



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029

**UNDERGROUND INJECTION CONTROL PERMIT NUMBER PAS2D219BWAR**  
**AUTHORIZATION TO OPERATE A CLASS II-D INJECTION WELL**

In compliance with provisions of the Safe Drinking Water Act, as amended, 42 U. S. C. §§ 300f et seq. ( SDWA) and the SDWA implementing regulations promulgated by the U. S. Environmental Protection Agency at Parts 144 -147 of Title 40 of the Code of Federal Regulations, this permit authorizes

Bear Lake Properties, LLC

5459 State Route 29

Springville, Pennsylvania  
18844

to convert the Smith-Ras #1 well into a Class II-D commercial brine disposal Injection Well (hereinafter, "Injection Well" or "Facility") and to operate the Injection Well for the purpose of injecting fluids produced in association with oil and gas production operations in accordance with the provisions of this permit. The Injection Well will be located in Columbus Township, Warren County, Pennsylvania. The coordinates for the Injection Well are: Latitude 41° 59' 34.31" and Longitude -79° 32' 01.58".

All references to Title 40 of the Code of Federal Regulations (C.F.R.) are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective as of the date of signature.

This permit shall remain in effect until midnight October 31, 2026.

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Catherine A. Libertz, Director  
Water Division

## PART I

## A. Effect of a Permit

Bear Lake Properties, LLC (the “Permittee”) is allowed to engage in underground injection at the Injection Well in accordance with the conditions of this permit. The Permittee shall not allow the underground injection activity, otherwise authorized by this permit, to cause or contribute to the movement of fluid containing any contaminant into any underground source(s) of drinking water (USDW), if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 C.F.R. Part 141 or if it may otherwise adversely affect the health of persons. Any underground injection activity not authorized in this permit or otherwise authorized by permit or rule is prohibited. 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, or any infringement of State or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under Part C or D of the SDWA, 42 U.S.C. §§ 300f-300j-11, or any other common or statutory law for any breach of any other applicable legal duty.

## B. Permit Actions

This permit can be modified, revoked and reissued, or terminated for cause or upon request as specified in 40 C.F.R. §§ 144.12, 144.39 and 144.40. Also, the permit is subject to minor modifications as specified in 40 C.F.R. § 144.41. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes, or anticipated noncompliance on the part of the Permittee shall not stay the applicability or enforceability of any permit condition.

## C. Severability

The provisions of this permit are severable, and if any provision of this permit or the Permittee’s application, dated March 24, 2015, and the supplemental submission dated July 17, 2015, collectively referred to as the “Application”, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

## D. General Requirements

1. Duty to Comply. The Permittee shall comply with all applicable UIC regulations, including 40 C.F.R. Parts 124, and 144-147, and with the conditions of this permit, except to the extent and for the duration that EPA authorizes any noncompliance in an emergency permit issued under 40 C.F.R. §144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance or modification, or for denial of a permit renewal application.

2. Need to Halt or Reduce Activity not a Defense. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
3. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.
4. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control and related appurtenances which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, adequate security to prevent unauthorized access and operation of the Injection Well and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this permit.
5. Duty to Provide Information. The Permittee shall furnish to the Director of the Water Protection Division (“Director”), within a time specified by the Director, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Director, 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 reports, the Permittee shall promptly submit information addressing these deficiencies.
6. Inspection and Entry. The Permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by the law to:
  - a. Enter upon the Permittee's premises where the 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, the Facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
  - d. Sample or monitor at reasonable times any substances or parameters at any location for the purposes of assuring permit compliance or as otherwise authorized by the SDWA.
- 7. Penalties. Any person who violates a requirement of this permit is subject to administrative or civil penalties, fines and other enforcement actions under the SDWA. Any person who willfully violates conditions of this permit is subject to criminal prosecution.
- 8. Transfer of Permits. This permit is not transferable to any person except after notice is sent on EPA Form 7520-7, approval is received from the Director, and the requirements of 40 C.F.R. § 144.38 are satisfied. The Director may require modification or revocation of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the SDWA or its implementing regulations. The transferee is not authorized to inject under this Permit unless and until the Director notifies the transferee that the transferee is so authorized through issuance of a revised permit identifying the transferee as the permittee.
- 9. Signatory Requirements.
  - a. The Permittee shall sign all reports required by this permit and other information requested by the Director as follows:
    - (1) for a corporation, by a responsible corporate officer of at least the level of vice-president;
    - (2) for a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
    - (3) for a Municipality, State, Federal, or other public agency by either a principal executive officer or a ranking elected official.
  - b. A duly-authorized representative of the person designated in paragraph a. above may also sign only if:
    - (1) the authorization is made in writing by a person described in paragraph a. above;

- (2) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated Facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or a position of equivalent responsibility. A duly authorized representative may thus be either a named individual or any individual occupying a named position; and
  - (3) the written authorization is submitted to the Director.
- c. If an authorization under paragraph b. of this section is no longer accurate because a different individual or position 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 Director 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 a. or b. of this section shall make the following certification:

"I certify under the penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

10. Confidentiality of Information.

- a. In accordance with 40 C.F.R. Parts 2 (Public Information), and § 144.5, any information submitted to the Director pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 C.F.R. Part 2.
- b. EPA will deny any claims of confidentiality for the following information:
  - (1) The name and address of any permit applicant or permittee.

- (2) Information which deals with the existence, absence, or level of contaminants in drinking water.
11. Reapplication. If the permittee wishes to continue an activity regulated by this permit after the expiration date of the permit, the permittee must submit a complete application for a new permit at least 100 days before this permit expires.
12. State Laws. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation.

## PART II

### A. General

The Permittee shall sign and certify copies of all reports and notifications required by this permit in accordance with the requirements of paragraph I.D.9 of this Permit and shall submit such information to the Director in hard copy, by mail, and in portable document format (*i.e.*, as a “.pdf” file), via e-mail, at the following mailing and/or e-mail addresses:

Source Water & UIC Section (3WD22)  
Drinking Water & Source Water Protection Branch  
U. S. Environmental Protection Agency  
Region III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103  
R3\_UIC\_Mailbox@epa.gov

### B. Record Retention

1. The Permittee shall retain records of all monitoring and other information required by this permit, including the following (if applicable), for a period of at least five years from the date of the sample, measurement, report or application, unless such records are required to be retained for a longer period of time under paragraph II. B.2 below. This period may be extended by the Director at any time. If the period is extended, the Permittee shall comply with the new period.
  - a. All data required to complete the Permit Application form for this permit and any supplemental information submitted under 40 C.F.R. § 144.31;
  - b. Calibrations and maintenance records and all original strip chart recordings for continuous monitoring instrumentation;

- c. Copies of all reports required by this permit;
2. The Permittee shall retain records concerning the nature and composition of all injected fluids, as listed in paragraphs II.C.4 and C.5 of this permit, until at least three years after the plugging and abandonment procedures are complete. The Permittee shall continue to retain these records after the three-year retention period unless he or she delivers the records to the Director or obtains written approval from the Director to discard the records.
3. Records of monitoring information shall include:
  - a. The date, exact place, and the time of sampling or measurements;
  - b. The individual(s) who performed the sampling or measurements;
  - c. A precise description of both sampling methodology and the handling (custody) of samples;
  - d. The date(s) analyses were performed;
  - e. The individual(s) who performed the analyses;
  - f. The analytical techniques or methods used;
  - g. The results of such analyses.

#### C. Monitoring Requirements

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The Permittee shall obtain representative sample(s) of the fluid to be analyzed and conduct analysis(es) of the sample(s) in accordance with the approved methods and test procedures provided in 40 C.F.R. § 136.3 and EPA's SW-846 Compendium, or methods and test procedures otherwise approved by the Director. The Permittee shall identify in its monitoring records the types of tests and methods used to generate the monitoring data.
2. The Permittee shall continuously monitor and record surface injection pressure, annular pressure, flow rate and cumulative volume in the Injection Well beginning on the date the Injection Well commences operation and concluding when the Injection Well is plugged and abandoned. The Permittee shall compile the monitoring data monthly to complete the Annual Report referenced in paragraph II.D.8 of this permit.

3. The Permittee shall also monitor and record semi-annually the fluid level of all of the following depleted gas production wells identified in the Application:
- a. R. Trisket #1, located approximately 4200 ft. northwest of the Injection Well;
  - b. R. Trisket #2, located approximately 3700 ft. to the west of the Injection Well;
  - c. T. Reed #4, located approximately 1500 ft. to the southwest of the Injection Well;
  - d. D. Wright #1, located approximately 2,000 ft. to the east of the Injection Well;  
and
  - e. R. Craker #1, located approximately 3700 ft. northeast of the Injection Well.

In the event that in the future the T. Reed #4 is converted from a monitoring well to a UIC-Permitted well, upon issuance of the UIC permit for T. Reed #4, the Permittee will use both the W.W. Hammond #1 and the T. Reed #2 wells as replacement monitoring wells for the T. Reed #4.

If fluid levels in any of the monitoring wells listed above is observed to rise within 100 feet of the base of the USDW, the Permittee shall stop disposal operations immediately, and shall notify the EPA orally to the Senior Permit Specialist for the Source Water & UIC Section (currently, Kevin Rowsey, 215-814-5463) or to the Senior Field Inspector for the Source Water & UIC Section (currently, David Rectenwald, 814-827-1952) within 24 hours of the observation and shall send written notification to EPA within 5 days of the observation. EPA will evaluate the operating conditions in order to instruct the Permittee on how to control the fluid level.

If the fluid level in a monitoring wells is observed to rise within 100 feet of the top of cement of the long-string casing, that is, it rises to the depth listed in the table below, the permittee shall stop injection operations immediately, and shall notify the EPA orally to the Senior Permit Specialist for the Source Water & UIC Section (currently, Kevin Rowsey, 215-814-5463) or to the Senior Field Inspector for the Source Water & UIC Section (currently, David Rectenwald, 814-827-1952) within 24 hours of the observation and shall send written notification to EPA within 5 days of the observation. The permittee shall demonstrate mechanical integrity of the monitoring well where fluid reached the trigger depth prior to resuming injection. The MIT test will be required on that monitoring well every two years thereafter.

| <b>Monitor Well</b> | <b>Depth of Well (ft)</b> | <b>Top of Cement (Depth - Thickness) (ft)</b> | <b>MIT Trigger Depth(ft)</b> |
|---------------------|---------------------------|---|------------------------------|
| Craker 1            | 4584                      | 3418  | 3318                         |
| Hammond 1           | 4676                      | 3510  | 3410                         |
| Reed 2              | 4553                      | 3387  | 3287                         |
| Reed 4              | 4566                      | 3530  | 3430                         |
| Trisket 1           | 4432                      | 2956  | 2856                         |
| Trisket 2           | 4429                      | 3082  | 2982                         |
| Wright 1            | 4479                      | 3313  | 3213                         |

4. The Permittee shall monitor the nature and composition of the injected fluid by sampling, analyzing and recording the injected fluid for the parameters listed



below, at the initiation of the injection operation and every two years thereafter, and whenever the operator anticipates a change in the injection fluid (e.g., from different geologic formations, geographic regions, different customers, etc.).

- |                             |                          |
|-----------------------------|--------------------------|
| - pH                        | - Manganese              |
| - Specific Gravity          | - Total Dissolved Solids |
| - Specific Conductance      | - Barium                 |
| - Sodium                    | - Hydrogen Sulfide       |
| - Chloride                  | - Alkalinity             |
| - Iron                      | - Dissolved Oxygen       |
| - Magnesium                 | - Hardness               |
| -Total Organic Carbon (TOC) |                          |

5. The Permittee shall measure the specific gravity of each truckload prior to unloading.
6. The Permittee shall verbally report to the Director analytical results for specific gravity that are greater than 1.218 or for TOC greater than 250 mg/l within twenty-four hours of obtaining the results.
7. The Permittee shall make a demonstration of mechanical integrity in accordance with 40 C.F.R. § 146.8, after the initial demonstration, at least once every two (2) years. Subsequent two (2) year demonstrations shall be conducted no more than thirty (30) days prior to the anniversary date of the issuance of this permit. In addition to the above requirement, the Permittee shall conduct a mechanical integrity test demonstration on the Injection Well when the protective casing or tubing is removed from the well, the packer is resealed, or a well failure is likely, or as requested by the Director. The Permittee may continue operation of the Injection Well only if the Permittee has demonstrated the mechanical integrity of the Injection Well to the Director's satisfaction. The Permittee shall cease injection operations if a loss of mechanical integrity becomes evident or if the Permittee cannot demonstrate mechanical integrity. The Injection Well shall be equipped with an automatic shut-off device which would be activated in the event of a mechanical integrity failure.
8. The Permittee shall perform all environmental measurements required by the permit, including, but not limited to: measurements of pressure, temperature, mechanical integrity (as applicable) and chemical analyses in accordance with EPA guidance on quality assurance.
9. The Permittee shall maintain a record of every load of fluid received. The record shall include the hauler's name, the producing well operator's name, and the location from which the load was obtained, 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 the volumes from each operator documented.

D. Reporting and Notification Requirements

1. Report on Permit Review. Within 30 days of receipt of this permit, the Permittee shall ensure the person designated pursuant to paragraph I.D.9 of this permit reports to the Director that he or she has read and is personally familiar with all terms and conditions of this permit.
2. Commencing Injection. The Permittee shall not commence injection until construction or well rework is complete and all of the following conditions have been satisfied:
  - a. The Permittee has submitted notice of completion of construction (EPA Form 7520-18) to the Director;
  - b. The Permittee has demonstrated to EPA that the Injection Well has mechanical integrity in accordance with 40 C.F.R. § 146.8 and the Permittee has received written notice from the Director that such demonstration is satisfactory; and
    - (1) The Director has inspected or otherwise reviewed the Injection Well and finds it is in compliance with the conditions of this permit; or
    - (2) The Permittee has not received notice from the Director of his or her intent to inspect or otherwise review the Injection Well within 13 days of the date of the notice in paragraph II.D.2.a of this permit, in which case, prior inspection or review is waived and the Permittee may commence injection.
3. Twenty-four Hour Reporting.
  - a. The Permittee shall report to the Director any noncompliance which may endanger, or has endangered, health or the environment. The Permittee shall provide such report orally to the Senior Permit Specialist for the Source Water & UIC Section (currently, Kevin Rowsey, 215-814-5463) or to the Senior Field Inspector for the Source Water & UIC Section (currently, David Rectenwald, 814-827-1952) within 24 hours from the time the Permittee becomes aware of the circumstances. The Permittee shall include the following information in the oral report:

- (1) Any monitoring or other information which indicates that any contaminant may endanger, or has endangered an underground source of drinking water.
  - (2) Any noncompliance with a permit condition, malfunction of the injection system which may cause, or has caused, fluid migration into or between underground sources of drinking water, or failure of mechanical integrity test demonstrations.
- b. The Permittee shall provide a written submission within five days of the time the Permittee becomes aware of the circumstances described above. 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, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
4. Anticipated Noncompliance. The Permittee shall give advance notice to the Director of any planned changes in the permitted Facility or activity which may result in noncompliance with permit requirements.
5. Other Noncompliance. The Permittee shall report all other instances of noncompliance to the Director in writing within ten (10) days of the time the Permittee becomes aware of the circumstances. The report shall contain the information listed in paragraph II.D.3 of this permit.
6. Planned Changes. The Permittee shall provide written notice to the Director as soon as possible of any planned physical alterations or additions to the permitted Facility.
7. Conversion. The Permittee shall provide written notice to the Director 30 days prior to the conversion of the Injection Well to an operating status other than an injection well.
8. Annual Report. The Permittee shall submit a written Annual Report to the Director summarizing the results of the monitoring required in Permit Condition C of Part II of this permit. This report shall include monthly monitoring records of injected fluids, the results of any mechanical integrity test(s), and any major changes in characteristics or sources of injected fluids. The report shall list the additives used in the operation of the well. The Permittee shall complete and submit this information with its Annual Report EPA Form 7520-11 (Annual Disposal Injection Well Monitoring Report). The Permittee shall submit the Annual Report to the Director no later than January 31st of each year, summarizing the activity of the calendar year ending the previous December 31st.

9. Plugging and Abandonment Reports and Notifications.
- a. The Permittee shall notify the Director in writing at least 45 days before plugging and abandonment of the Injection Well as described in condition in Part III.C of this permit. The Director may allow a shorter notice period upon written request.
  - b. The Permittee shall submit any revisions to the Plugging and Abandonment Plan attached to and incorporated into this permit (Attachment 1) to the Director no less than 45 days prior to plugging and abandonment on EPA Plugging and Abandonment Form 7520-19 (Well Rework, Plugging & Abandonment Plan, or Plugging & Abandonment Affidavit). The Permittee shall not commence plugging and abandonment until it receives written approval of the revisions to the Plan from the Director.
  - c. To the extent that any unforeseen circumstances occur during plugging and abandonment of the Injection Well that cause the Permittee to believe the Plugging and Abandonment Plan should be modified, the Permittee shall obtain written approval from EPA of any changes to the Plugging and Abandonment Plan prior to plugging the Injection Well.
  - d. Within 60 days after plugging the Injection Well, the Permittee shall submit a Plugging and Abandonment Report to the Director which shall consist of either:
    - (i) A statement that the Injection Well was plugged in accordance with the EPA approved Plugging and Abandonment Plan; or
    - (ii) Where actual plugging differed from the Plugging and Abandonment Plan previously submitted, the Permittee shall provide to the Director an updated version of form 7520-19 specifying the different procedures used.
  - e. The Permittee shall ensure that the Plugging and Abandonment Report is certified as accurate by the person who performed the plugging operation.
10. Compliance Schedules. The Permittee shall submit reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit no later than 30 days following each schedule date.

11. Mechanical Integrity Tests. The Permittee shall notify the Director in writing at least 30 days prior to conducting Mechanical Integrity Testing on the Injection Well.
12. Cessation of Injection Activity. Two years after the Permittee has ceased injection into the Injection Well, the Permittee shall plug and abandon the Injection Well in accordance with the Plugging and Abandonment Plan unless the Permittee:
  - a. Provides written notice to the Director describing actions and/or procedures, necessary to ensure that the Injection Well will not endanger any USDW during the period of temporary abandonment. These actions and procedures shall include compliance with the requirements of this permit applicable to active injection wells unless waived, in writing, by the Director;
  - b. Receives approval from the Director that the actions and/or procedures described in the notice are satisfactory; and
  - c. Implements such EPA approved actions and/or procedures.

E. Mechanical Integrity

1. Standards. The Permittee shall maintain the mechanical integrity of the permitted Injection Well pursuant to 40 C.F.R. § 146.8.
2. Request from Director. The Director may by written notice require the Permittee to demonstrate mechanical integrity at any time during the term of this permit and the Permittee shall comply with the Director's request.

PART III

A. Construction Requirements

1. Confining Zone. Notwithstanding any other provision of this permit, the Permittee shall inject through the Injection Well only into a formation which is separated from any Underground Source of Drinking Water by a confining zone, as defined in 40 C.F.R. § 146.3, that is free of known open faults or fractures within the Area of Review as required in 40 C.F.R. § 146.22.
2. Casing and Cementing. The Permittee shall:

- a. ensure the Injection Well is cased and cemented to prevent the movement of fluids into or between underground sources of drinking water and in accordance with 40 C.F.R. §§ 146.22 and 147.1955(b);
  - b. ensure the casing and cement used in the Injection well are designed for the life expectancy of the well;
  - c. ensure the Injection Well has surface casing installed from the surface to 406 feet below land surface and cemented back to the surface;
  - d. ensure the Injection Well has long string casing installed from the surface to 4493 feet and cemented back to approximately 2959 feet below land surface to isolate the injection zone; and
  - e. install in the Injection Well a tubing string set on a packer placed above the injection zone's perforated interval at approximately 4182 feet.
3. Logs and Tests. In accordance with 40 C.F.R. § 146.22(f), the Permittee shall prepare logs and perform tests as follows during the construction or rework of the Injection Well: electric, gamma ray and caliper logs in the open hole, a cement bond, temperature or density log on the surface casing (if cement returns are not achieved), and a cement bond log/variable density log on the long string casing. The Permittee shall submit to the Director, for the Injection Well, cement records, a narrative report that interprets the well log(s) and test results, which specifically relate to the results of the cementing operation, and a detailed description of the rationale used to make these interpretations. The narrative report shall be prepared by a knowledgeable log analyst and submitted to the Director. The Director may prescribe additional logs or waive logging requirements in the future should field conditions so warrant.
  4. Mechanical Integrity. The Permittee is prohibited from conducting injection operations in the Injection Well until it (i) demonstrates the mechanical integrity of the Injection Well in accordance with 40 C.F.R. § 146.8 and (ii) receives notice from the Director that such a demonstration is satisfactory in accordance with paragraph II.D.2 of this permit.
  5. Corrective Action. The Permittee is prohibited from conducting injection operations in the Injection Well until it has plugged all abandoned wells identified within the area of review. If an abandoned well is discovered within the one-quarter mile area of review as identified in the Permit Application, the permittee shall notify the Director upon discovery and within five (5) days of discovery submit to the Director for approval a plan for corrective action and implement the approved plan.

6. Completion Reports. The Permittee shall prepare a written Completion Report that summarizes the activities and the results of the testing required in Condition A.1 through 5 of Part III of this permit and submit the Completion Report to the Director prior to the commencement of injection operations.

B. Operating Requirements

1. Injection Formation. The Permittee shall inject only into the Grimsby, Power Glen, and Whirlpool sandstone of the Medina Group located in the subsurface interval between approximately 4222 feet and 4396 feet below surface elevation.
2. Injection Fluid. The Permittee shall not inject any hazardous waste as defined in 40 C.F.R. Part 261 or any fluid, other than fluids produced solely in association with oil and gas production operations and additives necessary to maintain the integrity of the well.
3. Injection Volume Limitation. Injection volume shall not exceed 30,000 barrels per month. A barrel consists of 42 gallons.
4. Injection Pressure Limitation. The Permittee shall not exceed a surface injection pressure maximum of 1716 psi and a bottom-hole injection pressure maximum of 4032psi. These pressures were calculated based on a maximum injection fluid specific gravity of 1.218. If the specific gravity of the injection fluid exceeds 1.218, then the Permittee shall reduce the surface injection pressure by an amount necessary to avoid exceeding the bottom-hole pressure maximum. The Permittee shall not inject fluid at a pressure which initiates fractures in the confining zone, as defined in 40 C.F.R. § 146.3, adjacent to underground sources of drinking water (USDW) or causes the movement of injection or formation fluids into an USDW.
5. The Permittee shall inject fluids into the well through the tubing string installed inside the long string casing. The Permittee is prohibited from injecting between the outermost casing protecting the USDW and the well bore, and also from injecting into any USDW.

C. Plugging and Abandonment.

1. Plugging and Abandonment. The Permittee shall plug and abandon the Injection Well as provided in the EPA approved Plugging and Abandonment Plan (EPA Form 7520-19) (Attachment 1).
2. The Permittee shall plug and abandon the Injection Well in such a manner that fluids shall not move into or between USDWs.


D. Financial Responsibility

1. The Permittee shall maintain continuous compliance with the requirement to maintain financial responsibility and resources to close, plug and abandon the Injection Well in accordance with 40 C.F.R. § 144.52(a)(7) in the amount of at least \$23,383. The well may not be constructed, reworked or operated if the financial responsibility for that well has not been established. Further, the Permittee must provide documentation to the Director that financial responsibility has been established for the Injection Well prior to construction, rework or operation. The Permittee will provide a Letter of Credit and Standby Trust Agreement assuring the plugging costs for the Injection Well. The Permittee shall not substitute this Letter of Credit with an alternative demonstration of financial responsibility, unless it has previously submitted evidence of that alternative demonstration to the Director and the Director notifies it that the alternative demonstration of financial responsibility is acceptable. The Director may require the Permittee to submit a revised demonstration of financial responsibility if the Director has reason to believe that the original demonstration is no longer adequate to cover the costs of plugging and abandonment.
2. Insolvency of Financial Institution. In the event of the bankruptcy of the trustee or issuing institution of the financial mechanism, or a suspension or revocation of the authority of the trustee institution to act as a trustee or the institution issuing the financial mechanism to issue such an instrument, the Permittee must immediately notify the Director in writing and submit an alternative demonstration of financial responsibility acceptable to the Director within sixty days after such an event.



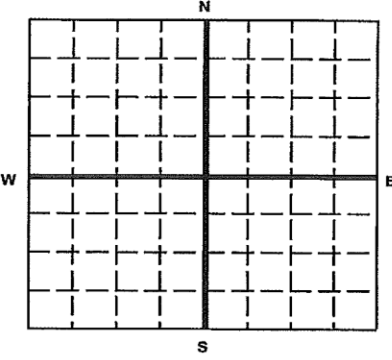
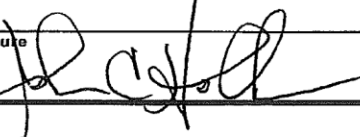
# Attachment 1

OMB No. 2040-0042 Approval Expires 11/30/2014



United States Environmental Protection Agency  
Washington, DC 20460

## PLUGGING AND ABANDONMENT PLAN

| <b>Name and Address of Facility</b><br>Bear Lake Properties Smith-Ras Unit #1<br>1889 Cornish Hill Rd., Bear Lake, PA 16402   |  | <b>Name and Address of Owner/Operator</b><br>Bear Lake Properties, LLC<br>3000 Village Run Road, Unit 103 # 223, Wexford, PA 15090 |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|---|--|--|--|------------------------|-------------------------|-----------|---------|---------|---------|--|---------|--------|--------|--------|------|--------|--|--|------|------|-----|----|--|--|--|--|---|-----|----|---|--|--|--|--------------------------------------|------|-------|------|-----|--|--|--|------------------------------|------|------|-----|---|--|--|--|--------------------------------------|--|--|--|--|--|--|--|-----------------------|------|------|------|------|--|--|--|---|---------|---------|---------|---------|--|--|--|---|--|------|----|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| <b>Locate Well and Outline Unit on Section Plat - 640 Acres</b><br><br>  | State <u>Pennsylvania</u> County <u>Warren</u> Permit Number _____   |  | Surface Location Description<br>_____ 1/4 of _____ 1/4 of _____ 1/4 of _____ 1/4 of Section _____ Township _____ Range _____   |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Locate well in two directions from nearest lines of quarter section and drilling unit<br>Surface Location _____ ft. frm (N/S) _____ Line of quarter section<br>and _____ ft. from (E/W) _____ Line of quarter section. |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>TYPE OF AUTHORIZATION</b><br><input checked="" type="checkbox"/> Individual Permit<br><input type="checkbox"/> Area Permit<br><input type="checkbox"/> Rule<br>Number of Wells _____                                |  | <b>WELL ACTIVITY</b><br><input type="checkbox"/> CLASS I<br><input checked="" type="checkbox"/> CLASS II<br><input checked="" type="checkbox"/> Brine Disposal<br><input type="checkbox"/> Enhanced Recovery<br><input type="checkbox"/> Hydrocarbon Storage<br><input type="checkbox"/> CLASS III |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Lease Name <u>Smith-Ras</u>  |  | Well Number <u>Unit #1</u>   |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>CASING AND TUBING RECORD AFTER PLUGGING</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>SIZE</th> <th>WT (LB/FT)</th> <th>TO BE PUT IN WELL (FT)</th> <th>TO BE LEFT IN WELL (FT)</th> <th>HOLE SIZE</th> </tr> </thead> <tbody> <tr> <td>8-5/8"</td> <td>24</td> <td>406</td> <td>406</td> <td>12-1/4"</td> </tr> <tr> <td>4-1/2"</td> <td>10.5</td> <td>4493</td> <td>1534</td> <td>7-7/8"</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>  |  | SIZE   | WT (LB/FT)   | TO BE PUT IN WELL (FT) | TO BE LEFT IN WELL (FT) | HOLE SIZE | 8-5/8"  | 24      | 406     | 406  | 12-1/4" | 4-1/2" | 10.5   | 4493   | 1534 | 7-7/8" |  |  |      |      |     |    |  |  |  |  | <b>METHOD OF EMPLACEMENT OF CEMENT PLUGS</b><br><input checked="" type="checkbox"/> The Balance Method<br><input type="checkbox"/> The Dump Baller Method<br><input type="checkbox"/> The Two-Plug Method<br><input type="checkbox"/> Other |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| SIZE  | WT (LB/FT)   | TO BE PUT IN WELL (FT)   | TO BE LEFT IN WELL (FT)  | HOLE SIZE              |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 8-5/8"  | 24   | 406  | 406  | 12-1/4"                |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 4-1/2"  | 10.5   | 4493   | 1534   | 7-7/8"                 |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>CEMENTING TO PLUG AND ABANDON DATA:</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>PLUG #1</th> <th>PLUG #2</th> <th>PLUG #3</th> <th>PLUG #4</th> <th>PLUG #5</th> <th>PLUG #6</th> <th>PLUG #7</th> </tr> </thead> <tbody> <tr> <td>Size of Hole or Pipe in which Plug Will Be Placed (inches)</td> <td>4-1/2"</td> <td>7-7/8"</td> <td>7-7/8"</td> <td>8-5/8"</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Depth to Bottom of Tubing or Drill Pipe (ft)</td> <td>4450</td> <td>2959</td> <td>460</td> <td>18</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Sacks of Cement To Be Used (each plug)</td> <td>20</td> <td>397</td> <td>16</td> <td>5</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Slurry Volume To Be Pumped (cu. ft.)</td> <td>23.6</td> <td>468.5</td> <td>18.9</td> <td>5.9</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Calculated Top of Plug (ft.)</td> <td>4180</td> <td>1700</td> <td>410</td> <td>0</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Measured Top of Plug (if tagged ft.)</td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Slurry Wt. (Lb./Gal.)</td> <td>15.6</td> <td>15.6</td> <td>15.6</td> <td>15.6</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Type Cement or Other Material (Class III)</td> <td>Class A</td> <td>Class A</td> <td>Class A</td> <td>Class A</td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> |  |  | PLUG #1  | PLUG #2                | PLUG #3                 | PLUG #4   | PLUG #5 | PLUG #6 | PLUG #7 | Size of Hole or Pipe in which Plug Will Be Placed (inches) | 4-1/2"  | 7-7/8" | 7-7/8" | 8-5/8" |      |        |  | Depth to Bottom of Tubing or Drill Pipe (ft) | 4450 | 2959 | 460 | 18 |  |  |  | Sacks of Cement To Be Used (each plug) | 20  | 397 | 16 | 5 |  |  |  | Slurry Volume To Be Pumped (cu. ft.) | 23.6 | 468.5 | 18.9 | 5.9 |  |  |  | Calculated Top of Plug (ft.) | 4180 | 1700 | 410 | 0 |  |  |  | Measured Top of Plug (if tagged ft.) |  |  |  |  |  |  |  | Slurry Wt. (Lb./Gal.) | 15.6 | 15.6 | 15.6 | 15.6 |  |  |  | Type Cement or Other Material (Class III) | Class A | Class A | Class A | Class A |  |  |  | <b>LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)</b><br><table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>From</th> <th>To</th> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> |  | From | To | From | To |  |  |  |  |  |  |  |  |  |  |  |  |
|   | PLUG #1  | PLUG #2  | PLUG #3  | PLUG #4                | PLUG #5                 | PLUG #6   | PLUG #7 |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Size of Hole or Pipe in which Plug Will Be Placed (inches)  | 4-1/2"   | 7-7/8"   | 7-7/8"   | 8-5/8"                 |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Depth to Bottom of Tubing or Drill Pipe (ft)  | 4450   | 2959   | 460  | 18                     |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Sacks of Cement To Be Used (each plug)  | 20   | 397  | 16   | 5                      |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Slurry Volume To Be Pumped (cu. ft.)  | 23.6   | 468.5  | 18.9   | 5.9                    |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Calculated Top of Plug (ft.)  | 4180   | 1700   | 410  | 0                      |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Measured Top of Plug (if tagged ft.)  |  |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Slurry Wt. (Lb./Gal.)   | 15.6   | 15.6   | 15.6   | 15.6                   |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Type Cement or Other Material (Class III)   | Class A  | Class A  | Class A  | Class A                |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| From  | To   | From   | To   |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>Estimated Cost to Plug Wells</b><br>\$23,383.00  |  |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>Certification</b><br>I certify under the 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. (Ref. 40 CFR 144.32)   |  |  |  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| Name and Official Title (Please type or print)<br>John C. Holko, Vice President   |  | Signature<br>                                  | Date Signed<br>03/06/2015  |                        |                         |           |         |         |         |  |         |        |        |        |      |        |  |  |      |      |     |    |  |  |  |  |   |     |    |   |  |  |  |                                      |      |       |      |     |  |  |  |                              |      |      |     |   |  |  |  |                                      |  |  |  |  |  |  |  |                       |      |      |      |      |  |  |  |   |         |         |         |         |  |  |  |   |  |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |