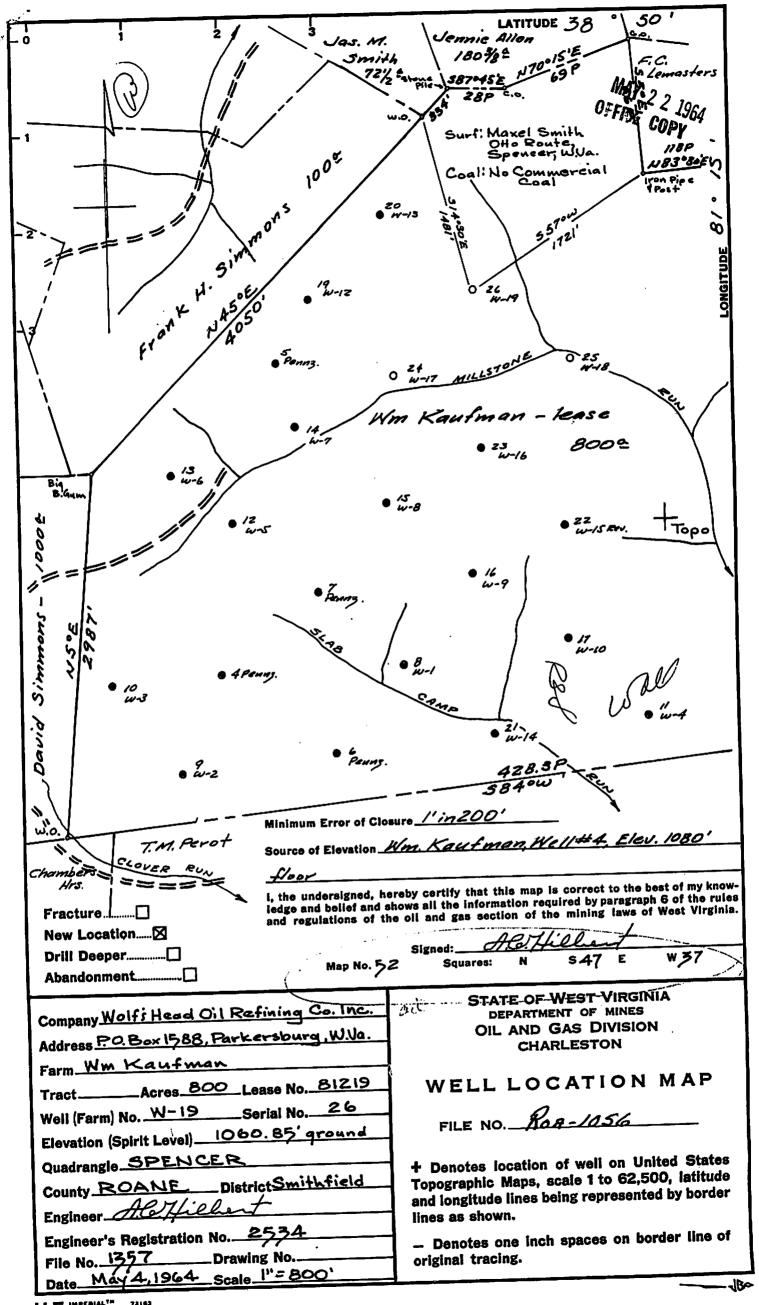
Oil or Gas Well Oil & Gas

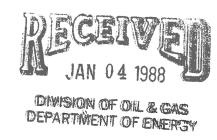
						011 01	(KIND)
Company WOLF	'S HEAD OI	REFINING (COMPANY, INC.	Casina			
Address P. O	Box 1588	Parkersbu	g. W. Va.	Casing and Tubing	Used in Drilling	Left in Well	Packers
Farm Wm.	Kaufman		Acres 800				
Location (waters	s) Millat	one Run		Size	!		
Well No. W-19 Elev. 1060.85				16	:		Kind of Packer
District Smit	hfield	CountyI	Roane	13			Steel Shoe
The surface of the	ract is owned in	fee by Maxel	Smith	10_3/4"OD	91	91	Guide Shoe
Otto Route				8x 5/8"OD	4661	4661	\$125.08" 44.08
Mineral rights a	re owned by	fred M. Opp	enheimer, II,	654			44 OD Vepth set
300 South L	ang Avenue	Address Pitts	ourgh 8, Pa.	EXCEPT 45"0	D/ 2286'	2286'	2728
Drilling commend	ced	June 12, 1	964	S.L.M.	2272	2286 : 2272 :	22.72. Perf. top
			.964	2 3/8"OD	2251.83'	2251,83	Perf. bottom
Date Shot	From	n	Го	Liners Used	-		Perf. top
With							. •
Open Flow	/10ths Water	in	Inch				Perf. bottom
			Inch		Sur	ace te;	
			y) Cu. Ft.				No. Ft 6/13/64 Date
			hrs.		45"	2272	6/20/64
			bbls., 1st 24 hrs.		NCOUNTERED	AT	FEETINCHES
							FEETINCHES
	·			:			FEETINCHES
WELL FRACTU	RED 6/27/	64 - Used:	1.050 Bbls.	Water, 46,00	0 # Sand. 3	300 Gel. R	DA Acid, 175# J-98
			5 Gal. Freflo)			<u> </u>
RESULT AFTER	R TREATMEN	т 611	- 50,000 Cu.	Ft.			· · · · · · · · · · · · · · · · · · ·
:			400 Lbs.		:	·····	
Fresh Water				Salt Water		Fac	
					:		
Formation	Color	Hard or Soft	Тор	Bottom	Oil, Gas or Water	Depth	Remarks
						1	
Top Soil	ľ		0	10			
Conductor				9			
Red Rock Slate	1		10	20			
Sand			20 85	85 200	•		;
Slate	·		200	230			
Red Rock			230	265			
Slate			265	295		1	•
Sand			295	395]	•
Slate			395	420		Ì	
Red Rock Sand	.		420	430			
Slate			430	-470 495			
Red Rock			470 485	4,85 495		j	
Slate			495	. 515			
Red. Rock	ł	•	515	525			:
Slate		•	525	675	•		
Red Rock			675	735	\$ #	1071717700	
Sand Bod Book			735	·765		Virener CA	
Red Rock Slate			765	815		. Pm	1 The state of the
Sand			815 840	840	11:	انج کے ۔	
Red Rock			905	905 925		1:1 1 3 3	* 82
Slate			925	965	1.5	1.2 67 2.3	
Red Rock	1				\ · \		`.ۥj/
			ן כפצ ן	1.202	X .	1 ~ ~	35
Slate			965 985	985 1245	1:	امد ما الما	2
Slate Sand			985 1245	1245 1350		4554	23
Slate	,		985	1245		4.55%	23
Slate Sand Slate			985 1245 1350	1245 1350		2650	

(over)

Formation	Color	Hard or Soft	Top /0	Bettom	Oil, Gas or Water	Depth Found	Remarks
Slate Sand Slate Sand Slate Sand Slate Sand Little Lime Pencil Cave Big Lime Keener Big Injun Pay Slate 4½" Casing			1400 1570 1620 1730 1760 1805 1920 1990 2027 2062 2078 2193 2202 2206 2235	1570 1620 1730 1760 1805 1920 1990 2027 2062 2078 2193 2202 2235 2216 2277 2272	Oil & Gas		Water Show Only Show
TOTAL	DEPTH			2277			
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UIC PERMIT UIC2D0870985

WELLHEAD PRESSURE INCREASE JUSTIFICATION

W. M. KAUFMAN NO. W-7

CLOVER FIELD - BIG INJUN RESERVOIR

PENNZOIL PRODUCTS COMPANY

EXPLORATION & PRODUCTION DIVISION

NOEL W. PUTSCHER
DECEMBER 29, 1987

INTRODUCTION

The purpose of this report is to provide test data to the West Virginia Department of Energy, Division of Oil & Gas, which justifies increasing wellhead injection pressure on Roane 0985 from 694 psig to 1000 psig. The West Virginia Department of Energy recently issued an Underground Injection Control permit for Roane 0985 which limited surface pressure to 694 psig. Pennzoil Products Company, operator of subject well, performed a step-rate test to determine the pressure at which the Big Injun would part in the subject well.

DISCUSSION

A step-rate injectivity test is normally used to estimate fracture pressure in an injection well. Fluid is injected at a series of increasing rates, with each rate preferably lasting the same length of time. In relatively low permeability formations (k <5md) each injection rate should last about 1 hour; 30 minute injection times are adequate for formations with permeability exceeding 10 md. As few as four rates may be used, but normally six, seven or eight rates are preferred. The analysis consists of plotting injection pressure at the end of each rate vs injection rate. It is preferable to plot bottom-hole pressure, but surface pressure may be used if it is positive throughout the test and friction effects are not significant. The plot should have two straight line segments. The break in the line indicates formation fracture pressure.

TEST RESULTS

On December 16, 1987, a step-rate test was run on Roane 0985. The initial pressure was 545 psi and was increased to 1160 psig, with five points in between. With each rate increase the pressure was read after at least one hour had passed. The results of this test are attached and the parting pressure was found to be 1104 psig. Pennzoil is requesting permission to inject into subject well at a wellhead pressure of 1000 psig.

¹ Robert C. Earlougher, Jr., Advances in Well Test Analysis Monograph Series, Society of Petroleum Engineers of AIME, Dallas (1977), Vol. 5, Chapter 7.

STEP RATE TEST

W. M. Kaufman W-7 Clover Field 12/16/87

WHP Press. (psig)	Rate (BPD)
545	49
625	51
840	89
975	114
1040	126
1120	176
1160	269

