pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

MEMO

TO Craig Lobins, PG
District Manager
Northwest District Oil and Gas Office
District Oil and Gas Operations

FROM Brian Babb, PG
Professional Geologist Manager
Northwest District Oil and Gas Office
District Oil and Gas Operations

DATE July 31, 2017

RE Bear lakes Properties Well Permit No. 123-33944
Class II Disposal Well application to inject waste into an underground formation for disposal
Bittinger No. 2 Columbus Township, Warren County

Background

Bear Lake Properties, LLC ("Bear Lake") submitted an application to alter the use of the Bittinger No. 2 conventional well, Well Permit No. 123-33944, on December 12, 2014 ("Application"). The location of Bittinger No. 2 well ("Well") is in Columbus Township ("Township"), Warren County, off of State Line Road in the State of New York, near the intersection with Weeks Road. The surface landowner at the location is Bear Lake. The Application proposes to alter the use of the Well from the production of gas in the Medina/ Whirlpool formation to disposal of waste in the same formation, between perforation intervals of 4286 feet to 4426 feet below ground surface. Sufficient bonding was not approved by the Department of Environmental Protection "Department" until May 1, 2017. This application came in at a time when the Department was changing review procedures for injection wells. The changes instituted include a more thorough review of the application to ensure the formation can accept the waste under the pressures prescribed and the well can transport the waste safely and effectively to protect underground sources of drinking water. These changes increased the review time for the application. Bear Lake was responsive and timely on all requests for extra information due to the review procedure changes.

Application Review

The Department's authority to deny a well permit application is set forth in Section 3211(e) of the 2012 Oil and Gas Act, 58 Pa. C.S. §3211(e). This section provides that "the department shall issue a permit

within 45 days of submission of a permit application unless the department denies the permit application for one or more of the reasons set forth in subsection (e.1), except that the department shall have the right to extend the period for 15 days for cause shown upon notification to the applicant of the reasons for the extension." Pursuant to Section 3211(e.1) of the 2012 Oil and Gas Act, the Department may only deny a well permit application for the following six reasons:

§3211 (e.1) Denial of permit. -- The Department may deny a permit for any of the following:

(1) The well site for which a permit is requested is in violation of any of this chapter or issuance of the permit would result in a violation of this chapter or other applicable law.
(2) The permit application is incomplete.
(3) Unresolved objections to the well location by the coal mine owner or operator remain.
(4) The requirements of section 3225 (relating to bonding) have not been met.
(5) The Department finds that the applicant, or any parent or subsidiary corporation of the applicant, is in continuing violation of this chapter, any other statute administered by the Department, any regulation promulgated under this chapter or a statute administered by the Department or any plan approval, permit or order of the Department, unless the violation is being corrected to the satisfaction of the Department. The right of the Department to deny a permit under this paragraph shall not take effect until the Department has taken a final action on the violations and:

(i) The applicant has not appealed the final action in accordance with the act of July 13, 1988 (P.L.530, No.94), known as the Environmental Hearing Board Act; or
(ii) If an appeal has been filed, no supersedeas has been issued.

(6) The applicant failed to pay the fee or file a report under section 2303(c) (relating to administration), unless an appeal is pending. The commission shall notify the Department of any applicant who has failed to pay the fee or file a report and who does not have an appeal pending.

§3211e1(1) *DEP may deny a permit if the well site for which a permit is requested is in violation of any of this chapter or issuance of the permit would result in a violation of this chapter or other applicable law.*

The Department has reviewed the application and has determined that the well site is not currently in violation of Chapter 32, or any other applicable law. The Application meets all applicable distance requirements of 58 C.S. 3215(a) of the 2012 Oil and Gas Act. Additionally, the Department reviewed the application in connection with 25 Pa.Code §91.51(Potential Pollution Resulting from Underground Disposal). Pursuant to 25 Pa.Code §91.51(b), the disposal of waste into underground horizons is prohibited unless the proposed underground disposal is for an abatement of pollution and it is improbable that the underground disposal would be prejudicial to the public interest and is acceptable to the Department.

The proposed fluid is natural gas well production wastewater/ brine, a residual waste. The disposal of this fluid through the proposed injection at the Well is an alternative to the other forms of disposal available. If not disposed at the Well, the fluid would have to be trucked a distance to a properly permitted industrial wastewater treatment facility, publically owned treatment works or another permitted underground injection well. These identified alternatives result in a greater likelihood of pollution to the waters of the Commonwealth, as opposed to the disposal of the fluid at the Well that will result in no pollution to the underground sources of drinking water.

The Department considered the possible potential pollution by requiring and ensuring that "the applicant can show by the log of the strata penetrated and by the stratigraphic structure of the region that it is improbable that the disposal would be prejudicial to the public interest." In making this determination, the Department conducted an analysis of the mechanical integrity of the well casing; and a review of the targeted geologic formation and its ability to accept the waste at the pressures proposed without causing a detrimental impact to the environment, the public or the geologic formation, including an analysis of the potential for inducing seismic activity. The mechical intergrity analysis was conducted by Department employee Bruce Jankura P.E., and a technical memorandum setting forth his analysis, conclusions, and recommendations is provided in Attachment A. The geologic analysis was conducted by Department employee Harry Wise P.G., and a technical memorandum setting forth his analysis, conclusions, and recommendations is provided in Attachment B.

The Department determined that the requirments of 25 Pa.Code §91.51(b) have been satisfied and the the issuance of a permit will not lead to a violation of 25 Pa.Code §91.51(b)

§3211e1(2) *The Department may deny a permit if the permit application is incomplete.*

Pursuant to 58 Pa. C.S. §3211(b) and 3211(b.1), an application shall include a plat and proof of notification. The Application included a complete plat as required by 58 Pa. C.S. §3211(b) and all required proof of notification as required by 58 Pa. C.S. §3211(b.1).

Because the Application was submitted as an alteration to the existing production well, to inject waste as a disposal well, additional application requirements are set forth in 25 Pa.Code §78.18(a).

Specifically, 25 Pa.Code §78.18(a) requires an applicant to:

(1) obtain a well permit pursuant to 25 Pa.Code §78.11,
(2) submit the EPA approved UIC Permit and necessary application material and documents pursuant to 40 CFR Part 146,

(3) submit a copy of the control and disposal plan for the well and related facilities pursuant to 25 Pa.Code §91.34 and
(4) submit a copy of the erosion and sedimentation plan for the well site pursuant to 25 Pa.Code §102 and 25 Pa.Code §78.53.

Bear Lake submitted the EPA approved UIC permit, along with the application material and other related documents under 40 CFR 146, pursuant to 25 Pa.Code §78.18(a)(2).

Bear Lake submitted the control and disposal plan as required by 25 Pa.Code §78.18(a)(3) within the Preparedness, Prevention and Contingency Plan. Bear Lake's control and disposal plan must meet the requirements of 25 Pa.Code §91.34, detailing the preventative measures to be utilized to prevent the activity from directly or indirectly reaching waters of the Commonwealth through accidents, carelessness, maliciousness, hazards, weather or other causes. Also, 25 Pa.Code §91.34 indicates that the applicant should address the nature of the disposal activity. Bear Lake detailed numerous preventive measures to meet the requirements of 25 Pa.Code §91.34, including: training, material compatibility, emergency shut-down procedures, secondary containment dikes, pressure monitoring, emergency contacts, lined pit for spillage containment, pipeline secondary containment, use of spill pallets, tanks equipped with site-glass tubes, 30ml lined containment area, corrosion inhibitors, vapor control valves, emergency procedures and regular inspections utilizing an inspection checklist.

25 Pa.Code §78.18(a)(4) requires that an erosion and sedimentation control plan must be submitted that meets the requirements of 25 Pa Code Chapter 102 and 25 Pa Code 78.53. In a letter to the Department, dated December 9, 2014, Bear Lake indicates that there is no earth disturbance activities associated with the conversion of this well to a waste disposal well.

A new Pennsylvania National Diversity Inventory (PNDI) receipt was necessary, as the Department is requiring all PNDIs to be updated as of May 4, 2015, to ensure including the updated status for the Long-Eared bat; the bat was not present. No endangered or threatened species were noted on the receipt.

The Department's review disclosed that there are no deep mines or gas storage fields in the area. The Departments review of other oil or gas wells within the area of review is consistent with the submittal. There are no operating wells within a quarter mile of the proposed waste disposal well. The Department does not see a discrepancy with the water supplies indicated in the area of review by Bear Lake.

The Application is complete and accurate. All portions of the necessary forms have been completed and all necessary submittals required by law and applicable regulations for review have been submitted.

§3211e1(3) *The department may deny a permit if unresolved objections to the well location by coal mine owner or operator remain.*

Coal owners and/or operators can object to the permit with good cause, pursuant to 58 Pa. C.S. §3211e.1(3) of the 2012 Oil and Gas Act, potentially leading to the denial of the permit after sufficient review by the the Department of the issues brought forth by the coal owner/ operator.

The Department did not receive an objection to the well location from a coal mine owner or operator.

§3211e1(4) *The department may deny a permit if the requirements of Section 3225 (relating to bonding) have not been met.*

The operator must secure sufficient bond in accordance with 58 Pa. C.S. §3225 of the 2012 Oil and Gas Act, or risk denial of the permit.

Bear Lake has provided sufficient bond in accordance with 58 Pa. C.S. §3225. Agreement ID No. 14778 indicates that Bear Lake has $2500 Bond approved on May 1, 2017 for this proposed injection well.

§3211e1(5) *The department may deny a permit if the Department finds that the applicant, or any parent or subsidiary corporation of the applicant is in continuing violation of this chapter, any other statute administered by the Department, any regulation promulgated under this chapter or a statute adminstered by the Department or any plan approval, permit or order of the Department, unless the violation is being corrected to the satisfaction of the Department.*

The applicant and its parent or subsidiary corporations must be in compliance as defined by 58 Pa. C.S. §3211e.1(5) of the 2012 Oil and Gas Act. The applicant and its parent or subsidiary corporations must not be in continuing violation of this chapter, any other statute administered by the Department, any regulation promulgated under this chapter or any plan approval, permit or order of the department, unless the violation is being corrected to the department's satisfaction, or risk denial of the permit.

The Department has not taken any final action on any potential compliance issues that Bear Lake or its subsidiaries, as defined in 58 Pa. C.S. §3211e.1(5), might have incurred as of the date of this decision. Therefore, no basis for denial of the Applicatoin exists under this subsection.

§3211e1(6) *The department may deny a permit if the applicant failed to pay the fee or file a report under section 2303(c) (relating to administration), unless an appeal is pending. The commission shall notify the Department of any applicant who has failed to pay the fee or file a report and who does not have an appeal pending.*

The applicant must remain in good standing regarding the proper payment of fees and/or required reports pursuant to 58 Pa. C.S. §2303(c) of the 2012 Oil and Gas Act, or risk denial of the permit.

The Department has not been notified that Bear Lake failed to pay proper impact fee or submit proper reports related to the impact fee pursuant to 58 Pa. C.S. §3211e.1(f) by the Public Utilities Commission ("PUC"). Seneca is in compliance with their impact fee and report requirements as of May 30, 2017, as indicated on the PUC's public website for Act 13 reporting, attached as Exhibit C. Specifically, Bear Lake is not listed as an operator with outstanding payments.

Summary

The Department issues a permit from a submitted application unless it is denied in accordance with the provisions outlined in Section 58 Pa. C.S. §3211.e.1 of the 2012 Oil and Gas Act. The Department has determined that there is no basis for denial of the Application pursuant to 58 Pa. C.S. §3211.e.1 of the 2012 Oil and Gas Act.

Accordingly, I recommend issuance of Well Permit No. 123-33944, Bittinger No. 2, located in Columbus Township, Warren County, with the following special conditions as recommended by Bruce Jankura, Harry Wise and myself, attached as Exhibit D.

Attachment A- Bruce Jankura/ Mechanical Integrity Review
Attachment B- Harry Wise/ Geologic Review
Attachment C- Public Utilities Commission/ Act 13 Compliance
Attachment D- Special Conditions

Attachment A

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

MEMO

TO S. Craig Lobins

FROM Bruce E. Jankura, P.E.

DATE May 25, 2017

RE Bear Lakes Properties
Warren County, Bittinger #2
Mechanical Integrity Review
EPA UIC Application Documents

MESSAGE:

This is an assessment of the mechanical integrity, for conversion from a gas well to an underground injection well, of Bear Lakes Properties' existing gas well, the Bittinger #2, in Columbus Township, Warren County, Pennsylvania, API # 37-123-33944.

I reviewed all the documents that were submitted by Bear Lakes Properties to PADEP Office of Oil and Gas Management under cover letter dated January 5, 2015. The cover letter subject indicated "Change in well Status to Injection." Various documents were identified as having information pertaining to mechanical integrity. A well is considered to have mechanical integrity when it is in compliance with the well construction and operating requirements of Pennsylvania laws and regulations.

Each document, listed in the "Table of Contents, Underground Injection Control (UIC) Class II Well Permit Application" by Sections and Appendices, that was determined applicable to mechanical integrity is listed below with comments. Each Section reviewed was performed in conjunction with the responses to the Notice of Deficiency in the letter Dated April 25, 2014 to the USEPA. My comments are based on 39 years of experience as a Petroleum Engineer and Environmental Regulator.

This well is a vertical, conventional, natural gas well with 8 5/8" surface casing set at 428'and cemented to the ground surface on 1/24/1984 and 4 ½" production casing set at 4,450' and cemented to 3,190' in the annulus (as per Figure #1 in Section #7). This well meets the most recent (2011) regulatory requirements for well construction and operation. No Annual Mechanical Integrity data has been reported for 2014 or 2015 because the operator has obtained an EPA UIC Injection Permit, there was no production for 2014 or 2015 and the PA Permitting process is ongoing for conversion to an injection well. A review of DEP'S eFACTS database (most recent inspection on 2/23/17, see Table #1), indicated this well has no outstanding issues or violations. Additional information regarding the construction and operation of this well is set forth below.

Section 1 – Area of Review Methods/Calculations

– "...we believe the Bittinger #2 is an excellent candidate for use as a brine disposal well."

Comment – The analytical methods employed, parameters used and production depletion volumes provided are all reasonable. Converting depleted reservoirs to water disposal zones is a common

practice throughout the oil & gas industry. Based on my review of the data presented, it is reasonable to consider this well and the injection formation a candidate for conversion to a brine disposal well.

Section 5 – Geologic Data on Injection and Confining Zones
– "Maximum Injection Pressure Calculations"

Comment – The value for the ISIP (2,200 psi) from the Smith/Ras #1 is reasonable, as shown on the Dowell pressure chart dated 6/24/84. This well is about 1,600' south of the Bittinger #2. Using this value and the other input values provided, the fracture gradient of 0.934 psi/ft and Maximum Injection Pressure Calculation value of 1,727 psi are reasonable.

Section 6 – Operating Data
– Injection Rate: "An injection rate of 30,000 bbls/month is therefore also proposed for this well (Bittinger #2)."

Comment – This is a reasonable injection volume. The critical parameter is the Maximum Allowable Surface Injection Pressure (MASIP) of 1,727 psi. This pressure will be the controlling factor, not the injection flow rate. As the pressure increases toward the maximum, the injection rate will have to be reduced to stay below the MASIP.

– Monitoring of Injection Fluid Samples and Well:

2. "Injection pressures, annular pressure, injection rate and cumulative volume will be continuously monitored and recorded electronically."
3. "A mechanical integrity test will be performed prior to initiating injection and at least once every two years."
4. "All monitoring records will be maintained throughout the life of the well."

Comment – These are reasonable practices. Bear Lakes should provide the data identified in #2 above to the Department on a monthly basis. This is necessary for the Department to routinely monitor injection activity and potential for induced seismicity. See Recommendations Below.

– Proposed Annulus Fluid; "...will consist of fresh water and a water soluble corrosion inhibitor."

Comment – This is a common industry best management practice and reasonable to utilize.

Section 7 – Well Construction – Injection Well Configuration
– Figure #1 - Well Construction Diagram, Bittinger #2.
Comment – This diagram is a reasonable depiction of the wellbore and casing program.

1. The Bittinger #2 well is currently in regulatory compliance based on a review of the PADEP eFACTS system.

2.The surface casing cementing calculations are a reasonable indication that sufficient cement was pumped to provide an adequate cement sheath.

3.The cement bond log run on the long string casing on August 13, 2013 was reviewed and confirms that the top of cement is at a depth of approximately 3,190'.

4.The Well Records provided show 4 ½" casing run in the hole to 4,450' and cemented with 250 sacks of cement in 1984. The top of cement in the 4½" annulus at 3,190' was confirmed by a Cement Bond Log run on August 13, 2013.

5. The diagram is not dated and there is no indication as to this being the current well construction or proposed construction. (See Clarification #1 below)

6. The Well Record dated 11/24/14 indicates 2 3/8" tubing was installed and anchored with a packer at 4,283' in August of 2014. Figure 1 shows 2 7/8" tubing anchored with a packer at 4,236' (47' shallower). This should be clarified. (See Clarification #2 below)

7.There is no information documenting the additional perforation of the 4 ½" casing or the hydraulic fracturing stimulation treatment as indicated by Figure 1. Documentation should be provided for the additional perforating date and the hydraulic fracturing, including the frac job pressure chart. (See Clarification #3 below)

8.Detailed pipe strength data is not provided, but the common oilfield tubulars used in northwestern PA are expected to have adequate internal yield pressure ratings for the tubing and production casing that would contain the proposed maximum injection pressure of 1,727 psi. Bear Lakes should provide the detailed pipe strength specifications for the tubulars in the injection well. (See Clarification #2 below)

9.A routine site inspection should be conducted on the Bittinger #2 well by the PADEP Oil & Gas Inspector to confirm the well status prior to initiation of injection. See Recommendations below.

Section 9 – Plugging and Abandonment Plan

– "At the point when the well is no longer used, the well will be abandoned in accordance with EPA and PADEP regulations."

Comment – The Plugging and Abandonment Plan, cost estimate, procedure and final plugged well drawing showing cement plug set depths, appear adequate to meet regulatory requirements.

Section 11 – Plan for Well Failures

– From the comment response letter, #10.b; "Attached revised Section 11 also describes how a significant pressure change within the annulus will be automatically detected and the injection well subsequently shut in."

Comment – This plan outline is reasonable, which includes pressure monitoring and automatic injection shut down associated with the tubing pressure and tubing by 4 ½" casing annulus.

– When conditions "indicate mechanical integrity problems, injection will cease and EPA will be verbally notified within 24 hours and notified in writing within 7 days."

Comment – This notification should apply to DEP also. See Recommendations.

EPA Approval Notices - EPA UIC Permit & EPA Response to Summary Comments

– In Part II, D.2.b. of the UIC Permit, Bear Lakes is required to meet the following condition; "The Permittee has demonstrated to EPA that the Injection Well has mechanical integrity in accordance with 40 CFR § 146.8 and the Permittee has received written notice from the Director that such demonstration is satisfactory; and..."

Comment – There is no reasonable need to duplicate this demonstration of mechanical integrity prior to initiating injection. Prior to commencing injection, Bear Lakes should provide DEP with the documentation showing how they complied with this provision of the EPA UIC Permit. See Recommendation Below.

Mechanical Integrity Info Clarifications

1. Clarify if Figure 1, Well Construction Diagram, is the current or the proposed wellbore configuration and provide the date it was prepared.

   Clarification – 2/16/16 email. Figure 1 in the EPA UIC Permit Application is a representation of the proposed wellbore configuration, prior to the actual well workover, and prior to obtaining a current gamma ray log. This projected configuration was prepared by TetraTech engineering. The current wellbore configuration detail is outlined on the attachment. (See info in #2 below)

2. Clarify the tubing size and set depth. The Well Record dated 11/24/14 indicates 2 3/8" tubing was installed and anchored with a packer at 4,283' in August of 2014. Figure 1 shows 2 7/8" tubing anchored with a packer at 4,236' (47' shallower).

   Clarification – 2/16/16 email. See attachment – (chart of information placed here):

Bittinger # 2 Down Hole Information :
Work over by BakerHughes Field Specialist/Terry Angus & Company Rep. JoeRajecki

2 3/8" X 4.70# ENX J55 ERW Tubing 8RD EUE TC R2 Purchased from MRC Global
Tubing Set @ 4,283.14 Tubing intsalled 9-22-14

4-1/2 Casing Pipe 10.5# .224 WT 65 STS R-3 Wheat. Casing installed 9-21 & 9-22-14
Casing Set @ 3,160 ft conection made with a Baker Hughes Lead Seal Patch 5 3/4 OD

New Perforations 9-17-14
Appalachian Well Surveys
Interval : 4334-4405 shots 63 total
4334 -4354 / 42 shots
4395 - 4405 / 21 shots

PSI setting for 4 1/2 casing tubular annular space 0 to 250psi

Packer
LOK -SET RTVBL PKR,A-3- 43A404.5" 9.5#-10.5# 3ft.85" length. On /Off Tool 1ft.35"

3. Provide documentation for the additional perforating date and the hydraulic fracturing treatment, including the frac job pressure chart.

   Clarification – 2/16/16 email. The initial state completion record indicates that this well was completed with un-cemented 4-1/2" casing, set on an open hole packer, due to the high natural gas flow rate encountered during the drilling of the well. There is no well record or state completion report detailing the subsequent cementing of the 4-1/2" casing and perforation/stimulation work. Conversations with former employees of the original well operator (US Energy Development), led us to expect that the casing had been cemented and stimulated. We were able to confirm the cementing operation with a cement bond log, however, we are unable to confirm any details of the presumed stimulation. Formation parting pressure is estimated from nearby well data, from the same producing interval.

4. Provide the detailed tubular specifications for all tubulars in the injection well.

   Clarification – 2/16/16 email. See attachment. (Info in Clarification #2 above)

5. Specify the pressure setting for the 4½" casing by tubing annular space and the pressure deviation setting that will cease injection.

   Clarification – 2/16/16 email. See attachment. (Info in Clarification #2 above)

Overall Mechanical Integrity Review Assessment

Mechanical Integrity for the Bittinger #2 gas well:

In my opinion, based on the data reviewed, the mechanical integrity of the Bittinger #2 Well is adequate for conversion from a production well to an underground injection well.

The Bittinger #2 Well is currently in compliance with the well construction and operating requirements of Pa Code Title 25 Ch78.

Recommendations

1. Provide, on a monthly basis to the DEP, injection pressures, annular pressures, injection rates and cumulative volume; in both digital and graphical formats. All pressures and rates should be monitored continuously.

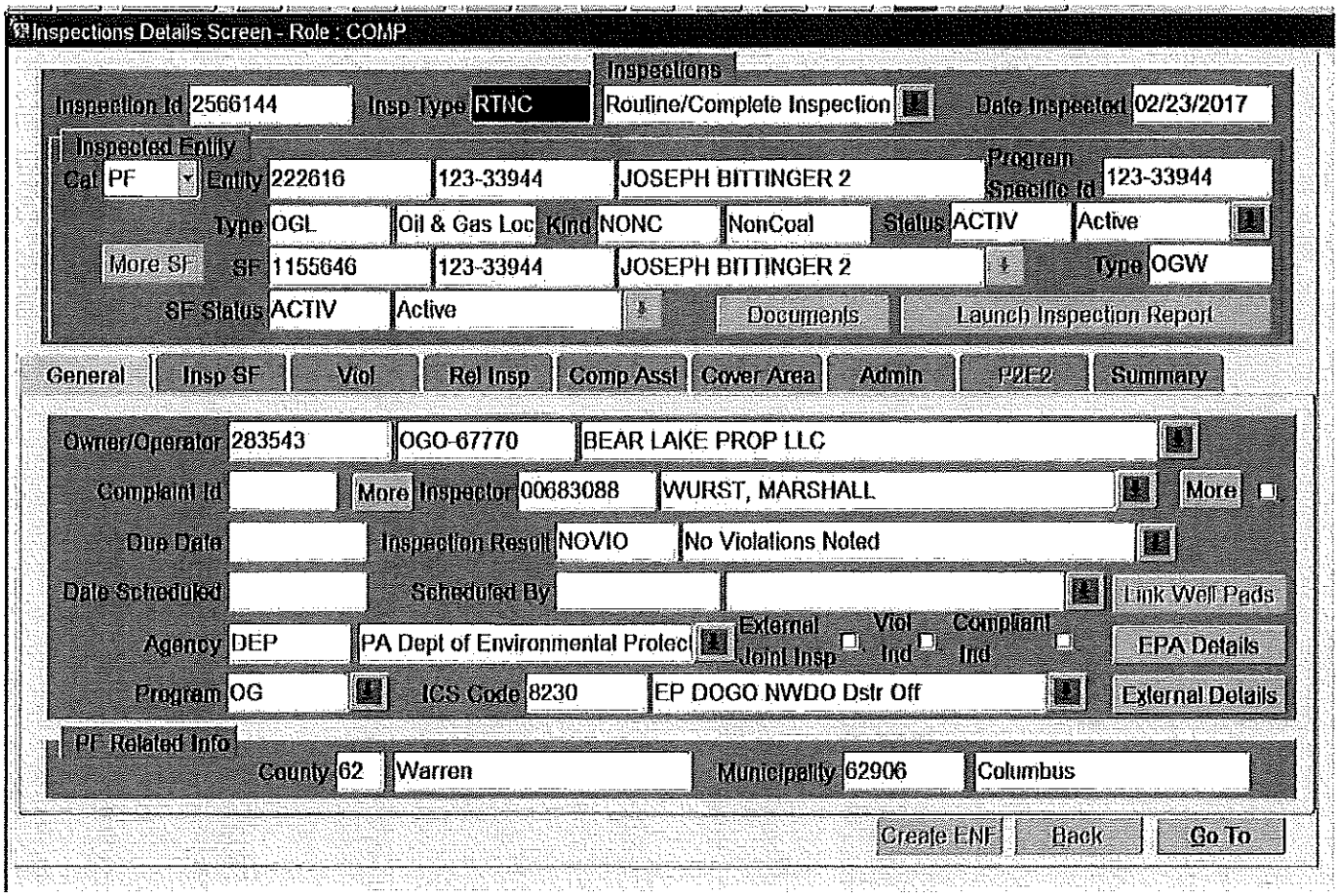
2. A routine site inspection should be conducted by the PADEP Oil & Gas Inspector to confirm the well status, including annular pressure readings, prior to initiation of injection.

3. DEP should be notified in the same fashion as EPA when conditions indicate mechanical integrity problems, which call for injection to cease and EPA to be verbally notified within 24 hours and notified in writing within 7 days.

4. Prior to commencing injection, provide DEP with the documentation showing how Bear Lakes complied with provision Part II, D.2.b. of the EPA UIC Permit, demonstrating that the well has mechanical integrity (11.o).

cc: John Ryder

Table #1 – DEP eFACTS Inspection Report Dated 2/23/17



Attachment B

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

MEMO

TO S. Craig Lobins

FROM Harry C. Wise, P.G. HCW

DATE February 8, 2017

RE Bear Lake Properties, LLC – Warren County, Joseph Bittinger Well #2
Geologicial Review
EPA UIC Application Documents

MESSAGE:

Analysis
This technical review is in response to a request from John Ryder to assess the suitability of the geologic structure and setting for waste disposal via injection in the vicinity of the Bear Lake Properties, LLC (Bear Lake) existing Joseph Bittinger Well #2 (Bittinger #2) gas well in Columbus Township, Warren County, Pennsylvania, API # 37-123-33944. The well formally served as a production well and is a candidate for conversion to an underground injection control (UIC) well.

I reviewed all the documents that were submitted by Bear Lake to the Pennsylvania Department of Environmental Protection's Office of Oil and Gas Management (hereafter the Department). The cover indicated "Change of Use – Class II Injection Well Permit Application Supporting Documents, API #37-123-33944, United States Environment Protection Agency (EPA) UIC Permit PAS2D217BWAR dated November 10, 2014". Various documents were identified as having information pertaining to geologic structure and setting.

The discussion that follows is based on my experience as a Professional Geologist and Environmental Regulator.

The proposed UIC well (Bittinger #2) served as a former gas production well targeting Grimsby and Whirlpool Sandstones within the Medina Group. Bear Lake has indicated that the Upper Silurian Salina Group and Lockport Formation between 3,270 feet and 4,123 feet below existing site grades would effectively serve as a stratigraphic seal (confining zone). Bear Lake has described the Salina Group as evaporates and dolomites and the Lockport Formation as a dolomite. This is consistent with known geologic description of these geologic units.

The Department reviewed a portion of a petrophysical log for the Bittinger #2 between 2,600 and 4,500 feet below site grades received by the Northwest Regional Office in Meadville on August 10, 2015 from Bear Lake as required by *§ 91.51. Potential pollution resulting from underground disposal.* The petrophysical log was prepared by Gearhart for U.S. Energy Development Corporation on January 29, 1984. The data corroborates Bear Lake's identification of a sandy injection zone with shale interbedding and shows that there is a limestone/dolomite sequence of rocks directly above the injection zone (between 3,885 feet and 4,090 feet). The petrophysical log also identifies confining (limestone/dolomite) zones that are present between approximately 3,300 and 3,620 feet below site grades.

It is my professional opinion that the injection horizon and surrounding strata result in suitable geologic structure and stratigraphy for waste disposal via underground injection. There are no concerns related to containment.

The Department's review of operating and plugged wells within a quarter-mile radial distance confirmed the information provided by Bear Lake in their application that there are no operating wells that penetrate the injection horizon (Figure 1). Within a one-mile radial distance, Bear Lake did not identify two wells located in New York State, one is located approximately 0.85 miles to the northeast of the site and the other is located approximately 1 mile east-northeast of the site. The first well is labeled as the Palmer R 1 well (API# 31-013-20944-00-00) and the company is listed as Empire Energy E&P LLC. New York's data indicate the well as being completed on 12/15/1987 to a depth of 4,595 feet. The second well is labeled as the Harold Cornish Unit 1 well (API #31-013-19262-00-00) and the company is listed as Rex Energy 1 LLC. Available data indicate the well as being completed on 10/31/1984 to a depth of 4,581 feet. Both wells target the Medina Group as the production zone. A total of twenty-one (21) active wells (9 in Pennsylvania and 12 in New York) were located within the one-mile radial distance of review. All of these wells target the Medina Group as the production zone.

A plugged well, API# 123-41380, E. Caflisch 1(the Department's eFACTS operator is listed as Empire Exploration Inc.) is located 0.99 miles west of the site. This well was plugged in September 1992 and the plugging certificate was approved by DEP in November 1992. Sand, a mechanical bridge plug and seventeen (17) sacks of cement were used to plug the gas-bearing zone from 4,000 feet to 4,305 feet (Figure 1).

Two abandoned wells have been identified within the mile radial distance of the proposed site. The first abandoned well (API #123-34843, identified as the Smith Ras Unit 1) is owned by Bear Lake Properties, LLC and will be used as a monitoring well for the proposed injection well. This well is located approximately 0.33 miles south of the site. The second abandoned well (API #123-33834, identified as the W W Hammond Jr 1) is owned by Bear Lake Energy (listed in eFACTS as OGO-67220, which is different than OGO-67770 for Bear Lake Properties, LLC). This well is located approximately 0.93 miles south of the site (Figure 1).

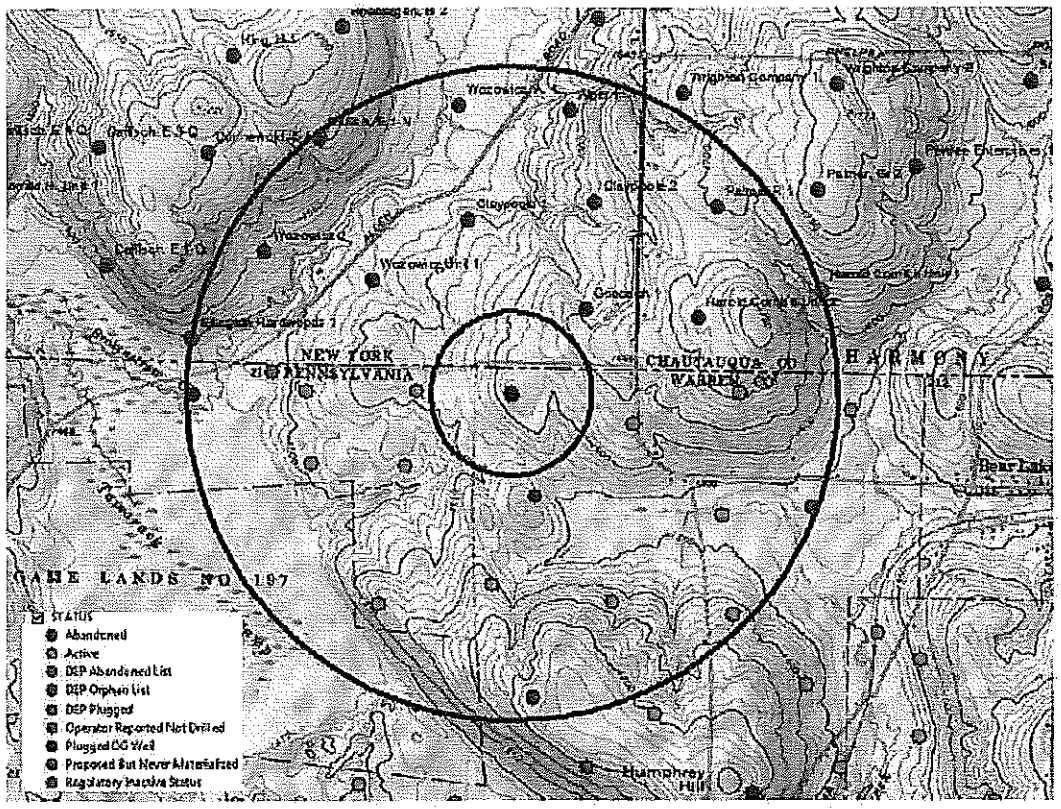

Figure 1. Conventional wells with the quarter-mile and one-mile buffers depicted (the inset status classifications only apply to Pennsylvania wells).

Historic and other well sites that are not listed in the Department's eFACTS database were reviewed. No other historic wells were located within the quarter mile and mile radial distances around the proposed injection well site.

It is my professional opinion that there are no concerns related to the suitability of the caprock, or seal, created by ongoing and legacy oil and gas production activities in the vicinity of the proposed UIC well location.

The Department's review indicates there are no mapped faults or structural fronts in the quarter and one (1) mile areas of review (Figure 2). In the application to EPA under "Potential for Faults and Seismicity", Bear Lake correctly notes that no faults are identified in the vicinity of the proposed wells site. The nearest fault identified in Pennsylvania or New York is over 25 miles to the southwest of the site.

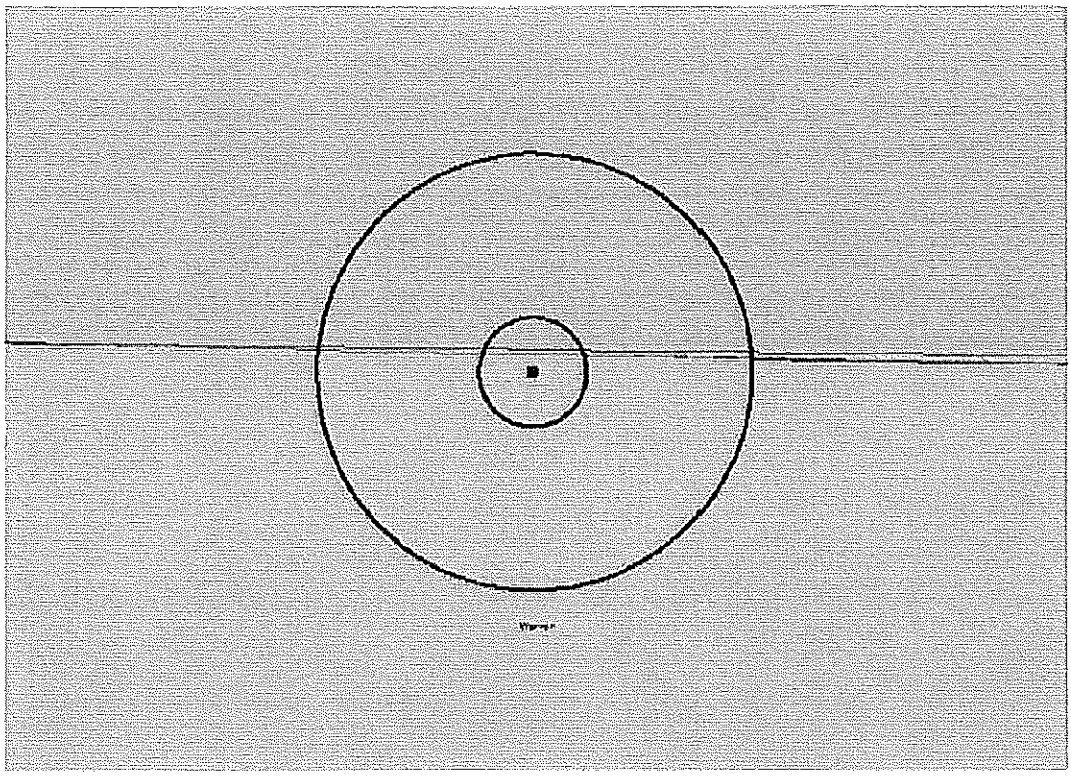

Figure 2. Faults located near the proposed well site.

The Department's review indicates there are no historical seismic events within the quarter- and one-mile radius area of review (Figure 3). There is one earthquake of 2M or greater identified within Warren County. This earthquake was identified on Pennsylvania's Department of Conservation and Natural Resources (DCNR) Map 69, *Earthquake Catalog and Epicenter Map of Pennsylvania.* The epicenter of this earthquake is over 25 linear miles from the proposed well site.

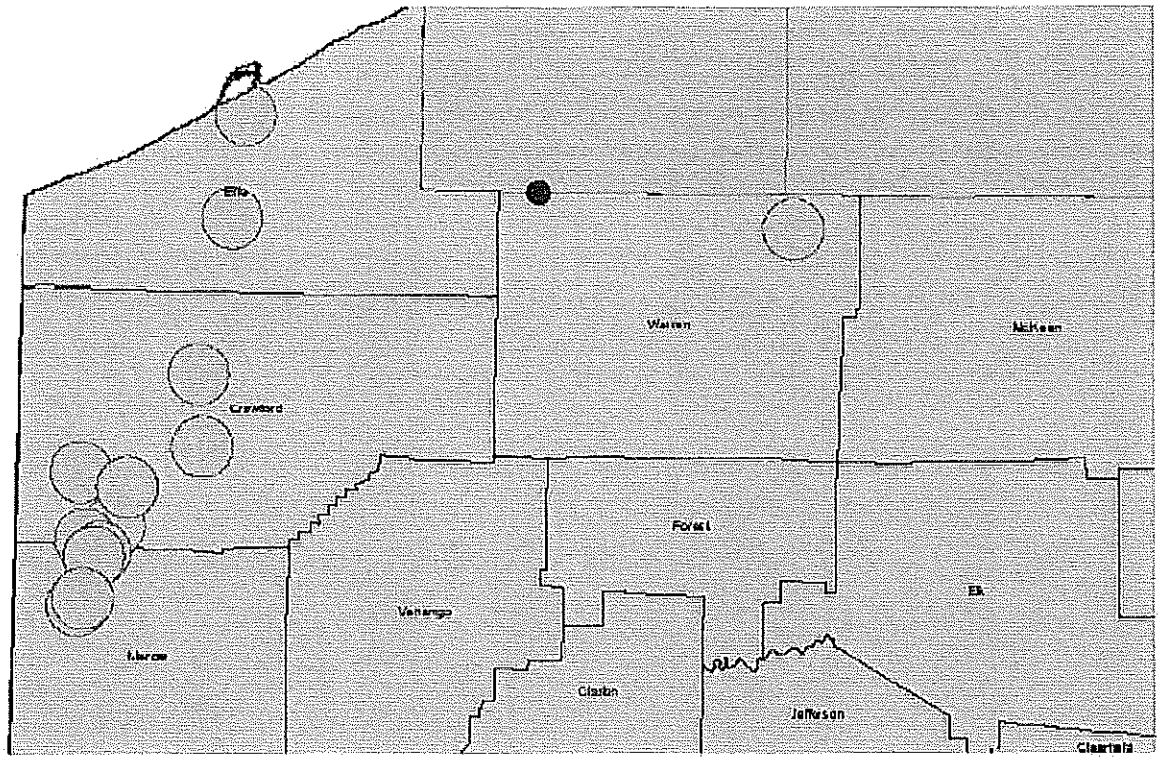

Figure 3. Seismic activity map showing 3-mile buffers around Magnitude 2 or greater earthquakes.

It should be noted that EPA reports induced seismicity associated with injection wells in Ohio resulted from injection into Precambrian basement rock. These rocks are often cross-cut by blind faults and are crystalline in nature. Additional studies by the State of Oklahoma (http://earthquakes.ok.gov/) and within the geologic community appear to corroborate the belief that injecting fluid into brittle, crystalline basement rock can result in induced seismicity. The Department reviewed maps showing the basement rock (depth of approximately 7,000 feet to 8,000 feet) and the injection zone (depth of 4,246 feet to 4,427 feet) for this well and identified a separation distance of approximately 2,500 to 3,500 feet (Figure 4)

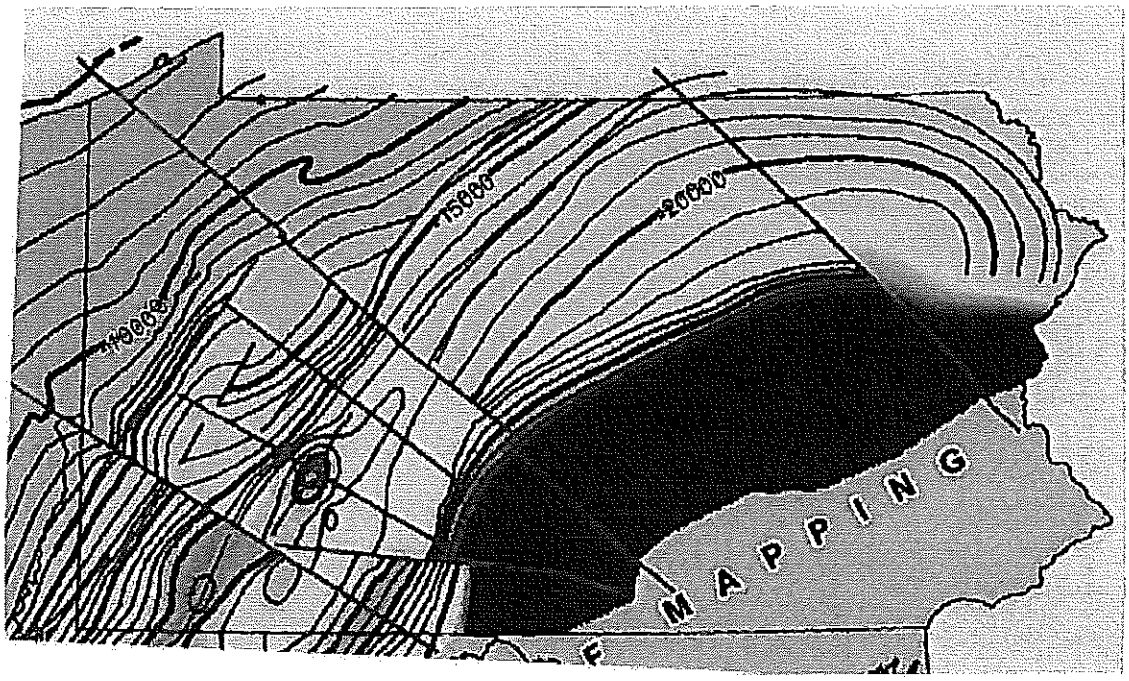

Figure 4. Depth to Precambrian crystalline basement rock. UIC well site (red circle)

Induced seismicity relating to the operation of injection wells results from the interrelationship of factors such as depth to basement rock, distance to existing faults, fault plane orientation and pore pressure regimes. This geologic analysis has not revealed indicators suggestive of a heightened potential for induced seismicity and injection has been taking place in nearby wells; however, the distance between the injection horizon and basement rock is minimal. Based upon the review of all available information, it is my professional opinion that injection activities at this well pose a low risk with regard to induced seismicity. It is recommended that this risk be managed through the application of permit conditions addressing seismic monitoring and mitigation.

The Department's review indicates the closest storage wells are located approximately 9.5 miles west-southwest of the proposed injection well site. This site is the location of an active storage field (Corry) (Figure 5). Since the Corry Storage Field is over 9 miles from the site, and outside the ¼ mile radius of review, it is not expected to be affected by injection activities. The Department's review indicated two waste injection wells within the one-mile radius of review. These wells are currently operated by Bear Lake and are discussed in the EPA application for the proposed well.

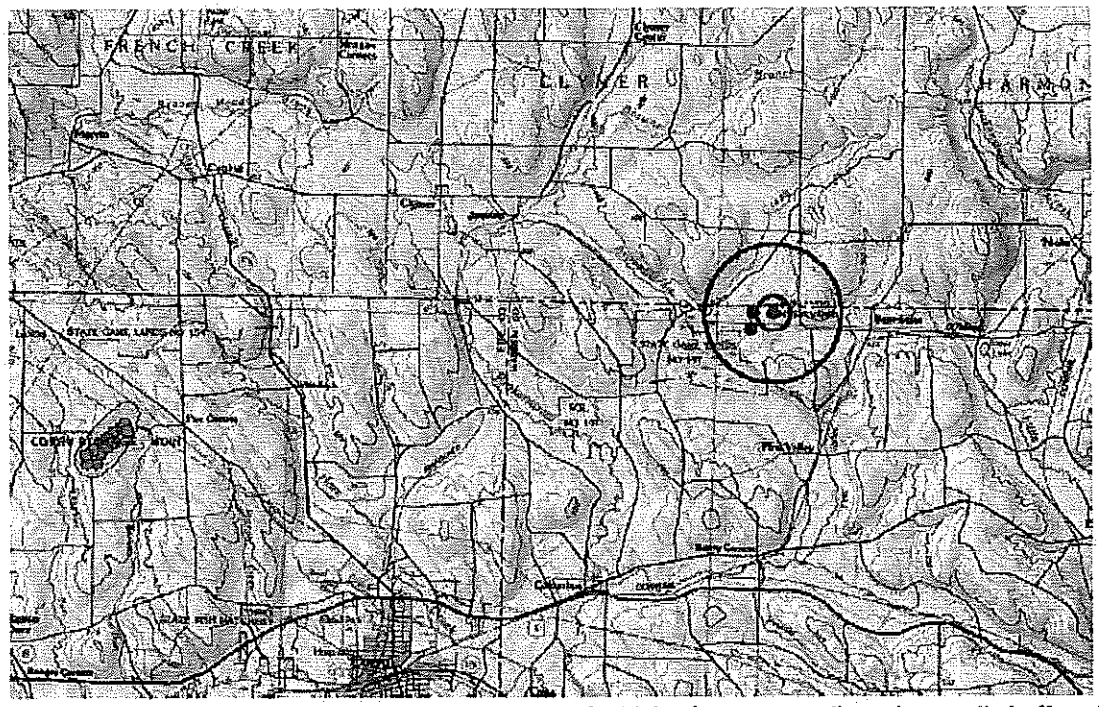

Figure 5. Map showing storage well and storage field locations (gold dots). Quarter-mile and one-mile buffers depicted.

The Department's review indicates there is no surface or underground mining within the quarter- and one-mile radius area of review (Figure 6). One surface mine (Lawsonham mine) is located approximately 1.15 miles east southeast of the proposed injection well site. This surface mine is listed as a coal mining operation (CMO).

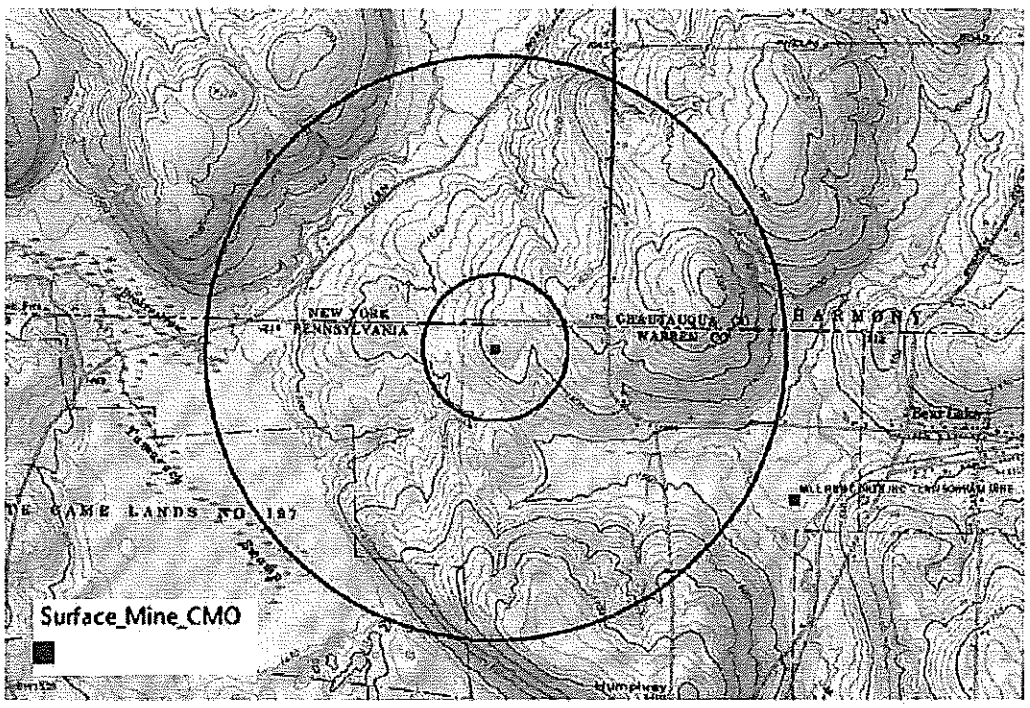

Figure 6. Map showing surface and underground mining activities in the area. Quarter-mile and one-mile buffers depicted.

The Department's review indicates there are no active municipal water wells within the 1-mile radius of review; however a private, domestic water well was found within this review area. The domestic water well is located approximately 0.34 miles east northeast of the proposed injection well site (Figure 7). Details of this private water well were provided in Pennsylvania Groundwater Information System (PaGWIS). The water well, which was drilled on December 1, 1993, extends to a depth of 86 feet with bedrock being located at a depth of 10 feet. The PaGWIS information also identifies Reepu Singh as the well owner. This well is located on what is now identified as Bear Lake's property in Appendix A of the application. In Bear Lake's application to EPA, they correctly indicated there are no water wells with in the quarter-mile area of review. Section 4 of the application contains a discussion of the depths to underground drinking water sources (USDW). The information supplied by Bear Lake within the application as it relates to depths of USDW corroborates the data obtained in PaGWIS that the deepest used supplies of drinking water are less than 300 feet below existing grades.

Regarding local water supplies:

- It is recommended that the location, depth and use of any additional private, domestic or other water wells be confirmed by the Department.

- Once the location, depth and usage of the aforementioned wells are confirmed, the Department must take steps to ensure the casing and cementing design of the proposed injection well satisfies the requirements of 25 Pa. Code Chapter 78, Subsection D.

Once the location, depth and usage of the aforementioned wells are confirmed, the Department should ensure the casing and cementing design of the proposed injection well satisfies the requirements of 25 Pa. Code Chapter 78, Subchapter D by completing an engineering assessment of the well's construction characteristics and integrity. If no issues are noted during the review, it is my professional opinion that there is no expected risk to surrounding water supply wells provided injection well integrity is maintained per the requirements of EPA's UIC Program. This belief is due to the required construction of the well, the geology, and the distance of these features to the well and its injection horizon.

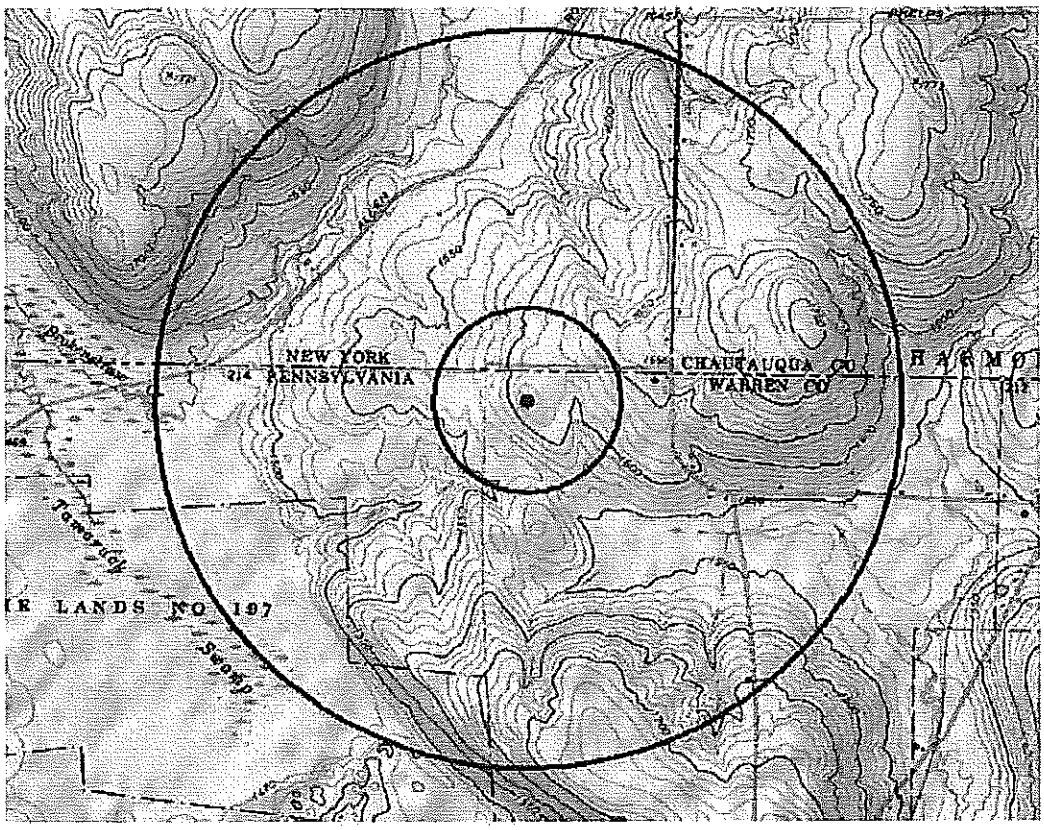

Figure 7. Map showing private and public water supply wells Quarter-mile and one-mile buffers depicted.

Summary of Geological Review/Assessment and Recommendations

Geological Assessment for the Bear Lake Properties, LLC – Warren County Joseph Bittinger Well #2 gas well:

In my professional opinion, based on the data reviewed, the geological structure and setting of the Bear Lake Properties, LLC – Warren County Joseph Bittinger Well #2 makes it a suitable candidate for conversion from a production well to an underground injection well.

The following recommendations should be observed:

- Prior to authorizing this activity: It is recommended that the location, depth and use of any additional private, domestic or other water wells be confirmed by the Department.

Once the location, depth and usage of the aforementioned wells are confirmed, the Department must take steps to ensure the casing and cementing design of the proposed injection well satisfies the requirements of 25 Pa. Code Chapter 78, Subsection D. If this is the case, it is my professional opinion that there is no expected risk to these wells provided injection well integrity is maintained per the requirements of EPA's UIC Program.

cc: John Ryder
Brian Babb
Michael Braymer
Joseph Iole
Keith Salador

End

Attachment C

Filter Payments

Producer Name

Filter

Outstanding Payments

Producer Name	Client ID	Amount	Paid Amount	Owed Amount
GUARDIAN EXPLORATION LLC	237396	$50,050.00	$0.00	$50,050.00
XTREME ENERGY CO	317770	$70,600.00	$0.00	$70,600.00

Producer Reports

Statement Of Account (../Reports/ReportViewer.aspx?rptPath=/Act 13/ProducerStatementOfAccount&params=/wASbQn4xyQ=)

Attachment D

Draft Bittinger #2 Well Permit Conditions (API # 37-123-33944)

Seismic Monitoring and Mitigation

The permittee shall prepare and implement a seismic Monitoring and Mitigation Plan. The seismic Monitoring and Mitigation Plan shall be submitted to the Department of Environmental Protection ("Department") at least 30 days prior to the anticipated start date of disposal activities in an existing well. This plan, or the plan as modified by the Department, shall be fully implemented at the time disposal activities begin and thereafter and shall include the following components:

(1) Installation of a seismometer that, at minimum, includes the following:
   a. One 3-component velocity sensor (X, Y, and Z axes), high-frequency seismometer **or** a local network consisting of a **minimum** of four high-frequency seismometers that have 3-component velocity sensors.
   b. For purposes of this seismic Monitoring and Mitigation Plan, a "seismic event" shall mean circumstances which reflect tectonic seismic activity above the thresholds and within the distances set forth in Paragraphs (11) or (12) below.
   c. For purposes of this seismic Monitoring and Mitigation Plan, an "Injection-Induced Seismic Event" shall mean circumstances which reflect seismic activity that may be directly attributable to the permitted injection activities. Raw seismic data gathered by the seismometer(s) described in (1) a. will be processed to calculate event location (epicenter/hypocenter) and magnitude. Events attributable to surface activities (such as, but not limited to, mining or blasting) or system noise will not be considered potential Injection-Induced Seismic Events.
   d. If the one sensor option is chosen, and an Injection-Induced Seismic Event occurs at or above the thresholds specified in (11) c and d below, the operator will cease injection operations within 48 hours of Event and mobilize a local network consisting of a minimum of four (4) high-frequency seismometers that have 3-component velocity sensors prior to re-establishing injection operations as set forth in (11) c and d.
   e. All seismometers shall be installed in accordance with the manufacturer's instructions prior to operation of the disposal well.

(2) A description of and specification sheet for the seismometer installed at the disposal well site.

(3) The installation of a recorder that, at a minimum, continuously records 100 samples per second using a data logger with 24-bit digitizer and Global Positioning System (GPS) timing, in accordance with the manufacturer's instructions prior to operation of the disposal well.

(4) A description of and specification sheet for the seismic recorder installed at the disposal well site.

(5) A description of the protocol for operating and completing calibration of the seismometer and seismic recorder installed at the disposal well site demonstrating that it conforms with the standards employed by the Pennsylvania State Seismic Network (PASEIS) and the manufacturer's instructions.

(6) A description of the routine maintenance and service checks that will be implemented to monitor the operability or running condition of the seismometer and seismic recorder installed at the disposal well site. The description should detail how the checks satisfy the manufacturer's instructions.

(7) Verification that tectonic seismic event data will be captured at the disposal well site electronically and in a manner that is suitable for tectonic seismic event recordation and analysis.

(8) Verification that seismic data will be provided to the Incorporated Research Institutions for Seismology (IRIS) Network in real time and that the continuous, real time data conforms to the data format required by IRIS for archiving under PASEIS' network code (PE) and open distribution. If data transmission is interrupted, notification will be provided to the Department verbally within 24 hours and in writing within seven (7) days.

(9) A description of measures that will be taken to install the seismometer in a manner that will minimize interference from background sources and allow for optimal Seismic Event identification and location (epicenter and hypocenter). This shall include a plan view map of proposed seismometer location(s).

(10) Contact information for the responsible person in charge of conducting seismic monitoring activities at the disposal well site.

(11) If the one sensor option is chosen, a tectonic seismic event contingency plan that includes monitoring, reporting and mitigation provisions consistent with the following:

a. Contingent upon analyst review, immediate electronic notification to the Department and the Department of Conservation and Natural Resources' Bureau of Topographic and Geologic Survey (BTGS) of detection of any measurable event, within six (6) miles measured radially from the disposal well.

b. Notification within 10 minutes via email to the Department and 1 hour via telephone to the Department's statewide toll-free number in the case of seismic activity referenced in a. above. Within 24 hours the operator will provide this data including filtering/processing of raw seismic data to identify and remove non-tectonic events (e.g. mine blasts or system noise).

c. Should an Injection-Induced Seismic Event occur (i.e., not a surface-related event or system noise), the Operator will reduce the well's operating injection rates. Reduction of the disposal well's operating injection rates in use at the time of the Injection-Induced Seismic Event by 50% within 48 hours of the occurrence of 3 or more consecutive Injection-Induced Seismic Events greater than 1.0 and less than 2.0 local magnitude (M_L) over a seven (7) day period occurring within three (3) miles measured radially from the disposal well. The seven (7) day period is defined as starting with the occurrence of any Injection-Induced Seismic Event of local magnitude 1.0 or greater. Reduced operating injection rates shall be maintained until the Department provides written notice addressing injection rates.

d. Termination of all injection activities within 48 hours of the occurrence of an Injection-Induced Seismic Event of local magnitude 2.0 or greater within three (3) miles measured radially from the disposal well until receipt of a written notice from the Department addressing continued well usage and operating conditions. The assessment of continued usage will include, but not limited to, the following criteria:

i. Magnitude and frequency of events detected;

ii. Operational history prior to the event and operating conditions at the time of the event (rates, volumes, pressures);

iii. Any mitigation/intervention attempts made prior to termination of activities;
iv. Ability of permittee to identify another potential source for the event based on data processing and analysis of conditions.

(12) If the network option is chosen, a tectonic seismic event contingency plan that includes monitoring, reporting and mitigation provisions consistent with the following:
a. Contingent upon analyst review, immediate electronic notification to the Department and the BTGS of detection of any measurable event, within three (3) miles measured radially from the disposal well.
b. Notification within 10 minutes via email to the Department and 1 hour via telephone to the Department's statewide toll-free number in the case of seismic activity referenced in a. above will include filtering/processing of raw seismic data to identify and remove non-tectonic events (e.g. mine blasts or system noise).
c. Should an Injection-Induced Seismic Event occur (i.e., not a surface-related event or system noise), the Operator will reduce the well's operating injection rates. Reduction of the disposal well's operating injection rates in use at the time of the Injection-Induced Seismic Event by 50% within 48 hours of the occurrence of 3 or more consecutive Injection-Induced Seismic Events greater than 1.0 and less than 2.0 local magnitude (M_L) over a seven (7) day period occurring within three (3) miles measured radially from the disposal well. The seven (7) day period is defined as starting with the occurrence of any Injection-Induced Seismic Event of local magnitude 1.0 or greater. Reduced operating injection rates shall be maintained until the Department provides written notice addressing injection rates.
d. Termination of all injection activities within 48 hours of the occurrence of an Injection-Induced Seismic Event of local magnitude 2.0 or greater within two (2) miles measured radially from the disposal well until receipt of a written notice from the Department addressing continued well usage and operating conditions. The assessment of continued usage will include, but not limited to, the following criteria:
i. Magnitude and frequency of events detected;
ii. Operational history prior to the event and operating conditions at the time of the event (rates, volumes, pressures);
iii. Any mitigation/intervention attempts made prior to termination of activities;
iv. Ability of permittee to identify another potential source for the event based on data processing and analysis of conditions.

(13) Provisions for submitting an updated seismic Monitoring and Mitigation Plan as needed or as may be required by the Department. Updates may be necessary in cases where the risk profile associated with injection activities changes. A signed and certified statement by a qualified professional person responsible for preparing the seismic Monitoring Plan that the plan is true and accurate and includes the components outlined above. The certification shall provide: "I, (insert name), hereby certify, under penalty of law as provided in 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that I prepared the seismic Monitoring Plan for (insert facility name) and the

information provided is true, accurate and complete to the best of my knowledge and belief."

(14) Upon commencement of disposal activities at the disposal well, the permittee shall record tectonic seismic event data electronically in an appropriate format for analysis (event location and magnitude) and maintain daily records of tectonic seismic event data electronically for review at the request of the Department. Tectonic seismic event records must be maintained for one (1) year.

(15) The permittee shall maintain all calibration, maintenance and repair records for the seismometer for at least five (5) years.

(16) The permittee shall maintain all calibration, maintenance and repair records for the seismic recorder for at least five (5) years.

(17) The operator may submit a summary report and plan for modification or discontinuation of the seismic Monitoring Plan five (5) years after injection activities commence. The Department's review will be completed as soon as practicable after receipt of the summary report and a written response will be provided to the operator. DEP's assessment of the report will be dependent on, but not limited to, the following criteria:

a. Magnitude and frequency of any events during the monitoring period;
b. Operational history during the monitoring period (rates, volumes, pressures);
c. Planned operational conditions moving ahead (rates, volumes, pressures);
d. Demonstration through pressure fall-off that system is at equilibrium and behaving in as a homogenous reservoir;
e. Need for any mitigation/intervention during the monitoring period.

Mechanical Integrity Special Permit Conditions

(18) At least 30 days prior to any formation stimulation, the permittee shall submit a treatment plan to the Department.

(19) The permittee shall provide on a monthly basis an electronic and graphical record of injection pressures, annular pressures, injection rates, and injection volumes and cumulative volumes in a format acceptable to the Department. All pressures and rates shall be monitored continuously with digital devices. The permittee shall also maintain records of this information for review at the request of the Department, for one (1) year.

(20) Prior to the initial injection of fluids into the disposal well, the permittee shall coordinate and conduct an inspection of the well site, including the seismometer and recorder, with the Department's Bureau of Oil and Gas Management.

(21) Prior to operation of the disposal well, the permittee shall provide the Department with documentation showing how it complied with provision Part II, D.2.b. of the EPA UIC Permit, demonstrating that the well has mechanical integrity.

(22) The permittee shall notify the Department verbally within 24 hours and in writing within seven (7) days of obtaining information showing evidence of compromised mechanical integrity and immediately cease injection operations.

Other Conditions

(23) This permit modification is conditioned upon the existence of the Class II-D brine disposal Injection Well effective date November 10, 2014, U.S. EPA permit #PAS2D217BWAR ("EPA Permit")

(24) A wellbore diagram of the proposed Plugging and Abandonment Plan shall be provided to the Department with a "Notice of Intention by Well Operator to Plug Well" form (8000-FM-OOGM0005) prior to plugging the well.