

 <b>United States Environmental Protection Agency</b> <b>Underground Injection Control</b> <b>Permit Application</b> <i>(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)</i>		<b>I. EPA ID Number</b>     					
		T/A	C				
<b>Read Attached Instructions Before Starting</b> <b>For Official Use Only</b>		U					
<b>Application approved</b> mo day year		<b>Date received</b> mo day year					
		<b>Permit Number</b> 					
		<b>Well ID</b> 					
		<b>FINDS Number</b> 					
<b>II. Owner Name and Address</b> <b>Owner Name</b> Bear Lake Properties, LLC		<b>III. Operator Name and Address</b> <b>Owner Name</b> Bear Lake Properties, LLC					
<b>Street Address</b> 3000 Village Run Road, Unit 103, #223		<b>Phone Number</b> (724) 444-7501					
<b>City</b> Wexford		<b>State</b> PA					
<b>ZIP CODE</b> 15090		<b>ZIP CODE</b> 15090					
<b>IV. Commercial Facility</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<b>V. Ownership</b> <input checked="" type="checkbox"/> Private <input type="checkbox"/> Federal <input type="checkbox"/> Other					
<b>VI. Legal Contact</b> <input type="checkbox"/> Owner <input checked="" type="checkbox"/> Operator		<b>VII. SIC Codes</b> 1389 - Oil and Gas Field Services, Not Elsewhere Classified					
<b>VIII. Well Status (Mark "x")</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center; vertical-align: middle;"> <input type="checkbox"/> A  Operating </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <b>Date Started</b>  mo day year  </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <input checked="" type="checkbox"/> B. Modification/Conversion </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <input type="checkbox"/> C. Proposed </td> </tr> </table>				<input type="checkbox"/> A Operating	<b>Date Started</b> mo day year 	<input checked="" type="checkbox"/> B. Modification/Conversion	<input type="checkbox"/> C. Proposed
<input type="checkbox"/> A Operating	<b>Date Started</b> mo day year 	<input checked="" type="checkbox"/> B. Modification/Conversion	<input type="checkbox"/> C. Proposed				
<b>IX. Type of Permit Requested (Mark "x" and specify if required)</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center; vertical-align: middle;"> <input checked="" type="checkbox"/> A. Individual </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <input type="checkbox"/> B. Area </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <b>Number of Existing Wells</b>  1 </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <b>Number of Proposed Wells</b>  </td> </tr> </table>				<input checked="" type="checkbox"/> A. Individual	<input type="checkbox"/> B. Area	<b>Number of Existing Wells</b> 1	<b>Number of Proposed Wells</b> 
<input checked="" type="checkbox"/> A. Individual	<input type="checkbox"/> B. Area	<b>Number of Existing Wells</b> 1	<b>Number of Proposed Wells</b> 				
<b>X. Class and Type of Well (see reverse)</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center; vertical-align: middle;"> <b>A. Class(es)</b>  (enter code(s)) </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <b>B. Type(s)</b>  (enter code(s)) </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <b>C. If class is "other" or type is code 'x,' explain</b>  </td> <td style="width: 25%; text-align: center; vertical-align: middle;"> <b>D. Number of wells per type (if area permit)</b>  </td> </tr> </table>				<b>A. Class(es)</b> (enter code(s))	<b>B. Type(s)</b> (enter code(s))	<b>C. If class is "other" or type is code 'x,' explain</b> 	<b>D. Number of wells per type (if area permit)</b> 
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II	D						
<b>XI. Location of Well(s) or Approximate Center of Field or Project</b>							
<b>Latitude</b> Deg 41 Min 59 Sec 50.5		<b>Longitude</b> Deg 79 Min 32 Sec 27.5					
<b>Township and Range</b> Sec 1/4 Sec Twp Range		Feet From Line Feet From Line					
		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
<b>XIII. Attachments</b> <i>(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)</i> For Classes I, II, III, (and other classes) complete and submit on a separate sheet(s) Attachments A--U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.							
<b>XIV. Certification</b> 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)							
<b>A. Name and Title (Type or Print)</b> Karl Kimmich, President		<b>B. Phone No. (Area Code and No.)</b> (724) 444-7501					
<b>C. Signature</b> 		<b>D. Date Signed</b> 10/29/2010					

## Well Class and Type Codes

**Class I** Wells used to inject waste below the deepest underground source of drinking water.

**Type** "I" Nonhazardous industrial disposal well  
"M" Nonhazardous municipal disposal well  
"W" Hazardous waste disposal well injecting below USDWs  
"X" Other Class I wells (not included in Type "I," "M," or "W")

**Class II** Oil and gas production and storage related injection wells.

**Type** "D" Produced fluid disposal well  
"R" Enhanced recovery well  
"H" Hydrocarbon storage well (excluding natural gas)  
"X" Other Class II wells (not included in Type "D," "R," or "H")

**Class III** Special process injection wells.

**Type** "G" Solution mining well  
"S" Sulfur mining well by Frasch process  
"U" Uranium mining well (excluding solution mining of conventional mines)  
"X" Other Class III wells (not included in Type "G," "S," or "U")

**Other Classes** Wells not included in classes above.

Class V wells which may be permitted under §144.12.

Wells not currently classified as Class I, II, III, or V.

## Attachments to Permit Application

Class	Attachments
I new well	A, B, C, D, F, H – S, U
existing	A, B, C, D, F, H – U
II new well	A, B, C, E, G, H, M, Q, R; optional – I, J, K, O, P, U
existing	A, E, G, H, M, Q, R, – U; optional – J, K, O, P, Q
III new well	A, B, C, D, F, H, I, J, K, M – S, U
existing	A, B, C, D, F, H, J, K, M – U
Other Classes	To be specified by the permitting authority

## INSTRUCTIONS - Underground Injection Control (UIC) Permit Application

**Paperwork Reduction Act:** The public reporting and record keeping burden for this collection of information is estimated to average 224 hours for a Class I hazardous well application, 110 hours for a Class I non-hazardous well application, 67 hours for a Class II well application, and 132 hours for a Class III well application. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, DC 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

This form must be completed by all owners or operators of Class I, II, and III injection wells and others who may be directed to apply for permit by the Director.

- I. **EPA I.D. NUMBER** - Fill in your EPA Identification Number. If you do not have a number, leave blank.
- II. **OWNER NAME AND ADDRESS** - Name of well, well field or company and address.
- III. **OPERATOR NAME AND ADDRESS** - Name and address of operator of well or well field.
- IV. **COMMERCIAL FACILITY** - Mark the appropriate box to indicate the type of facility.
- V. **OWNERSHIP** - Mark the appropriate box to indicate the type of ownership.
- VI. **LEGAL CONTACT** - Mark the appropriate box.
- VII. **SIC CODES** - List at least one and no more than four Standard Industrial Classification (SIC) Codes that best describe the nature of the business in order of priority.
- VIII. **WELL STATUS** - Mark Box A if the well(s) were operating as injection wells on the effective date of the UIC Program for the State. Mark Box B if wells(s) existed on the effective date of the UIC Program for the State but were not utilized for injection. Box C should be marked if the application is for an underground injection project not constructed or not completed by the effective date of the UIC Program for the State.
- IX. **TYPE OF PERMIT** - Mark "Individual" or "Area" to indicate the type of permit desired. Note that area permits are at the discretion of the Director and that wells covered by an area permit must be at one site, under the control of one person and do not inject hazardous waste. If an area permit is requested the number of wells to be included in the permit must be specified and the wells described and identified by location. If the area has a commonly used name, such as the "Jay Field," submit the name in the space provided. In the case of a project or field which crosses State lines, it may be possible to consider an area permit if EPA has jurisdiction in both States. Each such case will be considered individually, if the owner/operator elects to seek an area permit.
- X. **CLASS AND TYPE OF WELL** - Enter in these two positions the Class and type of injection well for which a permit is requested. Use the most pertinent code selected from the list on the reverse side of the application. When selecting type X please explain in the space provided.
- XI. **LOCATION OF WELL** - Enter the latitude and longitude of the existing or proposed well expressed in degrees, minutes, and seconds or the location by township, and range, and section, as required by 40 CFR Part 146. If an area permit is being requested, give the latitude and longitude of the approximate center of the area.
- XII. **INDIAN LANDS** - Place an "X" in the box if any part of the facility is located on Indian lands.
- XIII. **ATTACHMENTS** - Note that information requirements vary depending on the injection well class and status. Attachments for Class I, II, III are described on pages 4 and 5 of this document and listed by Class on page 2. Place EPA ID number in the upper right hand corner of each page of the Attachments.
- XIV. **CERTIFICATION** - All permit applications (except Class II) must be signed by a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, and by a principal executive or ranking elected official for a public agency. For Class II, the person described above should sign, or a representative duly authorized in writing.

Attachments to be submitted with permit application for Class I, II, III and other wells.

- A. **AREA OF REVIEW METHODS** - Give the methods and, if appropriate, the calculations used to determine the size of the area of review (fixed radius or equation). The area of review shall be a fixed radius of 1/4 mile from the well bore unless the use of an equation is approved in advance by the Director.
- B. **MAPS OF WELL/AREA AND AREA OF REVIEW** - Submit a topographic map, extending one mile beyond the property boundaries, showing the injection well(s) or project area for which a permit is sought and the applicable area of review. The map must show all intake and discharge structures and all hazardous waste treatment, storage, or disposal facilities. If the application is for an area permit, the map should show the distribution manifold (if applicable) applying injection fluid to all wells in the area, including all system monitoring points. Within the area of review, the map must show the following:

#### **Class I**

The number, or name, and location of all producing wells, injection wells, abandoned wells, dryholes, surface bodies of water, springs, mines (surface and subsurface), quarries, and other pertinent surface features, including residences and roads, and faults, if known or suspected. In addition, the map must identify those wells, springs, other surface water bodies, and drinking water wells located within one quarter mile of the facility property boundary. Only information of public record is required to be included in this map;

#### **Class II**

In addition to requirements for Class I, include pertinent information known to the applicant. This requirement does not apply to existing Class II wells;

#### **Class III**

In addition to requirements for Class I, include public water systems and pertinent information known to the applicant.

- C. **CORRECTIVE ACTION PLAN AND WELL DATA** - Submit a tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review, including those on the map required in B, which penetrate the proposed injection zone. Such data shall include the following:

#### **Class I**

A description of each well's types, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require. In the case of new injection wells, include the corrective action proposed to be taken by the applicant under 40 CFR 144.55.

#### **Class II**

In addition to requirement for Class I, in the case of Class II wells operating over the fracture pressure of the injection formation, all known wells within the area of review which penetrate formations affected by the increase in pressure. This requirement does not apply to existing Class II wells.

#### **Class III**

In addition to requirements for Class I, the corrective action proposed under 40 CFR 144.55 for all Class III wells.

- D. **MAPS AND CROSS SECTION OF USDWs** - Submit maps and cross sections indicating the vertical limits of all underground sources of drinking water within the area of review (both vertical and lateral limits for Class I), their position relative to the injection formation and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection. (Does not apply to Class II wells.)

E. **NAME AND DEPTH OF USDWS (CLASS II)** - For Class II wells, submit geologic name and depth to bottom of all underground sources of drinking water which may be affected by the injection.

F. **MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA** - Submit maps and cross sections detailing the geologic structure of the local area (including the lithology of injection and confining intervals) and generalized maps and cross sections illustrating the regional geologic setting. (Does not apply to Class II wells.)

G. **GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II)** - For Class II wells, submit appropriate geological data on the injection zone and confining zones including lithologic description, geological name, thickness, depth and fracture pressure.

H. **OPERATING DATA** - Submit the following proposed operating data for each well (including all those to be covered by area permits): (1) average and maximum daily rate and volume of the fluids to be injected; (2) average and maximum injection pressure; (3) nature of annulus' fluid; (4) for Class I wells, source and analysis of the chemical, physical, radiological and biological characteristics, including density and corrosiveness, of injection fluids; (5) for Class II wells, source and analysis of the physical and chemical characteristics of the injection fluid; (6) for Class III wells, a qualitative analysis and ranges in concentrations of all constituents of injected fluids. If the information is proprietary, maximum concentrations only may be submitted, but all records must be retained.

I. **FORMATION TESTING PROGRAM** - Describe the proposed formation testing program. For Class I wells the program must be designed to obtain data on fluid pressure, temperature, fracture pressure, other physical, chemical, and radiological characteristics of the injection matrix and physical and chemical characteristics of the formation fluids. For Class II wells the testing program must be designed to obtain data on fluid pressure, estimated fracture pressure, physical and chemical characteristics of the injection zone. (Does not apply to existing Class II wells or projects.) For Class III wells the testing must be designed to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if the formation is naturally water bearing. Only fracture pressure is required if the program formation is not water bearing. (Does not apply to existing Class III wells or projects.)

J. **STIMULATION PROGRAM** - Outline any proposed stimulation program.

K. **INJECTION PROCEDURES** - Describe the proposed injection procedures including pump, surge, tank, etc.

L. **CONSTRUCTION PROCEDURES** - Discuss the construction procedures (according to §146.12 for Class I, §146.22 for Class II, and §146.32 for Class III) to be utilized. This should include details of the casing and cementing program, logging procedures, deviation checks, and the drilling, testing and coring program, and proposed annulus fluid. (Request and submission of justifying data must be made to use an alternative to packer for Class I.)

M. **CONSTRUCTION DETAILS** - Submit schematic or other appropriate drawings of the surface and subsurface construction details of the well.

N. **CHANGES IN INJECTED FLUID** - Discuss expected changes in pressure, native fluid displacement, and direction of movement of injection fluid. (Class III wells only.)

O. **PLANS FOR WELL FAILURES** - Outline contingency plans (proposed plans, if any, for Class II) to cope with all shut-ins or wells failures, so as to prevent migration of fluids into any USDW.

P. **MONITORING PROGRAM** - Discuss the planned monitoring program. This should be thorough, including maps showing the number and location of monitoring wells as appropriate and discussion of monitoring devices, sampling frequency, and parameters measured. If a manifold monitoring program is utilized, pursuant to §146.23(b)(5), describe the program and compare it to individual well monitoring.

Q. **PLUGGING AND ABANDONMENT PLAN** - Submit a plan for plugging and abandonment of the well including: (1) describe the type, number, and placement (including the elevation of the top and bottom) of plugs to be used; (2) describe the type, grade, and quantity of cement to be used; and (3) describe the method to be used to place plugs, including the method used to place the well in a state of static equilibrium prior to placement of the plugs. Also for a Class III well that underlies or is in an exempted aquifer, demonstrate adequate protection of USDWs. Submit this information on EPA Form 7520-14, Plugging and Abandonment Plan.

R. **NECESSARY RESOURCES** - Submit evidence such as a Safety Bond or financial statement to verify that the resources necessary to close, plug or abandon the well are available.

S. **AQUIFER EXEMPTIONS** - If an aquifer exemption is requested, submit data necessary to demonstrate that the aquifer meets the following criteria: (1) does not serve as a source of drinking water; (2) cannot now and will not in the future serve as a source of drinking water; and (3) the TDS content of the ground water is more than 3,000 and less than 10,000 mg/l and is not reasonably expected to supply a public water system. Data to demonstrate that the aquifer is expected to be mineral or hydrocarbon production, such as general description of the mining zone, analysis of the amenability of the mining zone to the proposed method, and time table for proposed development must also be included. For additional information on aquifer exemptions, see 40 CFR Sections 144.7 and 146.04.

T. **EXISTING EPA PERMITS** - List program and permit number of any existing EPA permits, for example, NPDES, PSD, RCRA, etc.

U. **DESCRIPTION OF BUSINESS** - Give a brief description of the nature of the business.



21335 Signal Hill Plaza, Suite 100, Sterling, VA 20164 703-444-7000 703-444-1685 (FAX)

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## TECHNICAL MEMORANDUM

**TO:** Dale Skoff, Tetra Tech NUS

**FROM:** Jeffrey Benegar

**DATE:** October 4, 2010

**RE:** Area of Review/Zone of Endangerment Analysis for Bittinger #1 and #4 Well – Bear Lake Properties

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### EXECUTIVE SUMMARY

This technical memorandum (TM) summarizes the analytical modeling we have performed for the area of review/zone of endangerment analysis for the potential brine disposal injection wells, Bittinger #1 and #4, located in Columbus Township, Warren County, Pennsylvania. The relevant parameters for our analysis were obtained from Bear Lake Properties, LLC or estimated in the absence of any information. Our analysis is described in more detail below.

### OVERVIEW AND METHODOLOGY

There are several methods proposed for calculating the zone of endangerment of an injection well. The most simplistic method is the use of a fixed radius, based on the type of injection well being permitted. Other methods involve calculation of the radius based on well and formation properties. Most regulatory agencies require the use of calculations to determine the zone of endangerment. The method used here is the graphical method first used by US EPA Region 6. It involves the calculation of the increase of pressure in the formation due to injection, then converting that pressure into equivalent feet of head. The increase in head in the formation due to injection is then compared to the equivalent head of the lowest most underground source of drinking water (USDW). When plotted graphically, the intersection of those two curves at some distance,  $r$ , determines the radius of the zone of endangerment.

The increase in pressure in the formation due to injection depends on the properties of the injection fluid and the formation, the rate of fluid injection, and the length of time of injection. The most common mathematical expression to describe this increase in pressure was developed by Matthews and Russell (1967). Matthews and Russell assume that, for a single well injecting

into an infinite, homogeneous and isotropic, non-leaking formation, the increase in pressure (delta p) can be described as:

$\Delta p = 162.6 Q\mu / kh * [(\log(kt / \Phi\mu Cr^2) - 3.23)]$  where:

$\Delta p$  = pressure change (psi) at radius,  $r$  and time,  $t$

$Q$  = injection rate (barrels/day)

$\mu$  = injectate viscosity (centipoise)

$k$  = formation permeability (millidarcies)

$h$  = formation thickness (feet)

$t$  = time since injection began (hours)

$C$  = compressibility (total, sum of water and rock compressibility) (psi<sup>-1</sup>)

$r$  = radial distance from wellbore to point of investigation (feet)

$\Phi$  = average formation porosity (decimal)

## PARAMETERS USED IN THE ANALYSIS

The following parameters were used in the zone of endangerment analysis. There are several parameters that are unknown, including injection rate and formation permeability. For injection rate, we used the average and maximum rates expected. For permeability, we estimated a value considered representative of the average of the upper and lower range of values for this parameter.

### Bittinger #1 Medina Group Well

$Q$  = 1000 (average rate) or 2000 (maximum rate) barrels/day

$t$  = 10 years = 87,600 hours

$\mu$  = 1 centipoise

$k$  = 100 md

$h$  = 30 feet

$C$  = 3.0e-06 psi<sup>-1</sup>

$\Phi$  = 0.08

Specific gravity of injectate = 1.218

Surface elevation = 1518 feet

Depth to injection formation = 4210 feet

Base of lowest most USDW = 1218 feet in elevation (depth of 300 feet below surface)

Initial pressure at top of injection formation = 128 psi

### Bittinger #4 Medina Group Well

$Q$  = 1000 (average rate) or 2000 (maximum rate) barrels/day

$t$  = 10 years = 87,600 hours

$\mu$  = 1 centipoise

$k$  = 100 md

$h$  = 30 feet

$C$  = 3.0e-06 psi<sup>-1</sup>

$\Phi$  = 0.08

Specific gravity of injectate = 1.218

Surface elevation = 1561 feet

Depth to injection formation = 4285 feet

Base of lowest most USDW = 1261 feet in elevation (depth of 300 feet below surface)  
 Initial pressure at top of injection formation = 128 psi

## RESULTS

The Matthews and Russell equation was solved for various distances from the wellbore based on the parameters listed above. The distance between the Bittinger #1 and #4 wells is approximately  $\frac{1}{4}$  mile. The Matthews and Russell equation was used to calculate the increase in pressure in the formation with only one of these wells injecting. The results are shown in Table 1 for the two scenarios simulated. This increase in pressure was added to the values of delta p and the existing pressure in the injection formation to obtain the total pressure in the formation when both wells are injecting.

Table 1. Increase in pressure in formation due to both Bittinger wells injecting.

Scenario	Increase in pressure (psi)
Q = 1000 bpd, k = 100 md	222
Q = 2000 bpd, k = 100 md	443

These values were then converted to feet of head of formation brine. The values are plotted against distance from the wellbore and are shown in Figure 1 for the Bittinger wells for the two scenarios simulated (e.g., 2 unknowns: 2 injection rates and 1 permeability value). The plot shows the calculated pressure surface within the injection formation, measured as feet of head of formation brine above the top of the injection formation. Also shown is the head of the lowest most USDW. Where the two lines intersect, the radius of the zone of endangerment can be estimated. The increase in head in the formation due to injection will remain below the elevation of the lowest most USDW assuming even worst-case conditions (maximum injection rate of 2000 bpd).

As indicated above, certain input parameters (e.g., permeability) were approximated due to lack of site-specific data. In order to validate the findings of the analysis presented above, Bear Lake Properties plans to monitor fluid levels in the monitoring wells designated below on a semiannual basis. The proposed monitoring wells were all completed in the Medina Group rocks, as were the two proposed injection wells.

Injection Well	Monitoring Well	Approximate Distance and Direction From Injection Well
Bittinger #1	Bittinger #4 (unless injection also being performed in Bittinger #4)	0.25 mi to the south
	R. Trisket 2	0.34 mi to the west
	Smith/Ras Unit 1	0.29 mi to the east
Bittinger #4	Bittinger #1(unless injection also being performed in Bittinger #1)	0.25 mi to the north
	R. Trisket 1	0.33 mi to the west
	Joseph Bittinger 2	0.37 mi to the southeast

Should fluid levels in any of the monitoring wells rise to within 100 ft of the lowest most USDW (indicated above), then injection would cease, EPA notified and steps taken to adjust the injection rate to prevent fluid levels from rising to within 100 ft of the lowest most USDW in any of the monitoring wells.

## **CONCLUSIONS**

Our analysis of the area of review/zone of endangerment for the Bittinger #1 and #4 wells injecting together is based on a methodology typically used by US EPA. Based on the results, we believe the wells are excellent candidates for use as brine disposal wells. The analysis indicates that the increase in head in the formation due to injection will remain below the elevation of the lowest most USDW. The standard fixed radius of  $\frac{1}{4}$  mile can be used for the area of review/zone of endangerment for the Bittinger #1 and #4 wells. As indicated above, Bear Lake Properties plans to perform monitoring of nearby wells to validate the results of this analysis.

## **REFERENCES**

Matthews, C.S., Russell, D.G., (1967) Pressure Buildup and Flow Tests in Wells, SPE Monograph Series, Volume 1, New York.

## **FIGURES**

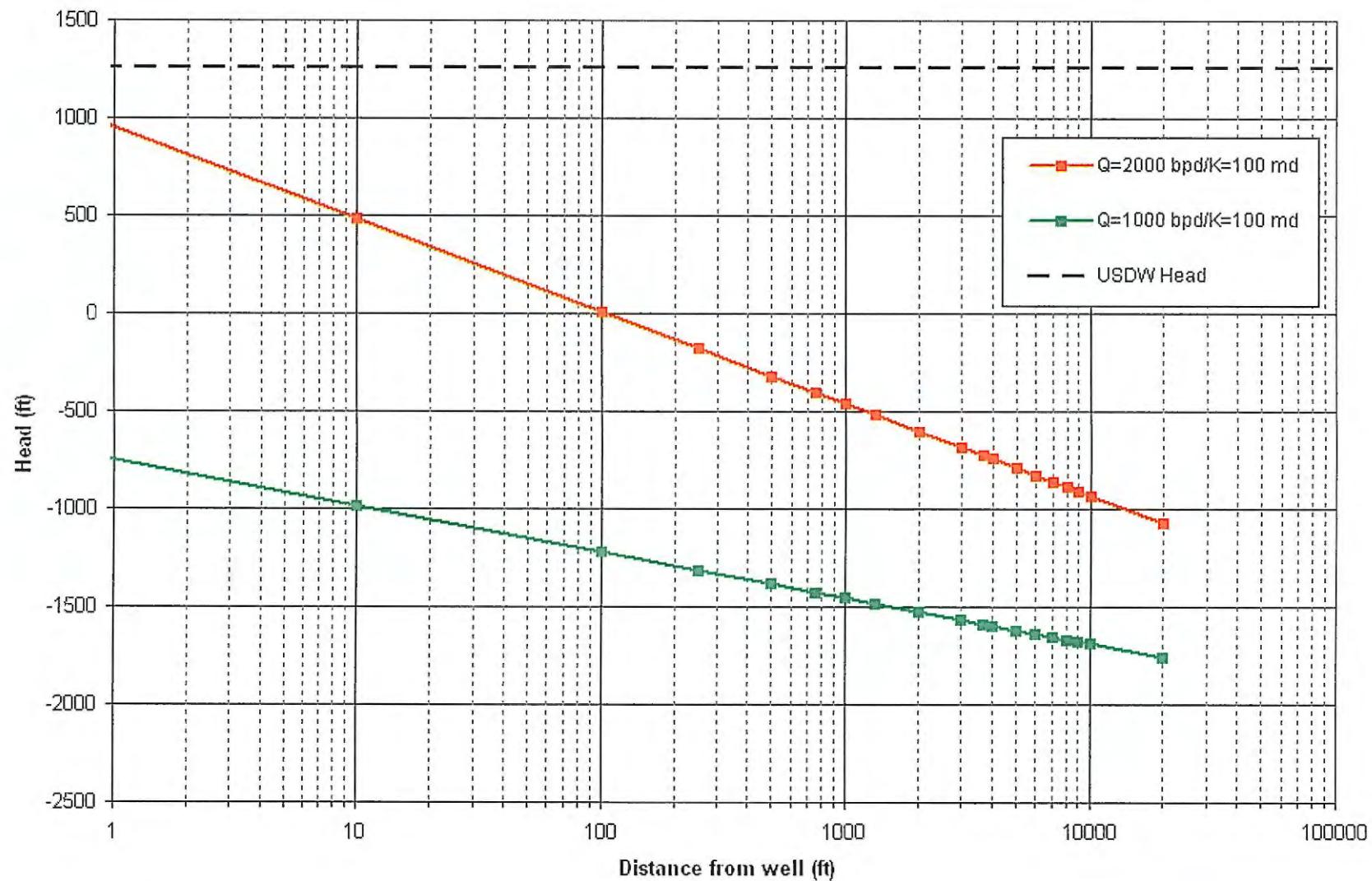


Figure 1. Feet of head of injection formation and USDW vs. distance from the well for Bittinger #1 and #4 well when both wells are injecting.

**AREA OF REVIEW**  
**WELLS WITHIN 0.25 MILES**

## Bittinger Area; Columbus Twp; Warren County, PA

Wells w/in 0.25 mile radius of Bittinger #4

	API #	TD	Drilling Completed	Last Csg	Csg depth	Completion	Comments
<b>Proposed Injection and Monitoring Wells</b>							
Bittinger #1	123-33914	4467	12/29/1983	4.5	4416	Perf'd & Frac'd: 4210-4327'	Subject of separate UIC Class II permit application
Bittinger #4	123-39874	4496	8/15/1987	4.5	4455	Perf'd & Frac'd: 4285-4302'; & 4352-4365'	
<b>Existing / Former Oil and Gas Wells</b>							
Bittinger #1	123-33914	4467	12/29/1983	4.5	4416	Perf'd & Frac'd: 4210-4327'	Subject of separate UIC Class II permit application
<b>Water Wells</b>							

#### **Area of Review**

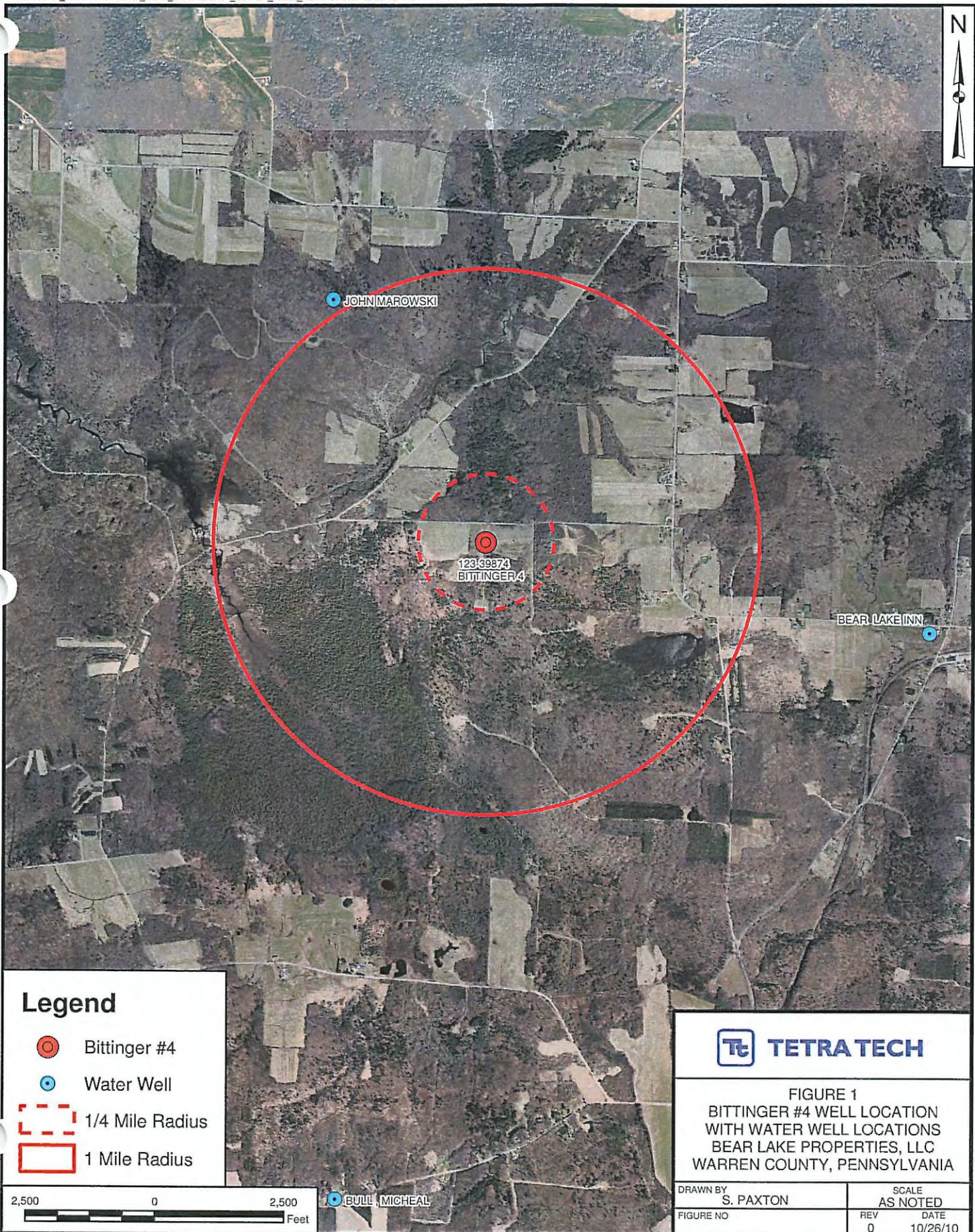
According to available records in the area, there are no intake or discharge structures, hazardous waste treatment, storage, or disposal facilities, mines, or quarries within one mile of the Bittinger #4 well. An intermittent unnamed tributary (UNT) to Tamarack Swamp is located approximately 0.25 miles south of the Bittinger #4 well. Tamarack Swamp is located approximately 0.75 to 1 mile west-southwest, Brokenstraw Creek is located approximately 0.5 miles northwest, and an UNT to Pine Valley Creek is located approximately 0.75 miles southeast of Bittinger #4.

According to publicly available records, there are no groundwater wells within  $\frac{1}{4}$  mile of the Bittinger #4 well. The nearest groundwater well is located approximately 1 mile to the northwest. The only oil and gas well located within  $\frac{1}{4}$  mile of the Bittinger #4 is the Bittinger #1 located approximately  $\frac{1}{4}$  mile to the south, which is also a proposed injection well and the subject of a UIC Class II Well permit application.

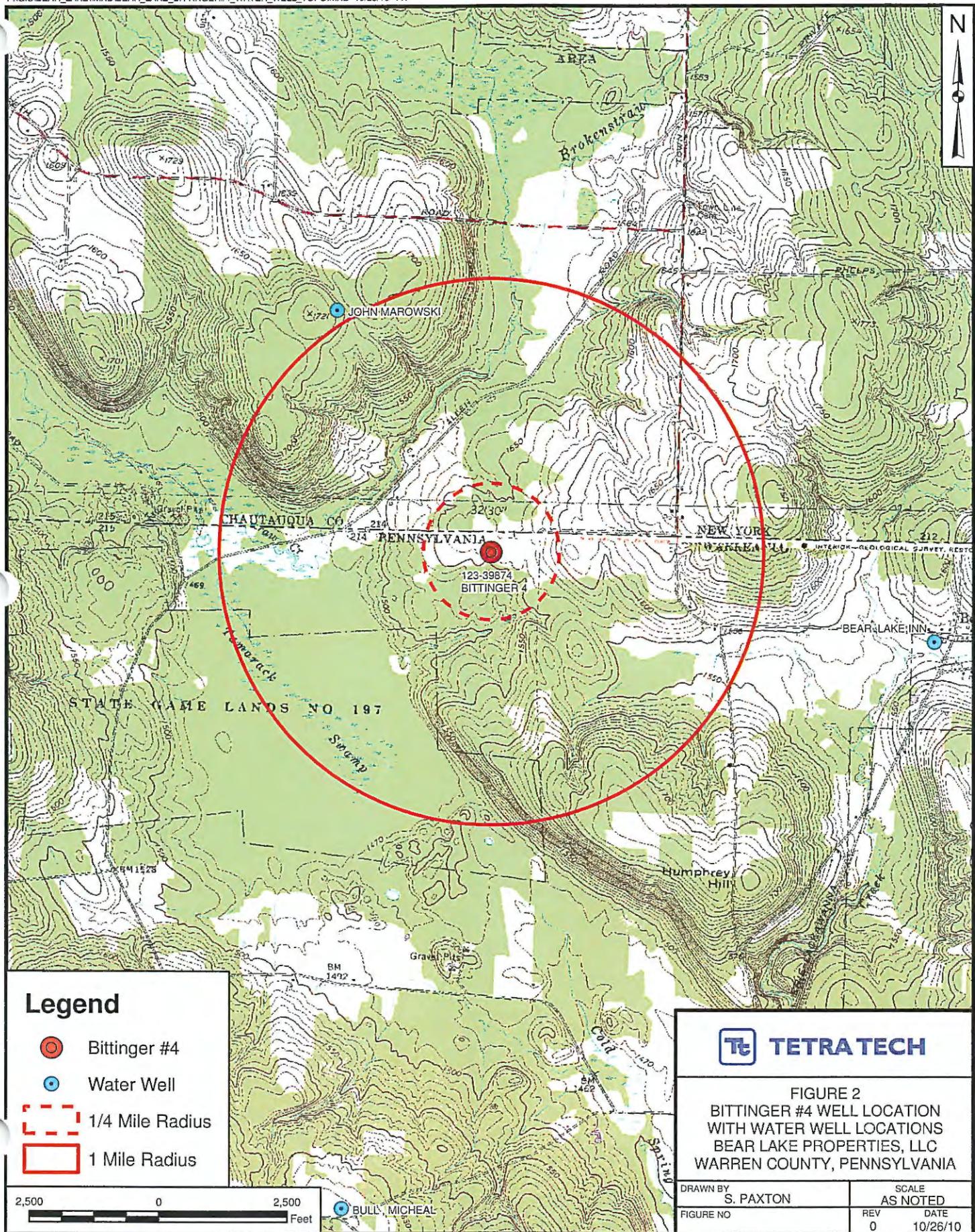
The names and addresses of residents located within  $\frac{1}{4}$  mile of the proposed injection well are provided in Appendix B.

**AREA OF REVIEW MAPS  
GROUNDWATER WELLS**

P:\GIS\BEAR LAKE\MXD\BEAR LAKE\_BITTINGER#4\_WATER WELL\_AERIAL.MXD 10/26/10 TW



PAGISBEAR\_LAKEMXDBEAR\_LAKE\_BITTINGER#4\_WATER\_WELL\_TOPO.MXD 10/26/10 TW



**AREA OF REVIEW MAPS**

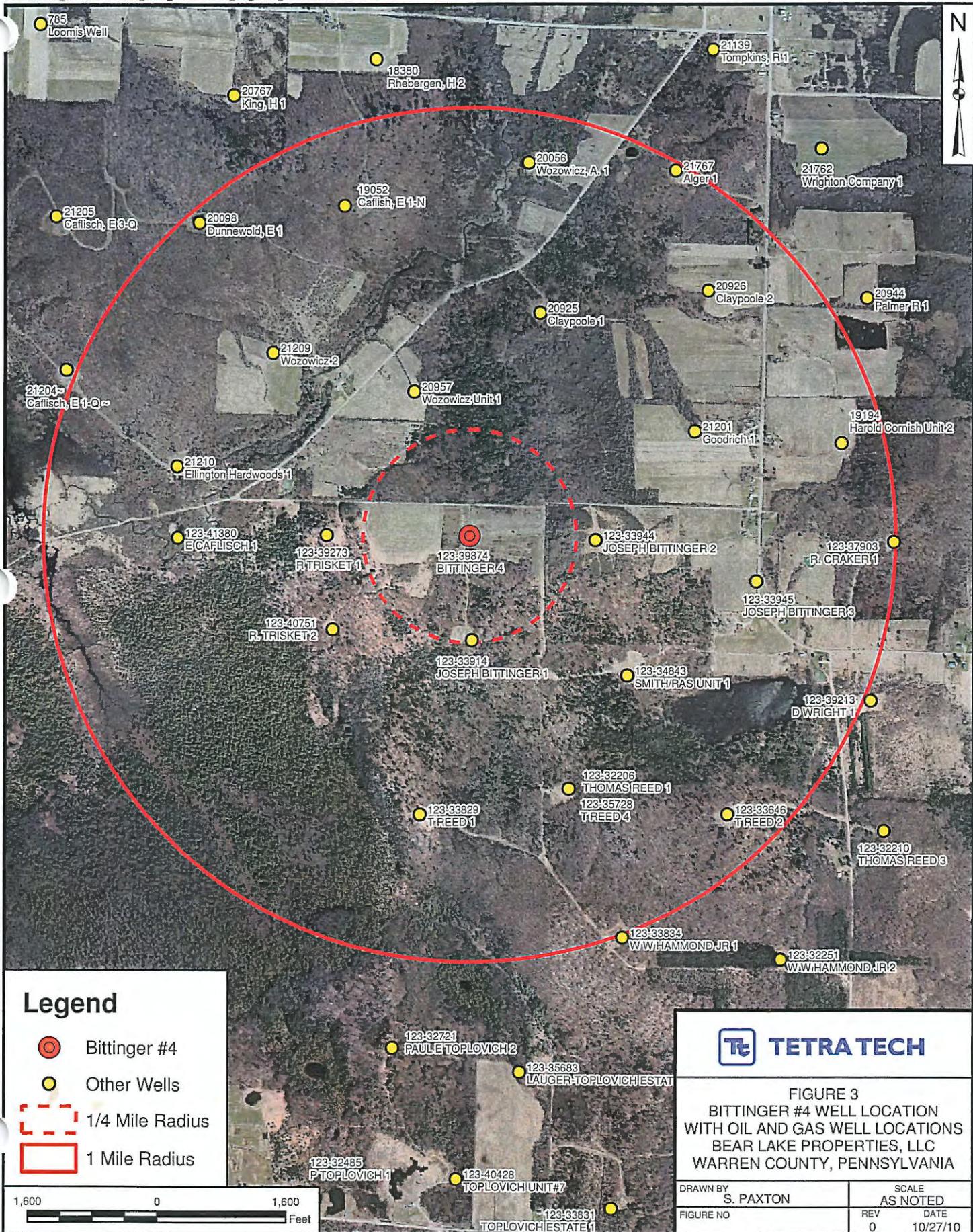
**OIL AND GAS WELLS**

STATELINE RD  
41°05'59.54.2" 079°31'41.1"

For assistance in accessing this document, please contact: R3\_UIC\_Mailbox@epa.gov

SPOT FWD  
WZOWICZ UNIT 1

PAGIS-BEAR\_LAKE.MXD|BEAR\_LAKE\_BITTINGER#4\_OG\_WELL\_AERIAL.MXD 10/27/10 TW



## **Corrective Action Plan and Well Data**

According to available records of oil and gas wells, there are no existing, or plugged and abandoned wells within a  $\frac{1}{4}$  mile radius area of review of the proposed injection point at Bittinger No. 4, with the exception of Bittinger No. 1 which is approximately  $\frac{1}{4}$  mile south of the proposed injection point. Bittinger No. 1 is the subject of a separate injection well permit application and therefore is not slated for corrective action.

The Bittinger No. 1 well will be used as a monitoring well until such time as the well is put into production. While being used as a monitoring well, if the fluid level is observed to rise up to within 100 feet of the base of the USDW, disposal operations in Bittinger No. 4 well will be stopped immediately, EPA will be notified, and operating conditions will be evaluated in order to control the fluid levels.

### **Existing Oil and Gas Wells within the Area of Review**

Well completion records are required to be submitted for all wells located within the area of review in order to evaluate the need for corrective action specific to each well. The well log for Bittinger No. 1 is provided as an attachment. No corrective action is needed for this well because it is also the subject of a separate injection well permit.

### **Plugged and Abandoned Wells**

There are no plugged and abandoned wells located within the  $\frac{1}{4}$  mile area of review for the Bittinger No. 4 well. Therefore, the no plugging records or well logs are provided as part of the corrective action plan.

Underground Sources of Drinking Water – Bittinger No. 4/Columbus Township,  
Warren County, PA

The site lies within the Glaciated Plateau section of the Appalachian Plateaus Physiographic province. Both unconsolidated glacial units and bedrock are used for potable water. The uppermost unit at the site is mapped as Wisconsin age glacial outwash deposits, which includes valley train, river terrace, and lake deposits. Outwash deposits consist primarily of bedded sand, silt, clay, and mixed sand and gravel. The well log for Bittinger No. 4 indicates that unconsolidated gravel is present from the surface to a depth of 36 feet below ground surface. (Pennsylvania Topographic and Geologic Survey, 1959)

The uppermost bedrock beneath the site is mapped as the Devonian age Venango formation. The Venango formation consists of interbedded pebble conglomerate, crossbedded sandstone, siltstone, and shale. This unit is up to 330 feet thick in Venango County; however, only a portion of the unit is present in the site area. This unit is used as an aquifer throughout Warren County. The well log for Bittinger No. 1 indicates that Devonian age shale is present from 37 ft to a depth of 2,679 ft below ground surface. This is believed to include the Venango Formation, the Chadakoin formation, and the underlying Bradford Group. The Bittinger No. 1 well log indicated that salt water was encountered at a depth of 3,935 feet below ground surface. Wells deeper than 100 feet deep usually encounter salt water, which is supported by the generally shallow well depths in Columbus township. (PADER, 1982, US Geologic Survey, 2007)

The Devonian age Chadakoin formation underlies Venango formation and consists of fine-grained marine clastics (siltstone and shale) and includes a purplish pink sequence which is often used as a marker unit. This unit is up to 450 thick in Warren County.

The Pennsylvania Geologic Survey "Ground Water Inventory System" (GWIS) and the New York State Department of Environmental Conservation databases were accessed to determine the sources of groundwater sources in the site area. The Pennsylvania data base contained a total of 1 groundwater wells and the New York database listed 4 groundwater wells within a one-mile radius of Bittinger #4 well. These wells range from 60 to 125 feet deep. The depth to bedrock ranges from 14 to 98 feet below ground surfaces. The wells were all completed within the bedrock unit. The listed information for these wells is provided in Appendix A. Although there are 5 total wells listed, the well reporting requirement was established in 1968 is not considered to be a complete record of water wells and other wells may be present. (Pennsylvania Topographic and Geologic Survey, September 15, 2010)

To better understand the underground sources of drinking water, the GWIS was searched for all wells within Columbus Township. Available well records for wells in Columbus Township are provided in Appendix A. The GWIS indicated that there are 35 recorded water wells in Columbus Township. The deepest well is listed as 130 feet deep, with reported well depths ranging from 42 to 130 feet deep. (Pennsylvania Topographic and Geologic Survey, September 20, 2009)

Based on the available information, the glacial units and the top 100 feet of bedrock is considered as the underground sources of drinking water in the site area. The well logs indicate that the glacial material is approximately 18 feet thick beneath the site. Freshwater is expected to be encountered to a depth of approximately 150 feet with increasing salinity beyond a depth of 150 feet. Bittinger No. 4 has surface casing to a depth of 506 feet below ground surface, providing a buffer of approximately 350 beyond the base of the underground sources of drinking water based on the well data in Columbus Township (maximum well depth of 130 feet) and the references indicating brine being encountered at depths over 100 feet within the bedrock units. Production casing extends several thousands of feet below the drinking water sources and the injection interval is at a depth from 4362 to 44459 feet below the ground surface.

For the purpose of this application, the depth of the deepest well in the area 130 feet (it is believed that the generally shallow well depth in the area was related to water quality issues based on the available literature) was doubled and rounded upward to the nearest 100 feet, providing a conservative maximum depth estimate of the underground source of drinking water of 300 feet.

References:

Pennsylvania Topographic and Geologic Survey, 1959. "Glacial Geology of Northwestern, PA." Bulletin G 32.

Pennsylvania Topographic and Geologic Survey, 1981. "Atlas of Preliminary Quadrangle Maps of Pennsylvania, PA." Map 61.

PADER, 1982. "Engineering Characteristics of the Rocks of Pennsylvania". Environmental Geology Report 1.

Pennsylvania Topographic and Geologic Survey, September 15/20, 2010. "Ground Water Inventory System". [www.dcnr.state.pa.us/topogeo/groundwater/PAGWIS](http://www.dcnr.state.pa.us/topogeo/groundwater/PAGWIS)

US Geologic Survey, 2007. "Ground-Water Resources and the Hydrologic Effects of Petroleum Occurrence and Development, Warren County, Northwestern Pennsylvania." Scientific Investigations Report 2006-5263.

**UNDERGROUND SOURCES OF DRINKING WATER**  
**BEDROCK MAP**

P:\GIS\BEAR\_LAKE\MAPDOCS\XDX\BITTINGER\_BEDROCK.MXD 10/26/10 TW

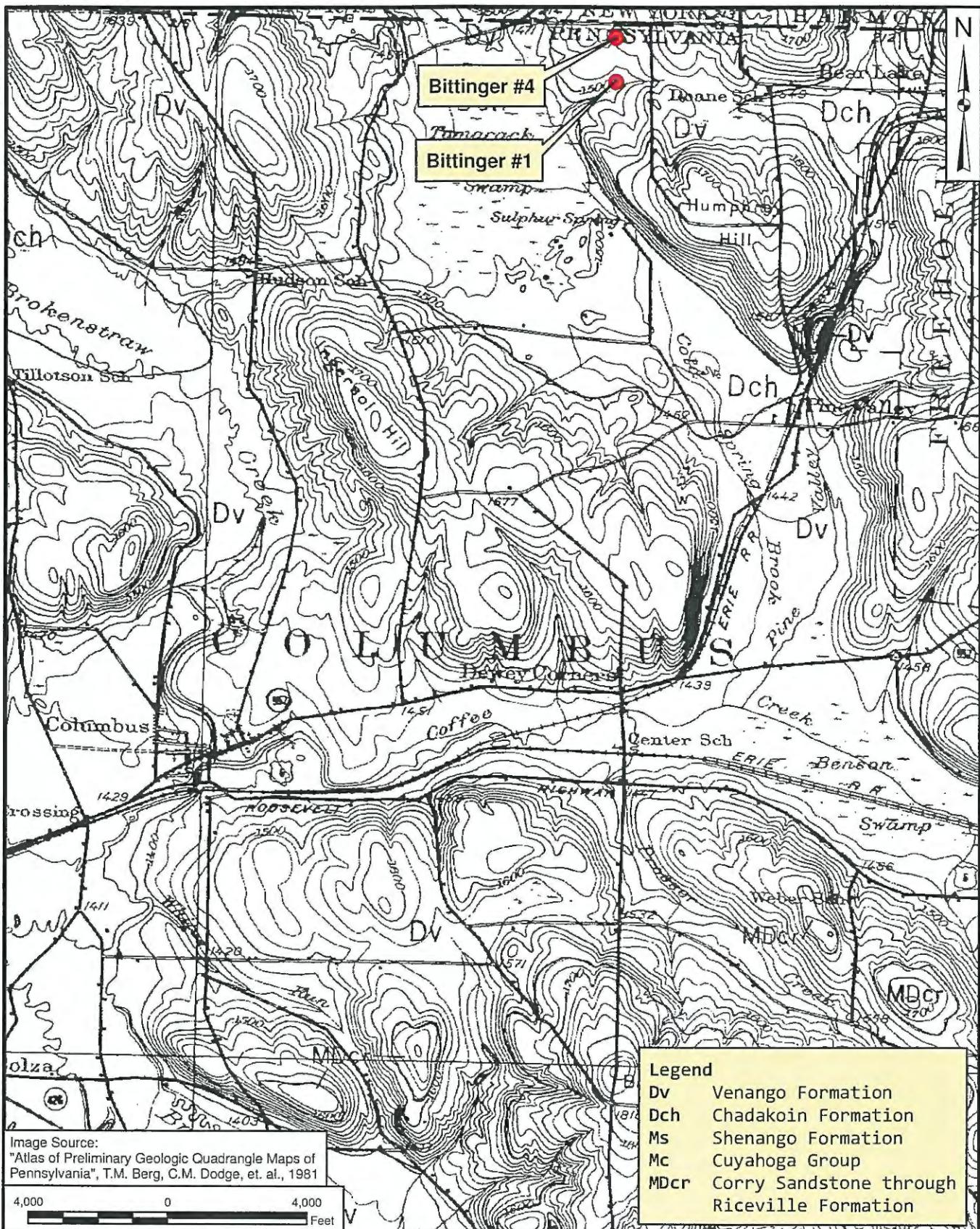


Image Source:  
"Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania", T.M. Berg, C.M. Dodge, et. al., 1981

4,000                    0                    4,000  
Feet



TETRA TECH

BEDROCK MAP  
BITTINGER #1 AND #4 WELLS  
BEAR LAKE PROPERTIES, LLC  
WARREN COUNTY, PENNSYLVANIA

SCALE AS NOTED	
DRAWN BY	DATE
J. ENGLISH	09/28/10
REV	DATE
0	_____
FIGURE NUMBER	
FIGURE NO.	

**UNDERGROUND SOURCES OF DRINKING WATER**

**GLACIAL MAP**

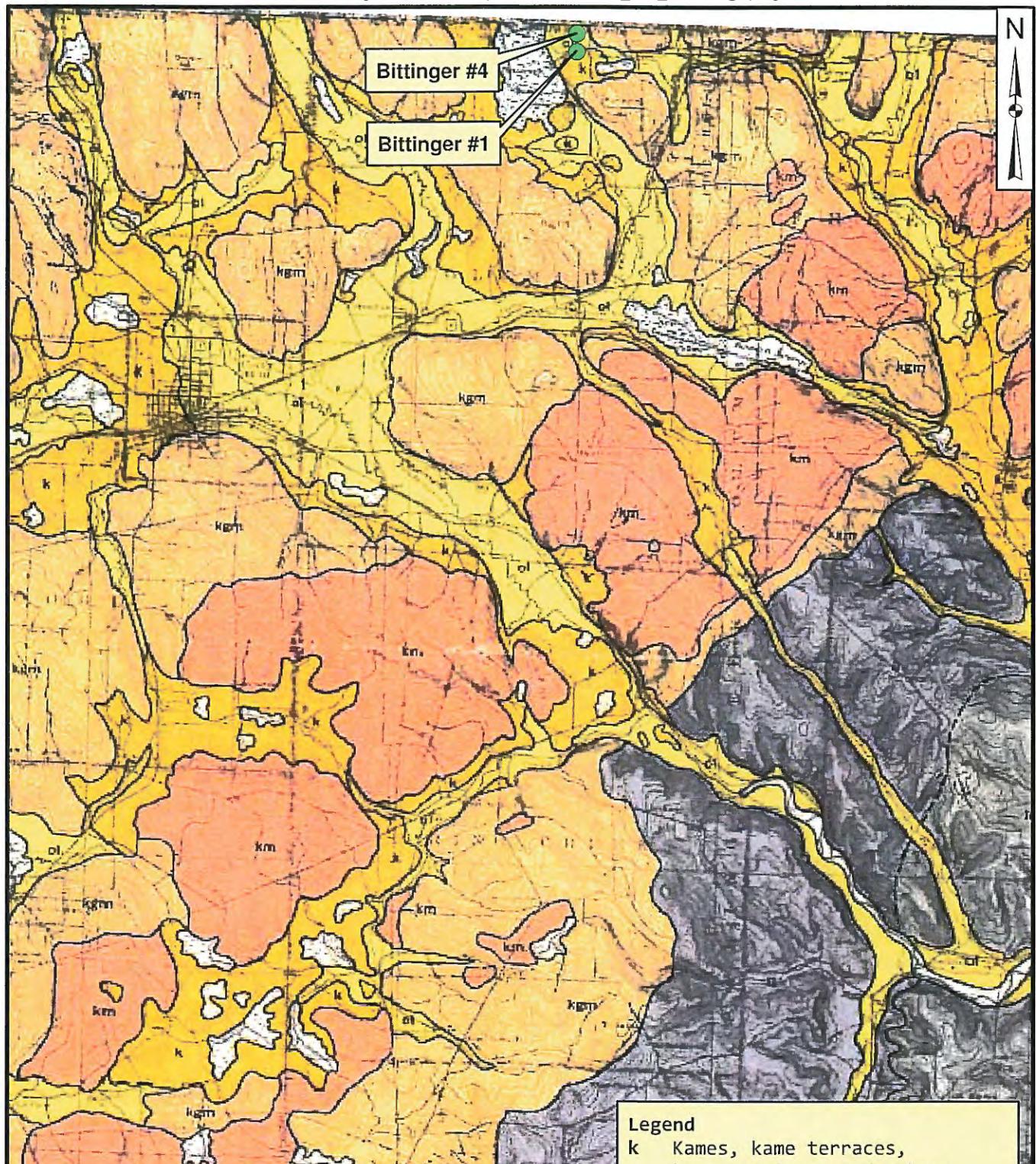


Image Source:  
"Glacial Geology of Northwestern Pennsylvania", V.C. Shepps, G.W. White, J.B. Droste, and R.F. Sitler, 1959

### Legend

**k** Kames, kame terraces,  
kame moraines, and eskers

- Outwash (valley trains), river terraces, lake deposits including beaches of former high levels of Lake Erie



TETRA TECH

GLACIAL MAP  
BITTINGER #1 AND #4 WELLS  
BEAR LAKE PROPERTIES, LLC  
WARREN COUNTY, PENNSYLVANIA

SCALE	
AS NOTED	
DRAWN BY	DATE
J. ENGLISH	09/29/10
REV	DATE
0	_____
FIGURE NUMBER	
FIGURE NO.	

**Section 5 – Geologic Data On Injection and Confining Zone**

**Revised Pages**

**Maximum Injection Pressure (MIP) Calculations for Bear Lake Properties Wells  
(Bittinger #1 and Bittinger #4)**

**1) Frac Gradient Based on Trisket #1 and Trisket #2 Wells**

R. Trisket #1

$$FG = [ISIP + (.433 \times SG \times D)] / D$$

Where:

ISIP = 2150 psi

SG = 1.0

D = 4253

R. Trisket #2

$$FG = [ISIP + (.433 \times SG \times D)] / D$$

Where:

ISIP = 2100 psi

SG = 1.0

D = 4254 ft

Well	ISIP (psi)*	Hydrostatic		Fracture Gradient	
		Factor (psi/ft)	SG	D (ft)	(psi/ft)
R. Trisket #1	2150	0.433	1.0	4253	0.939
R. Trisket #2	2100	0.433	1.0	4254	0.927
		Average Frac Gradient		0.933	

**2) Maximum Injection Pressure (MIP) Using Average Frac Gradient From Trisket Wells**

$$MIP = [FG - (.433 \times SG)] \times D$$

Bittinger #1      Bittinger #4

Depth:

Top Perf	4210	4285	Top of Perforations Used For Calculation
Bottom Perf	4327	4365	
Difference	117	80	
Mid-Point	4269	4325	

		Hydrostatic			Fracture Gradient (psi/ft)	MIP (Surface)
		Factor (psi/ft)	SG	D (ft)		
Bittinger #1	-	0.433	1.218	4210	0.933	1706
Bittinger #4	-	0.433	1.218	4285	0.933	1736

**Section 5 – Geologic Data On Injection and Confining Zone**

**Revised Pages**

**Maximum Injection Pressure (MIP) Calculations for Bear Lake Properties Wells  
(Bittinger #1 and Bittinger #4)**

**1) Frac Gradient Based on Trisket #1 and Trisket #2 Wells**

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D = 4253

R. Trisket #2

$$FG = [ISIP + (.433 \times SG \times D)] / D$$

Where:

ISIP = 2100 psi

SG = 1.0

D = 4254 ft

Well	ISIP (psi)*	Hydrostatic		Fracture Gradient	
		Factor (psi/ft)	SG	D (ft)	(psi/ft)
R. Trisket #1	2150	0.433	1.0	4253	0.939
R. Trisket #2	2100	0.433	1.0	4254	0.927
		Average Frac Gradient		0.933	

**2) Maximum Injection Pressure (MIP) Using Average Frac Gradient From Trisket Wells**

$$MIP = [FG - (.433 \times SG)] \times D$$

Bittinger #1      Bittinger #4

Depth:

Top Perf	4210	4285	Top of Perforations Used For Calculation
Bottom Perf	4327	4365	
Difference	117	80	
Mid-Point	4269	4325	

Bittinger #1	-	Hydrostatic		Fracture Gradient		MIP (Surface)
		Factor (psi/ft)	SG	D (ft)	(psi/ft)	
Bittinger #1	-	0.433	1.218	4210	0.933	1706
Bittinger #4	-	0.433	1.218	4285	0.933	1736

**Section 6 – Operating Data**

**Revised Pages**

## Operating Data

The proposed commercial brine disposal well will primarily be utilized to inject produced and flowback water from wells completed in the Marcellus Shale, the Medina Group and other natural gas and oil producing formations. Other oil and gas related wastewaters associated with the production of oil and natural gas or natural gas storage operations, which are approved by EPA for injection under a UIC Class II D injection well, may also be injected. According to Title 40 Chapter I Sec. 144.6 (b)(1), such fluids include those "Which are brought to the surface in connection with natural gas storage operations, or conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection."

## **Injection Rate**

Injectivity testing performed on the Bittinger #4 well, which is located approximately ¼ mile to the north of the Bittinger #1 well, indicated the well may be capable of sustaining injection rates on at least a short-term basis on the order of 3 bbl/min or approximately 4,300 bbl/day. Considering this was a relatively short-term test, a maximum injection rate of 2,000 bbl/day is proposed for operation of the facility, with an average injection rate of 1,000 bbl/day expected.

## **Maximum Allowable Surface Injection Pressure (MASIP) and Average Surface Injection Pressure**

MASIP calculations based on EPA approved equations are included in the "Geologic Data" section of this application. Based on these calculations, the proposed MASIP is 1706 psi. It is estimated that the average surface injection pressure will be approximately 1000 psi.

## **Laboratory Analysis of Injection Fluid Samples**

Laboratory samples representative of the types of brine which will be injected into the proposed injection well are attached. Samples were collected from produced water generated from gas wells in the vicinity of the injection well. The samples are characterized by chloride concentrations in the 200,000 mg/L range and specific gravity of approximately 1.2.

## **Monitoring of Injection Fluid Samples and Well**

The following identifies the UIC Class II underground injection well regulatory requirements and operational procedures which will be conducted to meet the subject requirements:

- 1. Monitoring of the nature of injected fluids at time intervals sufficiently frequent to yield data representative of their characteristics.** An initial sample of fluid will be collected and analyzed from initial loads proposed for disposal from new disposal customers. In addition, samples will be collected for analysis from new types of sources (e.g., from different geologic formations, geographic regions, etc.) which would be expected to differ significantly from brine previously characterized for disposal at the facility. Samples will be analyzed for the following parameters at a minimum: specific gravity, total dissolved solids, total organic carbon, and pH.
- 2. Observation of injection pressure, flow rate, and cumulative volume at least weekly based on the regulatory requirements for produced fluid disposal operations.** Injection pressures, flow rate, and cumulative volume will be continuously recorded electronically.

3. **A demonstration of mechanical integrity pursuant to 40 CFR Sec. 146.8 at least once every five years during the life of the injection well.** A mechanical integrity test will be performed prior to initiating injection and at least once every five years.
4. **Maintenance of the results of all monitoring until the next permit review.** All monitoring records will be maintained throughout the life of the well.

Reporting requirements consist of the following:

An annual report will be submitted to EPA summarizing the results of the required monitoring, including monthly records of injected fluids, and any major changes in characteristics or sources of injected fluid.

### **Proposed Annulus Fluid**

The proposed annulus fluid for the proposed injection well will consist of fresh water and a water soluble corrosion inhibitor. The corrosion inhibitor will be mixed in accordance with the manufacturer's recommendations then loaded into the well annulus prior to conducting injection operations. Product information for the type of corrosion inhibitor which will be utilized is attached. A similar type product may be used instead of the example product referenced.

### **Facility Layout and Operation**

As indicated in the attached facility layout diagram, the injection well facility will include a truck unloading area and holding tanks connected by piping with associated valves, all of which will be situated in a diked containment area. The containment area will be properly sized to account for the entire volume of the largest container, plus 10% freeboard, in the event of a leak. The brine will be transferred to the injection well utilizing injection pumps situated in the Equipment Shed along with filters and monitoring equipment. Automatic shut-off valves will be incorporated into the tank design to prevent overflow during filling operations. The facility will be surrounded by a fence having locking entrance and exit gates. A security camera will also be strategically situated on the site. The facility will be continually manned during unloading and injection operations. As indicated above, injection rate, cumulative volume and pressures will be continuously measured and recorded.

### Injection and Confining Zones

The well is designed to inject into the Grimsby and Whirlpool sandstone units of the Medina formation, with injection zone perforations at a depth of 4,285 to 4,302 and 4,352 to 4,365 feet below ground surface. The Medina is a depleted reservoir in this area.

As seen on the generalized stratigraphic column (attached), most of the geologic “groups” and “formations” overlying the Medina can be considered confining units totaling approximately 1,800 feet. Although many of these units are predominantly shale, they also contain reservoir rock and are shown with shading in confining unit column. Therefore, the Lockport and the Salina are seen as the most significant confining units and are a combined 520 feet thick in the site area. But as indicated these units provide only a portion of the confining capacity and there are numerous other units that provide further protection.

Also attached are the following:

- Bittinger #4 completion record,
- Maximum Injection Pressure (MIP) calculations based on Instantaneous Shut-In Pressure (ISIP) data for two nearby wells (R. Trisket #1 and #2),
- Bittinger #1 completion record and geophysical log,
- R. Trisket #1 and #2 treatment reports.

**GEOLOGIC DATA**  
**GENERALIZED STRATIGRAPHIC COLUMN**

**Generalized Stratigraphic Column**  
**Bittinger No 1 and Bittinger No. 4 Area**  
**Warren County, PA**

Age	Group	Formation	Predominant Rock Type	Total Depth to Base(Feet)	Thickness Feet	Confining Zone
Glacial Units				18	18	
Upper Devonian	Venango		Shale/sandstone			
Upper Devonian		Chadakoin	Shale			
Upper Devonian	Bradford		Shale			
Upper Devonian	Elk		Shale			
Upper Devonian		Java	Shale			
Upper Devonian		West Falls	Shale			
Upper Devonian		Sonyea	Shale			
Upper Devonian		Genesee	Shale			
Upper Devonian		Tully Limestone	Limestone	2848	107	
Upper Devonian	Hamilton	Mahantango	Shale, some sandstone			
Upper Devonian	Hamilton	Marcellus Shale	Shale	3018	170	
Middle Devonian		Onondaga	Limestone	3182	164	
Lower Devonian		Bois Blanc/Oriskany Sandstone	Sandstone	3211	29	
Upper Silurian		Bass Islands	Dolomite	3547	336	
Upper Silurian		Salina	Evaporites/Dolomite	3896	349	
Upper Silurian		Lockport Dolomite	Dolomite	4067	171	
Lower Silurian	Clinton		Sandstone	4189	122	
Lower Silurian		Medina, inlcuding the Grimsby and Whirlpool Sandstones	Sandstone/Shale	4367	178	

## Notes



- = Black shading Indicates that this unit is considered to be a confining zone
- = Diagonal shading Indicates that this unit is a confining unit that also contains producing zones within it
- = No shading indicates that this unit is a producing zone and is not considered to be a confining unit

**GEOLOGIC DATA**

**BITTINGER #4 COMPLETION RECORD**

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF ENVIRONMENTAL RESOURCES  
 BUREAU OF OIL AND GAS REGULATION  
 PITTSBURGH, PENNSYLVANIA 15222

(COLUMBUS)

REG-I/NH

Office Use Only

133-39874-74

71275

970' S 42° 00' 00"  
 112 40' W 79° 30' 00"  
 (C)

WELL RECORD

PERMIT NO 37-123-39874-00

PROJECT NO DEET

TYPE OF WELL

Gas

COLUMBUS FIELD, DEWEY CORNERS POOL DEU

WELL OPERATOR  
 U. S. Energy Development Corporation

TELEPHONE NO  
 (716)856-9764

ADDRESS

670 Statler Towers, Buffalo, NY 14202-9990

ZIP

FARM NAME

Bittinger

FARM NO  
 4

SERIAL NO

ACRES  
 62

TOWNSHIP

Columbus

COUNTY

Warren

DRILLING COMMENCED

8/11/87

DRILLING COMPLETED

8/15/87

ELEVATION

1561'

QUADRANGLE

Columbus

7 1/2'

15'

CASING AND TUBING RECORD

PIPE SIZE	AMOUNT IN WELL	MATERIAL BEHIND PIPE		PACKER			DATE RUN
		CEMENT (SKS)	GEL (SKS)	TYPE	SIZE	DEPTH	
13 3/8"	30'	NA					8/11/87
8 5/8"	506'	220	5				8/12/87
4 1/2"	4454.9'	265					11/5/87
		T.D.	B.D.	D.P.I.	Class	O G Lease	
		4496		4362	0	0 1	

PERFORATION RECORD

STIMULATION RECORD

DATE	INTERVAL PERFORATED FROM TO		DATE	INTERVAL TREATED	AMOUNT FLUID	AMOUNT SAND	INJECTION RATE
8/19	4459'	4362'	8/20/87	Same	840 bbls.	67,000#	20.7

NATURAL OPEN FLOW

3000 MCF

MMCF

AFTER TREATMENT OPEN FLOW

6,600 MCF

NATURAL ROCK PRESSURE

NA

HRS

DAYS

AFTER TREATMENT ROCK PRESSURE

1100

HRS

PPM

REMARKS:

MEDINA

RECEIVED  
 PA GEOLOGICAL SURVEY  
 SEP 30 1988

BUREAU OF OIL & GAS  
 ENVIRONMENTAL RESOURCES

INFORMATION ON REVERSE SIDE

A WELL RECORD SHALL BE FILED WITHIN 30 DAYS OF CESSATION OF DRILLING. IF THE WELL IS NOT COMPLETED WITHIN 30 DAYS OF CESSATION OF DRILLING, AN UPDATED WELL RECORD MUST BE SUBMITTED UPON COMPLETION OF THE WELL.

CDM  
 3-18-88

ER-OG-4: Rev. 10/82  
(pg 2)

123-39874

FORMATIONS						
NAME	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (if none or SALT WATER)	SOURCE OF DATA
Unconsolidated Gravel	0	18'				Driller's Record & Geophysical Logs
Devonian Shale	18'	2741'				
Tully Limestone	2741'	2848'				
Hamilton Shale	2848'	3018'				
Onondaga Limestone	3018'	3182'				
Bois Blanc	3182'	3211'				
Akron Dol	3211'	3292'				
Camillus	3292'	3366'				
Syracuse	3366'	3547'				
Salt	3547'	3896'				
Lockport Dol	3896'	4067'			Salt water	
Rochester Shale	4067'	4151'				
Packer Shell	4151'	4189'				
Grimsby Sandstone	4189'	4304'	Gas			
Power Glen Shale	4304'	4350'				
Whirlpool Sandstone	4350'	4367'	Gas			
Queenston Shale	4367'	4496'		T.D.		

RECEIVED  
August 30 1987  
DATE  
APPROVED BY  
Signature: *Mark J. Hayes*  
TITLE  
U.S. GEOLOGICAL SURVEY  
Oil & Gas Geology Division  
Signature: *Mark J. Hayes*

**GEOLOGIC DATA**

**MAXIMUM INJECTION PRESSURE CALCULATIONS**

**Maximum Injection Pressure (MIP) Calculations for Bear Lake Properties Wells**  
 (Bittinger #1 and Bittinger #4)

**1) Frac Gradient Based on Trisket #1 and Trisket #2 Wells**

R. Trisket #1

$$FG = [ISIP + (.433 \times SG \times D)] / D$$

Where:

ISIP = 2150 psi

SG = 1.218

D = 4253

R. Trisket #2

$$FG = [ISIP + (.433 \times SG \times D)] / D$$

Where:

ISIP = 2100 psi

SG = 1.218

D = 4254 ft

Well	ISIP (psi)*	Hydrostatic			Fracture Gradient (psi/ft)
		Factor (psi/ft)	SG	D (ft)	
R. Trisket #1	2150	0.433	1.218	4253	1.033
R. Trisket #2	2100	0.433	1.218	4254	1.021
Average Frac Gradient				1.027	

**2) Maximum Injection Pressure (MIP) Using Average Frac Gradient From Trisket Wells**

$$MIP = [FG - (.433 \times SG)] \times D$$

Bittinger #1      Bittinger #4

Depth:

Top Perf	4210	4285
Bottom Perf	4327	4365
Difference	117	80
Mid-Point	4269	4325

	Hydrostatic Factor (psi/ft)	SG	D (ft)	Fracture Gradient (psi/ft)	MIP (Surface)
Bittinger #1	-	0.433	1.218	4210	1.027
Bittinger #4	-	0.433	1.218	4285	1.027

**GEOLOGIC DATA**

**BITTINGER #1 WELL RECORD**



FORMATIONS						
NAME	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (FRESH OR SALT WATER)	SOURCE OF DATA
Unconsolidated Gravel	0'	37'			Fresh @ 25'	Driller's record and geophysical logs
Devonian Shale	37'	2679'				
"Tully" Ls	2679'	2785'				
Hamilton Shales	2785'	2955'				
Onondaga	2955'	3129'				
Unconformity Interval	3129'	3145'				
Akron-Bertie	3145'	3220'			Salt @ 3935'	
Camillus	3220'	3298'				
Syracuse	3298'	3525'				
Vernon	3525'	3784'				
Salt Zone	3504'	3709'	4430'			
Lockport	3784'	4009'				
Rochester	4009'	4113'				
Irondequoit-Reynales	4113'	4150'				
Grimsby	4150'	4265'				
Power Glen	4265'	4316'				
Whirlpool	4316'	4331'				
Queenston	4331'	TD				
TD	4431					

June 21

1984

DATE

Douglas K. Walch

APPROVED BY Douglas K. Walch

Geophysicist

TITLE

# GEARHART

COMPENSATED DENSITY  
SIDE WALL NEUTRON  
LOG

## BOREHOLE VOLUME

FILING NO.		COMPANY U. S. ENERGY DEVELOPMENT CORPORATION	
WELL BITTINGER NO. 1		FIELD COLUMBUS	
COUNTY WARREN STATE PENNSYLVANIA		LOCATION PERMIT NO: WAR-33914	
SEC _____ TWP _____ RGE _____		Elev. _____	
G. L. K. B. 10 Ft. Above Perm. Datum		Elev. K. B. D. F. G. L.	
Permit Datum K. B.		Other Services GR-DLL LASERLOG- (WELL)	
Log No. Measured from K. B.			
Drillbit Measured from K. B.			
Date 12-29-83			
Run No. ONE			
Depth - Driller 4467			
Depth - Logger 4431			
Logged Interval 4429			
Top Logged Interval 411			
Type fluid in hole SALT BRINE			
Density Visc. N.A.			
pH Fluid Loss N.A.			
Mat. rec. temp., deg F. 104			
Source of Samples N.A.			
Rm @ Meas. Temp.			
Rm @ Meas. Temp. N.A. @ °F			
Rmc @ Meas. Temp. N.A. @ °F			
Source Rm N.A.			
End Circulation N.A.			
Logger on Bottom 2:31			
Recorded By S. CASS			
Witnessed By MR. HALL			
Run No.	Bit	Re-Hole Record	Casing Record
dm	dm	To	Size
Wt.	Wt.	Wt.	Wt.
From	From	From	From

### EQUIPMENT DATA

LOGGING UNIT	LOCATION	GAMMA RAY		DENSITY				SIDE WALL NEUTRON			
		TOOL NO.	TOOL NO.	Source No.	Type	STG.	TOOL NO.	Source No.	Type	STG.	
7528	MEADVILLE	4285	2643	CSV-306	CS 137	2 CI	7153	71-1-321G	AMBE	5 C	241

### CALIBRATION DATA

GAMMA RAY		DENSITY						SIDE WALL NEUTRON					
BKG. CPS	STD CPS	MAGNESIUM		ALUM/NUM		TEST BLOCK		CALIPER		BKG. CPS	Calibrator CPS	CALIPER	
		LS	SS	LS	SS	LS	SS	4"	8.1"			4"	8.
131.4	586.8	1099	1620.4	246.7	429.7			1166	4060	23	260	751	411

### LOGGING DATA

GENERAL		GAMMA RAY		DENSITY				SIDE WALL NEUTRON						
DEPTH	SPEED FPM	TC	API/CD	TC	MATRIX DENSITY	FLUID DENSITY	TC	MATRIX TYPE	A	FIXED BIAS	TEMP. GRAO.	SALTS NACL PPM	MUD WT.	SURF TENS.
IM	TO													
29	4144	30	AUTO	20	AUTO	2.68	1.1	AUTO	LS	2	.97	1.2	100,000	9.0
44	3300	45	AUTO	20	AUTO	2.83	1.1	AUTO	LS	2	.97	1.2	100,000	9.0
0	411	45	AUTO	20	AUTO	2.71	1.1	AUTO	LS	2	.97	1.2	100,000	9.0

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1-29-83

04:07

364.4

266956

0008-02

0

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GR API 200

-0.05 AP 0.45

GR API 400

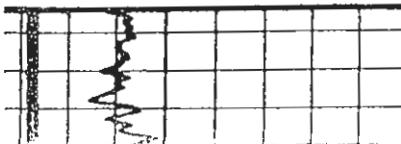
30 φ (5NL)

Y - CAL 16

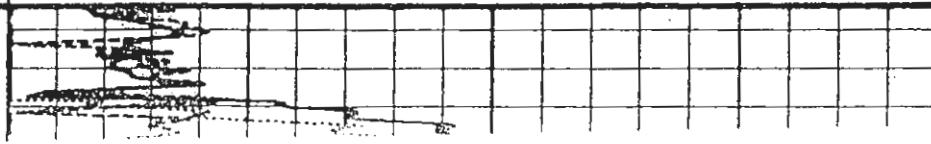
30 φ (CDL)

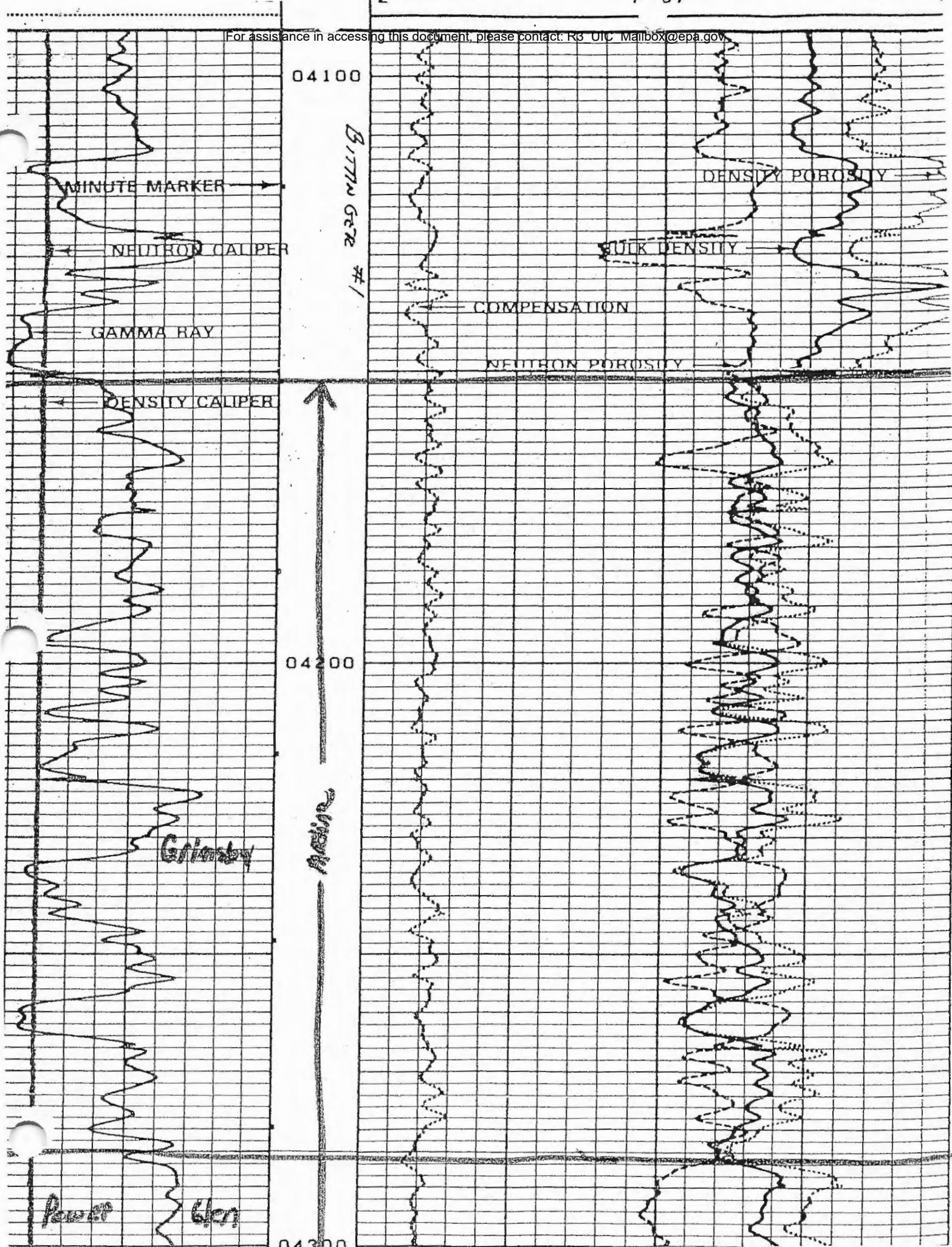
X - CAL 16

2 P (B)



0008-02





Power

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04300

Whirlpool

Queensboro



**GEOLOGIC DATA**

**R. TRISKET #1 WELL DATA**

WORKOVER TREATMENT REPORT

---

WELL NAME: R. TRISKET #1                    ACCT. # 9288                    PROGRAM BAYLON/DOMAC '84

DATE WORK PERFORMED: 9/11/91

WORKOVER PERORMED:

7 A.M. - S.R. crew at our shop

Move rig to R. Trisket #1

7:30 - R.U. open well to tank

8:30 - Start out with tubing

11:30 - Tubing out

12 Noon - Swabbed - checked T.D.    SL TD = 4325' 11' pocket

12:15 - Swab casing - F1 = 4100'

3 P.M. - Swabbed back 25 bbls.

3:30 - R.D.

4:30 - Shut down

Water swabbed back is black with sulfur smell

Well Name & No. R. TRISKET #1 Loc.   
Permit No. WAR-39273 COLUMBUS Twp.,  WARREN Co., ~~PA~~  
PA

PERFORATION RECORD

Company N.L. MCCULLOUGH Formation MEDINA/WHIRLPOOL Date 12/21/84

Pumped in 500 gal. acid and 500 gal. water, ran Gamma Ray and collar log.  
PBTD 4402 ft. Perf. as follows:

4191 - 4251 w/ 10 shots - 4308 - 4314 w/ 4 shots  
         -          w/          shots -          -          w/          shots  
         -          w/          shots -          -          w/          shots

Size of shots .42 Total Shots 14

FRAC JOB

Company DOWELL Date 12/21/84

Loaded hole. Broke formation @ 2500 # Back to 1750 #. Pumped in 500 gals.

15% Acid @ 27 BPM @ 3400 #, waited 5 min. & fraced as follows:

	BBLS./ <del>gal.</del>	# Per Gal.	SAND	BPM	Press.
1.	<u>0</u> - <u>96</u>	Pad	<u>      </u>	<u>25</u>	<u>3300</u>
2.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
3.	<u>96</u> - <u>248</u>	1#	<u>80/100</u>	<u>25</u>	<u>3300</u>
4.	<u>248</u> - <u>304</u>	2#	<u>80/100</u>	<u>24.5</u>	<u>3400</u>
5.	<u>304</u> - <u>426</u>	2#	<u>20/50</u>	<u>24.5</u>	<u>3200</u>
6.	<u>426</u> - <u>591</u>	3#	<u>20/50</u>	<u>27</u>	<u>3150</u>
7.	<u>591</u> - <u>814</u>	4#	<u>20/50</u>	<u>27</u>	<u>3000</u>
8.	<u>814</u> - <u>886</u>	Flush	<u>      </u>	<u>27</u>	<u>3100</u>
9.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
10.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
11.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
12.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
13.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
14.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
15.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
16.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
17.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
18.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
19.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>
20.	<u>        </u>		<u>      </u>	<u>      </u>	<u>      </u>

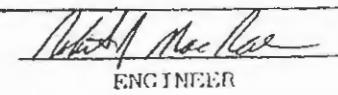
ISIP 2150 # 5 MIN. 2050 # Job complete 4:45 P.M.

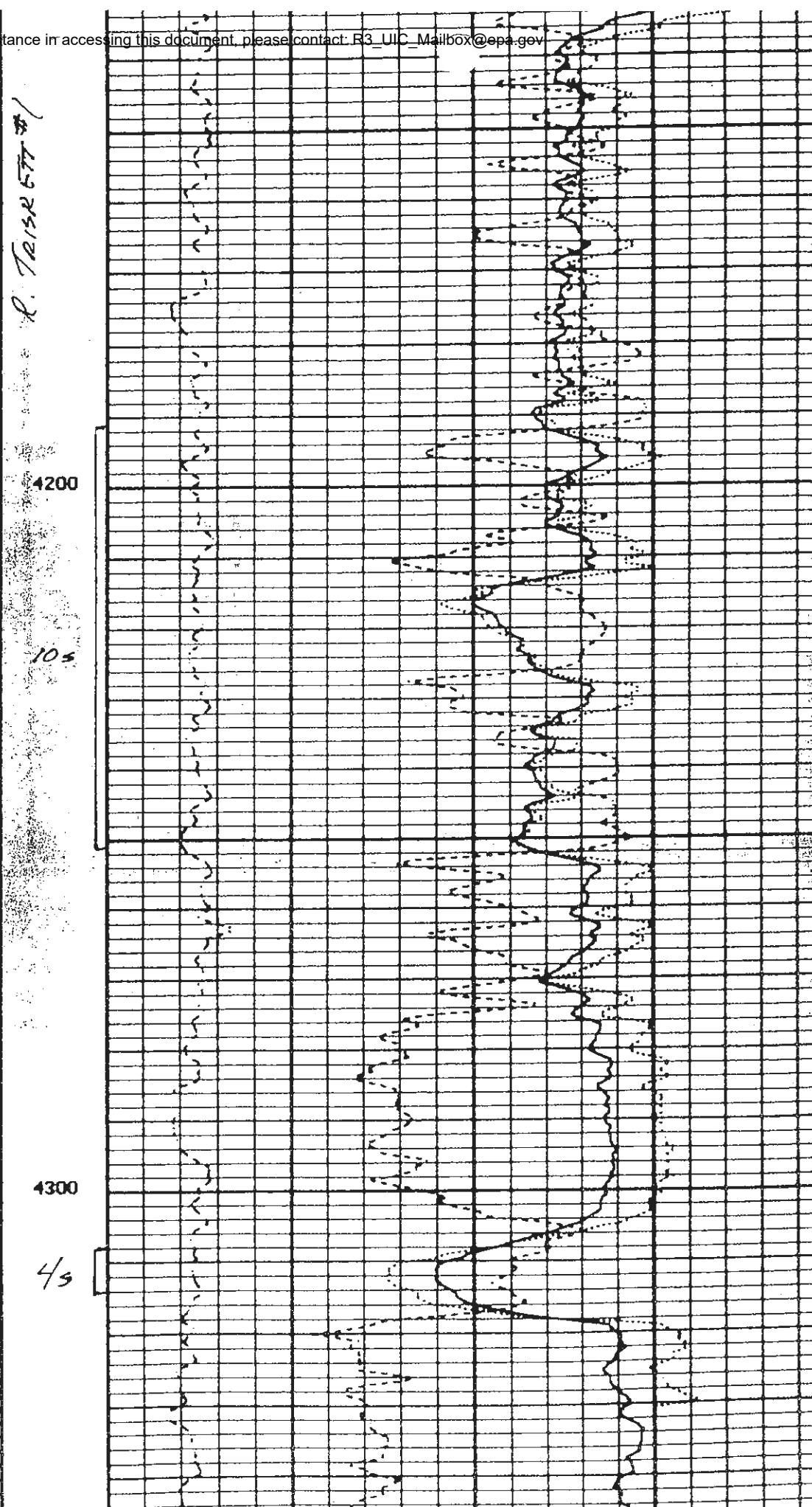
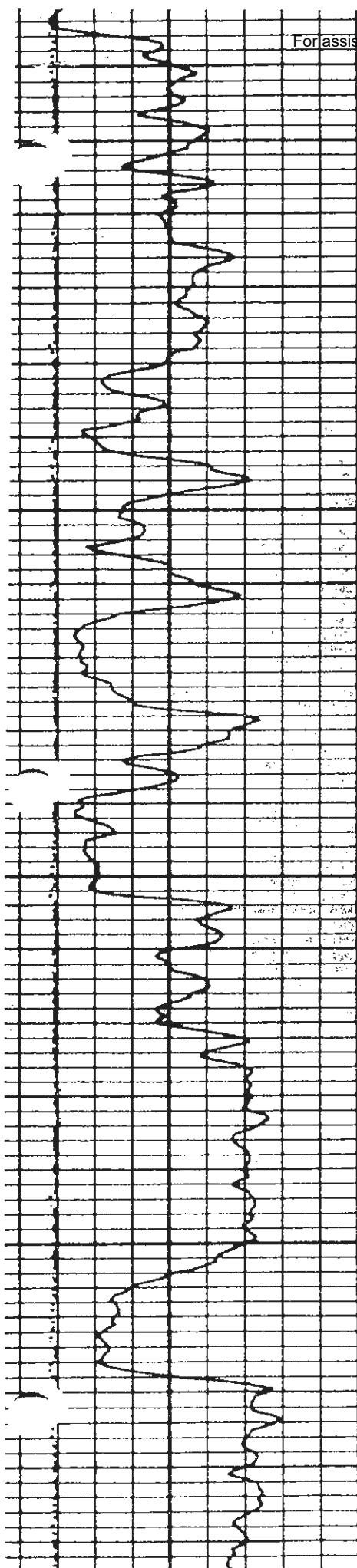
Open to pit 5:15 P.M. Flowed back 24 hrs. Total water 886 bbls.

60,000 # 20/40 & 10,000 # 80/100. Avg. pump rate 26 BPM @ 3200 # Press.

HHP used 2039. Nitrogen used 145,000 SCF

REMARKS: Increase rate at 480 bbls. to 27 BPM - Increase Nitrogen to 4800SCF per minute.

  
Robert MacLean  
ENGINEER



## WELL TREATMENT REPORT



WAR-37413

DATE

12/21/94

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WL-931-N PRINTED IN U.S.A.

DOWELL, DIVISION OF DOW CHEMICAL U.S.A.

WELL NAME AND NUMBER <i>P. Fisket #1</i>	LOCATION (LEGAL) <i>Columbus Lp.</i>	DOWELL LOCATION <i>Boeby 6A</i>	TREATMENT NUMBER <i>07-16-8607</i>		
FORMATION <i>Medina</i>	STATE <i>N.Y. Pk.</i>	JOB DONE DOWN TUBING <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> ANNULUS <input type="checkbox"/>	PAGE <input type="checkbox"/> OF <input type="checkbox"/> PAGES ALLOWABLE PRESSURE TBG: <i>3500</i> CSG: <i>3500</i>		
COUNTY / PARISH <i>Warren</i>	SERVICE NAME <i>WT 30 w/ w2</i>	TYPE OF WELL OIL <input type="checkbox"/> GAS <input checked="" type="checkbox"/> WATER <input type="checkbox"/> INJ. <input type="checkbox"/>	OIL: <i>API GRAVITY</i> VAPOR PSI		
TYPE OF SERVICE Acidizing Fracturing	SERVICE NAME Sand Control Other	AGE OF WELL NEW WELL <input checked="" type="checkbox"/> Rework <input type="checkbox"/>	TOTAL DEPTH <i>4423'</i> BHT. (LOG)		
CUST. NAME <i>U.S. Energy</i>	ADDRESS <i>1080 Shaffer Blvd.</i>	CASING SIZE <i>4.5</i> WT. <i>10.8</i> DEPTH	TUBING SIZE WT. DEPTH		
CITY, STATE ZIP CODE <i>Buffalo N.Y.</i>		TYPE OR GRADE LINER SIZE WT. TOP-BOTTOM	TYPE OR GRADE PACKER TYPE PACKER DEPTH		
SERVICE INSTRUCTIONS:		OPEN HOLE	CASING VOL.	TUBING VOL.	ANNULAR VOL.

FOR CONVERSION PURPOSES 24 BBLS EQUALS 1000 GALLONS

ARRIVED ON LOCATION: *14:00* LEFT LOCATION: *1700*DIAMETER OF PERFORATIONS = *.92*

## PERFORATED INTERVALS

TOP	TO	BOTTOM	NO. OF HOLES	TOP	TO	BOTTOM	NO. OF HOLES
<i>4191</i>	TO	<i>4318</i>	<i>14</i>		TO		
	TO				TO		
	TO				TO		
	TO				TO		

TIME (0001 to 2400)	INJECTION RECORD						PRESSURE		NOTATIONS	
	RATE BPM	TYPE OF FLUID	DENSITY	INCREMENT VOL. BBLS	CUM. VOL. BBLS	PROP. TYPE	PROP. #/GAL	CSG.	TBG.	
<i>14:00</i>										Pre-Job Safety Meeting
<i>15:10</i>										Pre-Job Pressure Test To <i>3050</i> psi
<i>15:30</i>	<i>23</i>	<i>WT 30</i>		<i>0</i>						<i>break flow</i>
<i>16:00</i>	<i>0</i>									<i>shot down</i>
<i>16:30</i>	<i>27</i>	<i>11</i>								<i>estab. rate drop back</i>
<i>16:33</i>	<i>25</i>	<i>WT 30 w/ 24600/min</i>	<i>16</i>							<i>start frost</i>
<i>16:36</i>	<i>25</i>			<i>960</i>	<i>960</i>	<i>1#</i>	<i>3300</i>			<i>start sand</i>
<i>16:42</i>	<i>24</i>			<i>246</i>	<i>11</i>	<i>8#</i>	<i>3300</i>			<i>increase sand</i>
<i>16:44</i>	<i>24.5</i>			<i>898</i>	<i>948</i>	<i>2#</i>	<i>3300</i>			<i>1000# 100 in. st. 2%</i>
<i>16:49</i>	<i>25</i>			<i>428</i>		<i>3#</i>	<i>2150</i>			<i>increased sand</i>
<i>16:50</i>	<i>27</i>				<i>11</i>		<i>3000-3150</i>			<i>1 Rate. 12 4500pm</i>
<i>16:55</i>	<i>27</i>			<i>590</i>	<i>11</i>	<i>4#</i>	<i>3300</i>			<i>increased sand</i>
<i>17:00</i>	<i>27</i>				<i>11</i>		<i>3100</i>			
<i>17:02</i>	<i>28</i>	<i>—</i>		<i>814</i>	<i>—</i>	<i>—</i>	<i>3000</i>			<i>1000# 100 in, 14500psi st. high</i>
<i>17:05</i>	<i>27</i>			<i>882</i>						<i>flush in, shot down</i>

FRAC. GRADIENT,

AVG. INJECTION RATES

MATERIALS CHARGED FOR:

<i>.94</i>	Liq. <i>26 BPM.</i> W/PROP <i>26 BPM.</i>	MTRL <i>100 Sand.</i>	QUANTITY <i>1000#</i>	MTRL <i>1-318</i>	QUANTITY <i>65#</i>
TOTAL FLUID <i>886</i>	TOTAL PROP <i>70000#</i>				
BBLS.	LBS.				
TREATING PRESSURE SUMMARY <i>3500</i> FINAL <i>3160</i> AVG <i>3280</i>	IMMED. S.D.P. <i>2150</i> 2050 100 Sand.	15 MIN. SIP	6000#	L-SL <sub>0</sub> <i>150#</i>	

PRODUCTION PRIOR TO THIS TR.

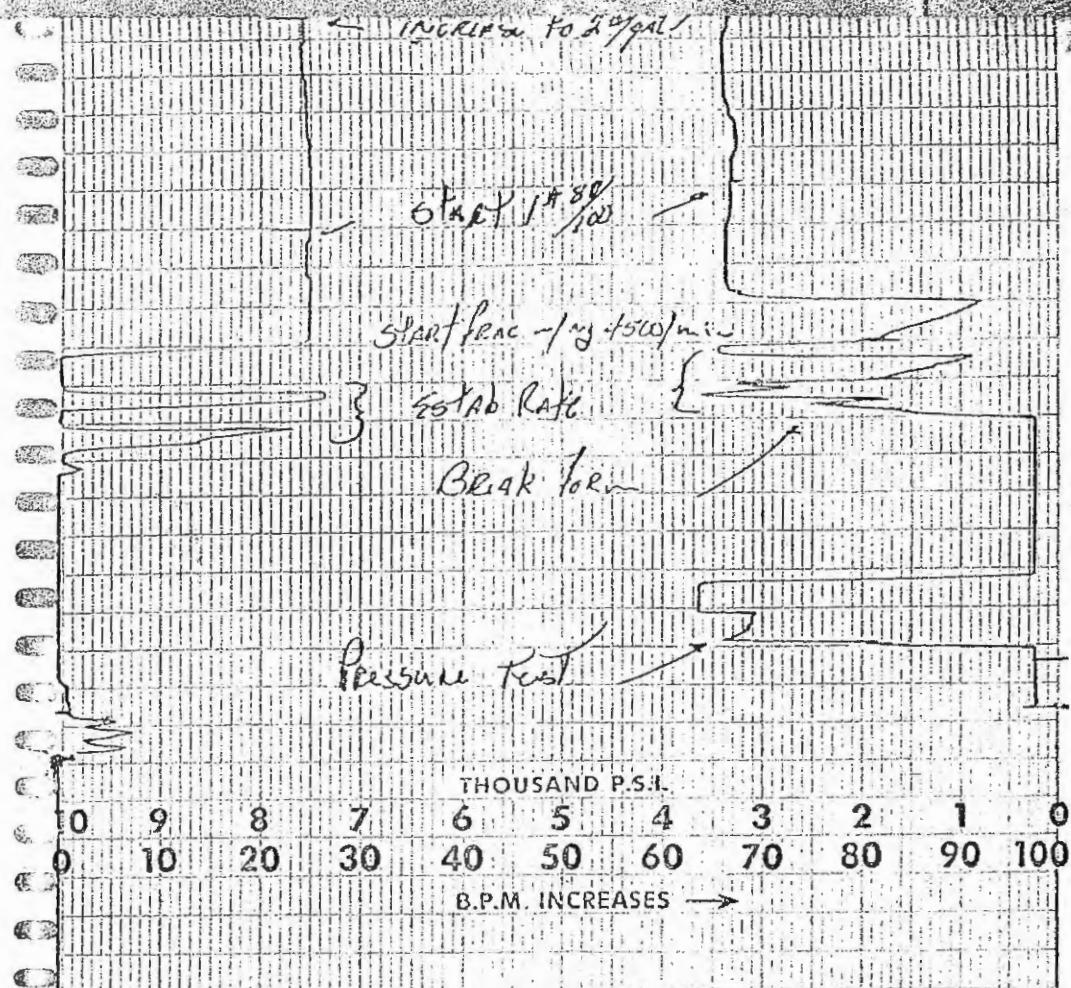
 Test  
 Stabilized*L-53 45gal.*

CUSTOMER REPRESENTATIVE

*R. McRae.*

DOWELL SERVICE SUPERVISOR

*J.R. Schaffer.**F15N 45gal.*



DOWELL DIVISION OF DOW CHEMICAL U.S.A.

RECORDED SERVICE

TREATMENT NO.

01-16-8707

TYPE OF  
SERVICE

WT30-1/2

DATE

12/21/84

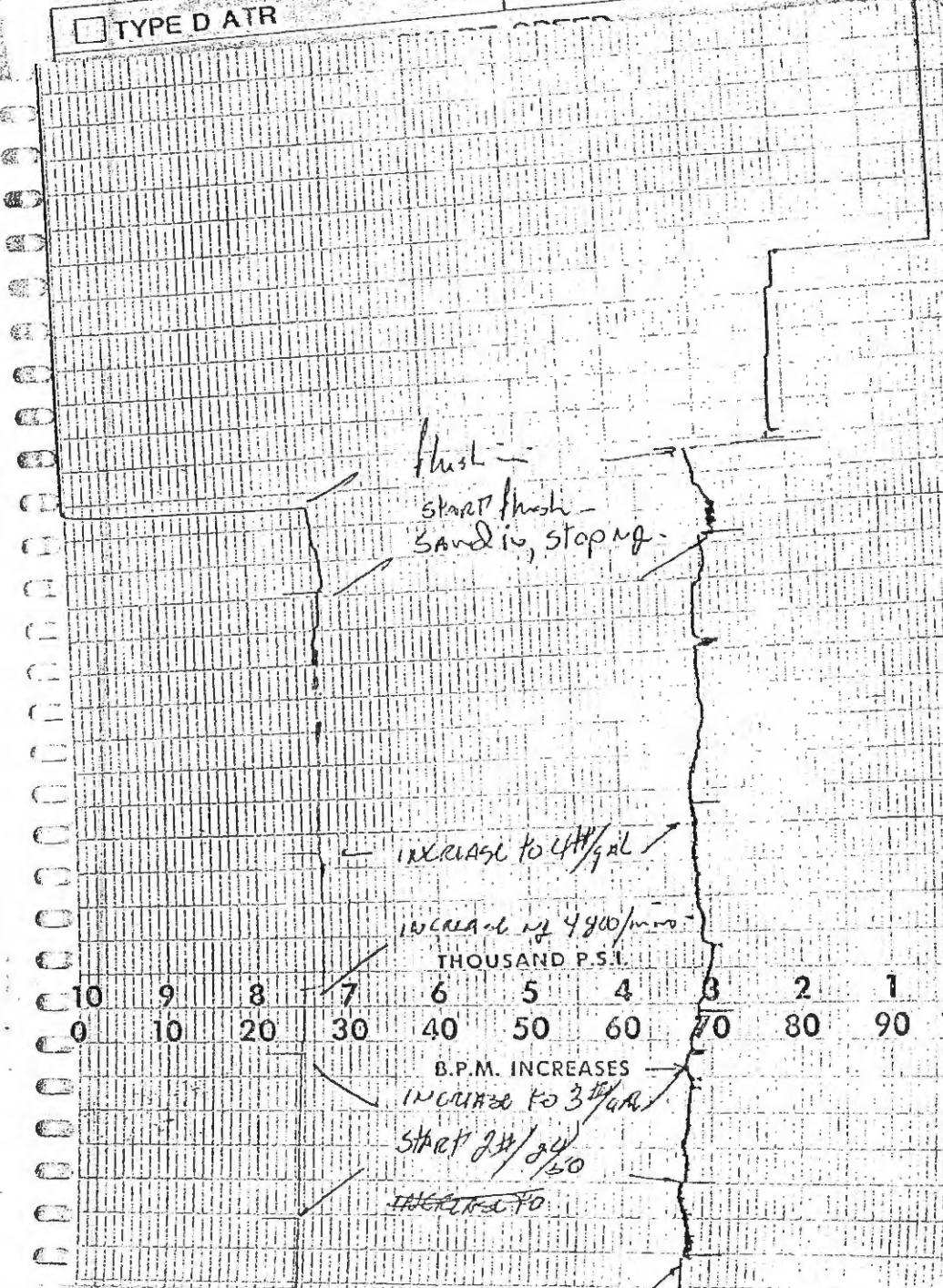
OWNER	WELL NAME AND NUMBER
U.S. Energy	R. Trisket #1
OWNER'S REPRESENTATIVE	SERVICE ENGINEER
B. McRae	
J. Schubert	

REMARKS:

PLEASE CHECK APPROPRIATE BOXES

TYPE D ATR

TYPE C ATR



**GEOLOGIC DATA**

**R. TRISKET #2 WELL DATA**

HILLBURTON SERVICES

HILLBURTON  
DIVISION Pittsbugh, Pa

HILLBURTON  
LOCATION

Bradford, Pa

# HYDRAULIC STIRRING SERVICE TREATING REPORT

R. TRISKETT #2

BILLED ON  
TICKET NO. 896925-7

2012 R-3  
d Columbus

Sec. \_\_\_\_\_ Twp. \_\_\_\_\_

Rng. \_\_\_\_\_

County Warren

State Pa

mation Name \_\_\_\_\_ Type \_\_\_\_\_  
 mation Thickness \_\_\_\_\_ From \_\_\_\_\_ To \_\_\_\_\_  
 ial Prod: Oil \_\_\_\_\_ Bpd. Water \_\_\_\_\_ Bpd. Gas \_\_\_\_\_ Mcfd.  
 ent Prod: Oil \_\_\_\_\_ Bpd. Water \_\_\_\_\_ Bpd. Gas \_\_\_\_\_ Mcfd.  
 ation Tool# \_\_\_\_\_ Mandrel Size \_\_\_\_\_ Extensions \_\_\_\_\_ In.  
 ker Type \_\_\_\_\_ Set At \_\_\_\_\_  
 tom Hole Temp. \_\_\_\_\_ RBP@ \_\_\_\_\_  
 d Or Flange \_\_\_\_\_ Pbd \_\_\_\_\_

	NEW USED	WEIGHT	SIZE	FROM	TO	MAXIMUM PSI ALLOWABLE
CASING	N	10.5	4 1/2	0	4389	
LINER						
TUBING						
OPEN HOLE						SHOTS/FT.
PERFORATIONS		,39	4201	4307		8
PERFORATIONS						
PERFORATIONS						

## MATERIALS

at. Fluid H2O Density 8.33 Lb./Gal. <sup>0</sup> API  
 pl. Fluid H2O Density 8.3 Lb./Gal. <sup>0</sup> API  
 p. Type Sand Size 80/100 Lb. 162,000  
 p. Type Sand Size 20/40 Lb. 10,000  
 Radioactive Tracer \_\_\_\_\_ Carrier \_\_\_\_\_ Units-MCI \_\_\_\_\_  
 factant Type \_\_\_\_\_ Gal. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 factant Type \_\_\_\_\_ Gal. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 id Loss Type \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 ling Agent \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 ling Agent LGC-14 Gal.-Lb. 280 @ \_\_\_\_\_ /1000 Gal.  
 aker Type GBW-30 Gal.-Lb. 4 @ \_\_\_\_\_ /1000 Gal.  
 aker Type \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 ker \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 r \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 er Type \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 fer Type Citric Acid Gal.-Lb. 200 @ \_\_\_\_\_ /1000 Gal.  
 teriacide \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 -Foamer AQF-4 Gal.-Lb. 38 @ \_\_\_\_\_ /1000 Gal.  
 y Control Clusta XP Gal.-Lb. 10 @ \_\_\_\_\_ /1000 Gal.  
 ter Clafix II Gal.-Lb. 80 @ \_\_\_\_\_ /1000 Gal.  
 ction Reducer \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 spac Balls \_\_\_\_\_ Qty. \_\_\_\_\_ Size \_\_\_\_\_ S.G.  
 ter \_\_\_\_\_

## JOB DATA

CALLED OUT DATE	ON LOCATION DATE	JOB STARTED DATE	JOB COMPLETED DATE
01/05/90	01/05/90	01/05/90	01/05/90

TIME 0730 TIME 1200 TIME 1400 TIME 1530

## PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
<u>B. Jackson</u> 46175		
<u>C. Thomas</u> 69581	3298 14400	
<u>R. Wheeler</u> 87647	2683 44900	
<u>K. Thompson</u> B4639	5997 msu	
<u>L. Colts</u> C6159	3892 IP	
<u>Caldwell</u> D8034	3305 SBP	
<u>M. English</u> D7811	3302 SBP	
<u>J. Piscarella</u> D7783	9911 TD	
<u>J. Gould</u> D7896	3905 46c	
	SBP	cornland

## ACID DATA

id Type \_\_\_\_\_ % \_\_\_\_\_ Gal.-Bbl. \_\_\_\_\_  
 id Type \_\_\_\_\_ % \_\_\_\_\_ Gal.-Bbl. \_\_\_\_\_  
 factant Type \_\_\_\_\_ Gal. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 factant Type \_\_\_\_\_ Gal. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 Agent Type \_\_\_\_\_ Gal. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 ty Control Type \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 rrosion Inhibitor \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 rrosion Inhibitor \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 cking Inhibitor \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 in Sequester \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
 ction Reducer \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.

DEPARTMENT Stim

DESCRIPTION OF JOB Water Frac

## PRESURES IN PSI

Displacement 3401  
 Maximum 4600  
 Fracture Gradient \_\_\_\_\_  
 2100 5 Min. 2180 10 Min. \_\_\_\_\_ 15 Min. \_\_\_\_\_

HYDRAULIC HORSEPOWER  
 ered 1500 Available 2400 Used 1480

AVERAGE RATE IN BPM  
 ating 16.7 Disp. 16.7 Overall 16.7

## SUMMARY

## VOLUMES

Preflush: Bbl.-Gal. \_\_\_\_\_ Type \_\_\_\_\_  
 Load & Bkdn Bbl.-Gal. 5318 Pad: Scf-Bbl.-Gal. \_\_\_\_\_  
 Treatment: Bbl.-Gal. 20450 Disp: Bbl.-Gal. 2865  
 Gas Assist \_\_\_\_\_ Tons-Scf \_\_\_\_\_ @ \_\_\_\_\_ Scf/Bbl.  
 Foam Quality \_\_\_\_\_ % Total Volume Foam \_\_\_\_\_ Bbl.-Gal.  
 Total Volume: Bbl.-Gal. 28624 Fluid-Foam \_\_\_\_\_

## REMARKS

100% ENERGY USE  
 PLEASE K. TRISKETT  
 WELL NO. #2  
 JOB TYPE WATER FRACTURE  
 01/05/90

**HALLIBURTON SERVICES  
JOB LOG**

DRM 2013 R-2

WELL NO. 开 2

LEASE R. Trisket

TICKET NO. 896925-7

CUSTOMER U. S. Energy

PAGE NO. 1

JOB TYPE Water Flea water

DATE 01/05/90

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS		PRESSURE (PSI)		DESCRIPTION OF OPERATION AND MATERIALS
				T	C	TUBING	CASING	
								Safety Meeting
1410				4				Pick up Pump
12 1/2				2		4176	Test Lines	Ave Psi 3600
14		2462		4		670	Load Hole	HHP 1480
30 3/4				4		3367	Pad	
35 1/4		2856		1		3868	Start Sand 80/100 1 PPG	
43	↑	5000				3830	Inc Sand 80/100 2 PPG	
46 3/4		7630				3266	Start Sand 80/100 2 PPG	
59 1/2		5000				3581	Inc Sand 3 PPG	
1508	16.1	15000				3595	Inc Sand 4 PPG	
12		17856				3523	Sand on Bottom	
15 3/4		20450				3939	Finish Sand	
19 1/2	↓	2856				3800	Finish Flush	
19 1/2						2100	PSIP	
24 1/2						2180	5 min	

ALLEGHENY

NUCLEAR

SURVEYS INC.

## U.S. ENERGY DEV. CORP.

R. TRISKET # 2

DENSITY / NEUTRON

LOCATION PRVNC/CO. FIELD WELL, U.S. ENERGY DEV. CORP.	COMPANY U.S. ENERGY DEV. CORP.			
	WELL R. TRISKET # 2			
	FIELD COLUMBUS TWP.			
	PROVINCE/COUNTY WARREN			
	COUNTRY/STATE USA / PA			
PERMIT NUMBER 37-123-40751				
LOCATION COLUMBUS QUAD.	OTHER SERVICES			ANALYSIS DFE
	LSD	SEC	TWP	
PERMANENT DATUM GROUND LEVEL ELEVATION 1508				ELEVATIONS
LOG MEASURED FROM KB 12 FT. ABOVE PERMANENT DATUM				KB 1520
DRILLING MEASURED FROM K. B.				DF 1519
				CL 1508
DATE	18-DEC-89			
RUN NUMBER	ONE			
DEPTH-DRILLER	4425			
DEPTH-LOGGER	4429			
FIRST READING	4419			
LAST READING	0			
CASING-DRILLER	522			
CASING-LOGGER	516			
BIT SIZE	7 7/8			
HOLE FLUID TYPE	BRINE			
DENS./VISC.				
PH/FLUID LOSS				
SAMPLE SOURCE				
RM @ MEAS TEMP				
RMF @ MEAS TEMP				
RMC @ MEAS TEMP				
SOURCE: RMF/RMC				
RM @ BHT				
TIME SINCE CIRC				
MAX REC TEMP				
EQUIPMENT/BASE	*267*	PA		
RECORDED BY	C. SHERRELL			
WITNESSED BY	T. ROBERTS			
WITNESSED BY	D. VALCH			

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT, GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY F OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

## MAIN LOG

DEPTH BASED DATA - MAXIMUM SAMPLING INCREMENT 10.0 CMS. . . RECORDED @ 18-DEC-89 17:57:11  
PLOTTED ON 18-DEC-89, FILE # 2, ID: MAIN LOG . . . TAPE ID: DENSITY / NEUTRON

BIT SIZE  
INCHES

11 16

DEPTH  
IN  
FEET

30

20

DENSITY POROSITY  
PERCENT

10

0

-10

DENSITY CALIPER  
INCHES

11 16

TIMING  
MARKS  
EVERY  
60 SEC

30

20

LIMEST. NEUTRON POROSITY  
PERCENT

10

0

-10

GAMMA RAY

API  
100 200  
200 300 400

REPLAY  
SCALE  
240:1

0

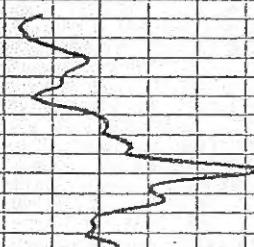
50

DENSITY CORRECTION  
GRAMS PER CC

-0.05

0.20

0.40



150

200

250

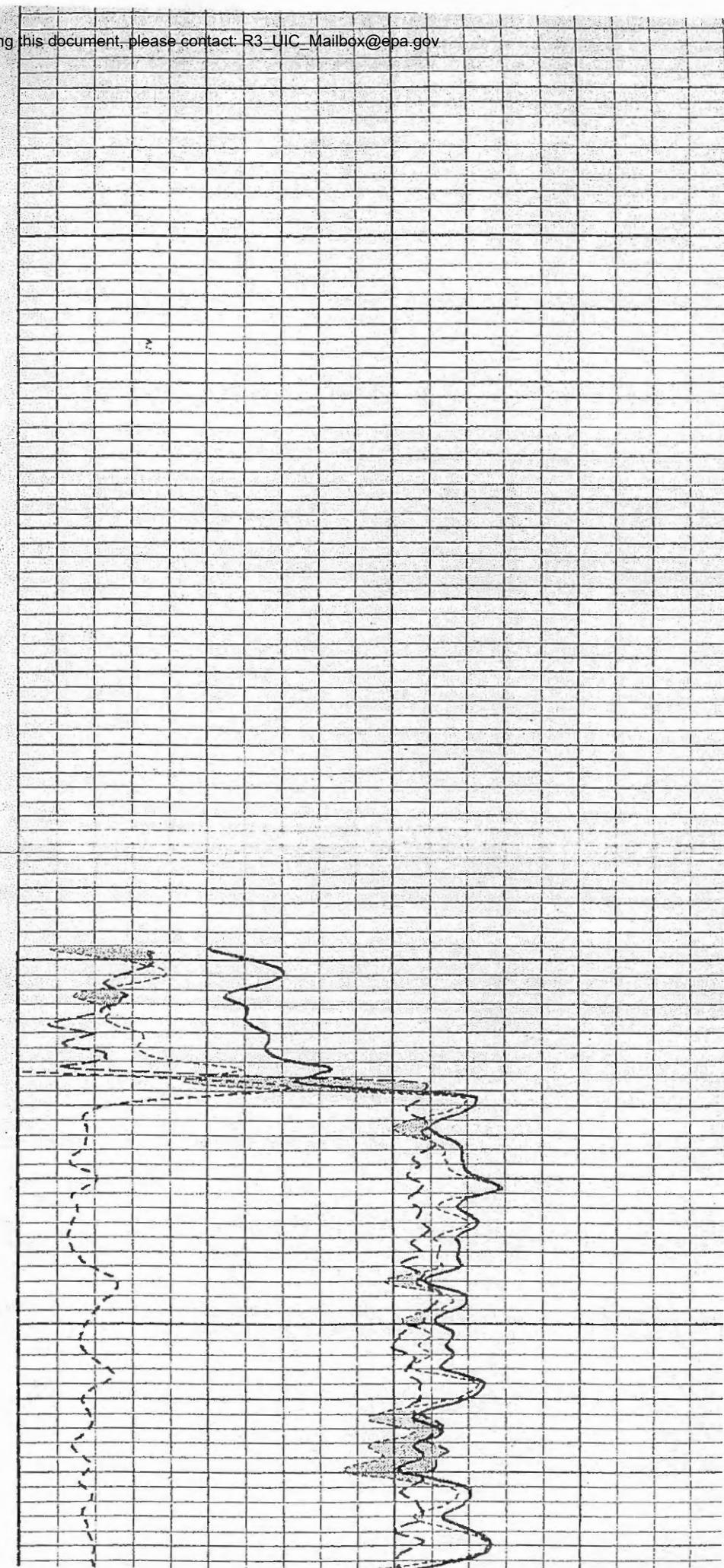
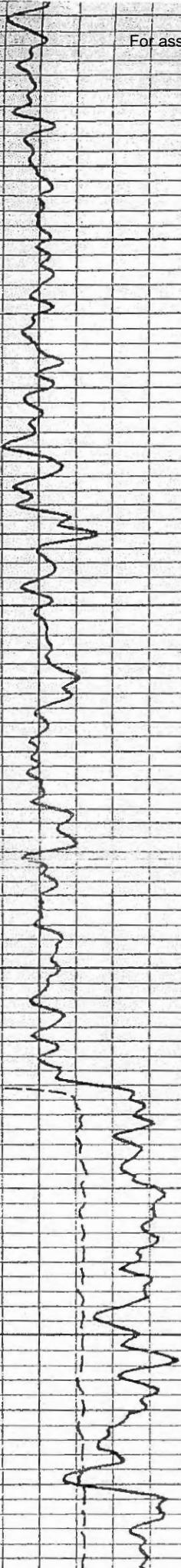
300

400

450

500

550



## Operating Data

The proposed commercial brine disposal well will primarily be utilized to inject produced and flow-back water from wells completed in the Marcellus Shale, the Medina Group and other natural gas and oil producing formations. Other oil and gas related wastewaters associated with the production of oil and natural gas or natural gas storage operations, which are approved by EPA for injection under a UIC Class II D injection well, may also be injected. According to Title 40 Chapter I Sec. 144.6 (b)(1), such fluids include those "Which are brought to the surface in connection with natural gas storage operations, or conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection."

## **Injection Rate**

Injectivity testing performed on the proposed injection well (Bittinger #4) indicated the well may be capable of sustaining injection rates on at least a short-term basis on the order of 3 bbl/min or approximately 4,300 bbl/day. Considering this was a relatively short-term test, a maximum injection rate of 2,000 bbl/day is proposed for operation of the facility, with an average injection rate of 1,000 bbl/day expected.

## **Maximum Allowable Surface Injection Pressure (MASIP) and Average Surface Injection Pressure**

MASIP calculations based on EPA approved equations are included in the "Geologic Data" section of this application. Based on these calculations, the proposed MASIP is 2141 psi. It is estimated that the average surface injection pressure will be approximately 1000 psi.

## **Laboratory Analysis of Injection Fluid Samples**

Laboratory samples representative of the types of brine which will be injected into the proposed injection well are attached. Samples were collected from produced water generated from gas wells in the vicinity of the injection well. The samples are characterized by chloride concentrations in the 200,000 mg/L range and specific gravity of approximately 1.2.

## **Monitoring of Injection Fluid Samples and Well**

The following identifies the UIC Class II underground injection well regulatory requirements and operational procedures which will be conducted to meet the subject requirements:

- 1. Monitoring of the nature of injected fluids at time intervals sufficiently frequent to yield data representative of their characteristics.** An initial sample of fluid will be collected and analyzed from initial loads proposed for disposal from new disposal customers. In addition, samples will be collected for analysis from new types of sources (e.g., from different geologic formations, geographic regions, etc.) which would be expected to differ significantly from brine previously characterized for disposal at the facility. Samples will be analyzed for the following parameters at a minimum: specific gravity, total dissolved solids, and pH.
- 2. Observation of injection pressure, flow rate, and cumulative volume at least weekly based on the regulatory requirements for produced fluid disposal operations.** Injection pressures, flow rate, and cumulative volume will be continuously recorded electronically.

3. **A demonstration of mechanical integrity pursuant to 40 CFR Sec. 146.8 at least once every five years during the life of the injection well.** A mechanical integrity test will be performed prior to initiating injection and at least once every five years.
4. **Maintenance of the results of all monitoring until the next permit review.** All monitoring records will be maintained throughout the life of the well.

Reporting requirements consist of the following:

An annual report will be submitted to EPA summarizing the results of the required monitoring, including monthly records of injected fluids, and any major changes in characteristics or sources of injected fluid.

### **Proposed Annulus Fluid**

The proposed annulus fluid for the proposed injection well will consist of fresh water and a water soluble corrosion inhibitor. The corrosion inhibitor will be mixed in accordance with the manufacturer's recommendations then loaded into the well annulus prior to conducting injection operations. Product information for the type of corrosion inhibitor which will be utilized is attached. A similar type product may be used instead of the example product referenced.

### **Facility Layout and Operation**

As indicated in the attached facility layout diagram, the injection well facility will include a truck unloading area and holding tanks connected by piping with associated valves, all of which will be situated in a diked containment area. The containment area will be properly sized to account for the entire volume of the largest container, plus 10% freeboard, in the event of a leak. The brine will be transferred to the injection well utilizing injection pumps situated in the Equipment Shed along with filters and monitoring equipment. Automatic shut-off valves will be incorporated into the tank design to prevent overflow during filling operations. The facility will be surrounded by a fence having locking entrance and exit gates. A security camera will also be strategically situated on the site. The facility will be continually manned during unloading and injection operations. As indicated above, injection rate, cumulative volume and pressures will be continuously measured and recorded.

**OPERATING DATA**

**TYPICAL BRINE LABORATORY ANALYSIS**

August 26, 2010

Larry Drane  
Tetra Tech NUS  
661 Andersen Drive  
Foster Plaza 7  
Pittsburgh, PA 15220

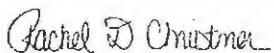
RE: Project: Bittinger  
Pace Project No.: 3032291

Dear Larry Drane:

Enclosed are the analytical results for sample(s) received by the laboratory on August 12, 2010. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Rachel Christner for  
Timothy Reed  
timothy.reed@pacelabs.com  
Project Manager

Enclosures

#### REPORT OF LABORATORY ANALYSIS

Page 1 of 14

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## CERTIFICATIONS

Project: Bittinger  
Pace Project No.: 3032291

### Pennsylvania Certification IDs

1638 Roseytown Road Suites 2,3&4, Greensburg, PA 15601  
Alabama Certification #: 41590  
Arizona Certification #: AZ0734  
Arkansas Certification  
California/NELAC Certification #: 04222CA  
Colorado Certification  
Connecticut Certification #: PH 0694  
Delaware Certification  
Florida/NELAC Certification #: E87683  
Guam/PADEP Certification  
Hawaii/PADEP Certification  
Idaho Certification  
Illinois/PADEP Certification  
Indiana/PADEP Certification  
Iowa Certification #: 391  
Kansas/NELAC Certification #: E-10358  
Kentucky Certification #: 90133  
Louisiana/NELAC Certification #: LA080002  
Louisiana/NELAC Certification #: 4086  
Maine Certification #: PA0091  
Maryland Certification #: 308  
Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification  
Missouri Certification #: 235  
Montana Certification #: Cert 0082  
Nevada Certification  
New Hampshire/NELAC Certification #: 2976  
New Jersey/NELAC Certification #: PA 051  
New Mexico Certification  
New York/NELAC Certification #: 10888  
North Carolina Certification #: 42706  
Oregon/NELAC Certification #: PA200002  
Pennsylvania/NELAC Certification #: 65-00282  
Puerto Rico Certification #: PA01457  
South Dakota Certification  
Tennessee Certification #: TN2867  
Texas/NELAC Certification #: T104704188-09 TX  
Utah/NELAC Certification #: ANTE  
Virgin Island/PADEP Certification  
Virginia Certification #: 00112  
Washington Certification #: C1941  
West Virginia Certification #: 143  
Wisconsin/PADEP Certification  
Wyoming Certification #: 8TMS-Q

### Indiana Certification IDs

7726 Moller Road, Indianapolis, IN 46268  
Illinois/NELAC Certification #: 100418  
Indiana Certification #: C-49-06  
Kansas Certification #: E-10247

Kentucky Certification #: 0042  
Ohio VAP: CL0065  
Pennsylvania: 68-00791  
West Virginia Certification #: 330

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE ANALYTE COUNT

Project: Bittinger  
Pace Project No.: 3032291

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3032291001	Bittinger #4	EPA 200.7	SAB	1	PASI-PA
		ASTM D5057	DDM	1	PASI-I
		EPA 9251	DJT	1	PASI-PA
		ASTM D516-90,02	BKH	1	PASI-PA

## REPORT OF LABORATORY ANALYSIS

Page 3 of 14

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## PROJECT NARRATIVE

Project: Bittinger  
Pace Project No.: 3032291

Method: EPA 200.7  
Description: 200.7 Metals, Total  
Client: Tetra Tech NUS  
Date: August 26, 2010

### General Information:

1 sample was analyzed for EPA 200.7. All samples were received in acceptable condition with any exceptions noted below.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Sample Preparation:

The samples were prepared in accordance with EPA 200.7 with any exceptions noted below.

### Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

### Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: MPRP/4378

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 3032227008,3032454001

M0: Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

- MS (Lab ID: 204064)
  - Iron

### Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

Page 4 of 14

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## PROJECT NARRATIVE

Project: Bittinger  
Pace Project No.: 3032291

Method: ASTM D5057  
Description: Specific Gravity/Bulk Density  
Client: Tetra Tech NUS  
Date: August 26, 2010

### General Information:

1 sample was analyzed for ASTM D5057. All samples were received in acceptable condition with any exceptions noted below.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: Bittinger  
Pace Project No.: 3032291

---

Method: EPA 9251  
Description: 9251 Chloride  
Client: Tetra Tech NUS  
Date: August 26, 2010

### General Information:

1 sample was analyzed for EPA 9251. All samples were received in acceptable condition with any exceptions noted below.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

### Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

Page 6 of 14

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## PROJECT NARRATIVE

Project: Bittinger  
Pace Project No.: 3032291

Method: ASTM D516-90,02

Description: ASTM D516-9002 Sulfate Water

Client: Tetra Tech NUS

Date: August 26, 2010

### General Information:

1 sample was analyzed for ASTM D516-90,02. All samples were received in acceptable condition with any exceptions noted below.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

### Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: WETA/5039

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 3032270002

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 206381)
- Sulfate

### Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

### Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: Bittinger  
Pace Project No.: 3032291

Sample: Bittinger #4	Lab ID: 3032291001	Collected: 08/10/10 22:00	Received: 08/12/10 08:45	Matrix: Water				
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Iron	203000	ug/L	500	10	08/16/10 13:16	08/26/10 11:55	7439-89-6	
Specific Gravity/Bulk Density	Analytical Method: ASTM D5057							
Density	1.2	g/mL	0.50	1		08/22/10 16:30		
9251 Chloride	Analytical Method: EPA 9251							
Chloride	242000	mg/L	15000	5000		08/25/10 16:42	16887-00-6	
ASTM D516-9002 Sulfate Water	Analytical Method: ASTM D516-90,02							
Sulfate	191	mg/L	50.0	5		08/21/10 17:11	14808-79-8	

Date: 08/26/2010 05:04 PM

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

 Project: Bittinger  
 Pace Project No.: 3032291

 QC Batch: MPRP/4378 Analysis Method: EPA 200.7  
 QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total  
 Associated Lab Samples: 3032291001

METHOD BLANK: 204058 Matrix: Water

Associated Lab Samples: 3032291001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron	ug/L	ND	50.0	08/18/10 10:57	

LABORATORY CONTROL SAMPLE: 204059

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron	ug/L	5000	4830	97	80-120	

MATRIX SPIKE &amp; MATRIX SPIKE DUPLICATE: 204061 204062

Parameter	Units	3032454001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Iron	ug/L	30300	5000	5000	36100	35300	116	101	75-125	2	

MATRIX SPIKE SAMPLE: 204064

Parameter	Units	3032227008 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Iron	ug/L	210000	5000	201000	-168	75-125	M0

SAMPLE DUPLICATE: 204060

Parameter	Units	3032454001 Result	Dup Result	RPD	Qualifiers
Iron	ug/L	30300	30800	2	

SAMPLE DUPLICATE: 204063

Parameter	Units	3032227008 Result	Dup Result	RPD	Qualifiers
Iron	ug/L	210000	200000	4	

## QUALITY CONTROL DATA

Project: Bittinger  
Pace Project No.: 3032291

QC Batch:	WET/6579	Analysis Method:	ASTM D5057
QC Batch Method:	ASTM D5057	Analysis Description:	Spec.Gravity/Bulk Density,ASTM D5057
Associated Lab Samples:	3032291001		

SAMPLE DUPLICATE: 468560

Parameter	Units	Result	Dup Result	RPD	Qualifiers
Density	g/mL	1.0	1.0	0	

Date: 08/26/2010 05:04 PM

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

Project: Bittinger  
 Pace Project No.: 3032291

QC Batch:	WETA/5063	Analysis Method:	EPA 9251
QC Batch Method:	EPA 9251	Analysis Description:	9251 Chloride
Associated Lab Samples:	3032291001		

METHOD BLANK: 207248 Matrix: Water

Associated Lab Samples: 3032291001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	3.0	08/25/10 00:00	

LABORATORY CONTROL SAMPLE: 207249

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	40	39.6	99	85-115	

MATRIX SPIKE SAMPLE: 207250

Parameter	Units	3032433007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	31.9	20	49.1	86	85-115	

SAMPLE DUPLICATE: 207251

Parameter	Units	3032433007 Result	Dup Result	RPD	Qualifiers
Chloride	mg/L	31.9	32.4	1	

## QUALITY CONTROL DATA

 Project: Bittinger  
 Pace Project No.: 3032291

 QC Batch: WETA/5039 Analysis Method: ASTM D516-90,02  
 QC Batch Method: ASTM D516-90,02 Analysis Description: ASTM D516-9002 Sulfate Water  
 Associated Lab Samples: 3032291001

METHOD BLANK: 206379 Matrix: Water

Associated Lab Samples: 3032291001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	ND	10.0	08/21/10 16:17	

LABORATORY CQNTROL SAMPLE: 206380

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	30	29.0	97	85-115	

MATRIX SPIKE SAMPLE: 206381

Parameter	Units	3032270002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	90.0	40	119	72	85-115	M1

SAMPLE DUPLICATE: 206382

Parameter	Units	3032270002 Result	Dup Result	RPD	Qualifiers
Sulfate	mg/L	90.0	89.9	.1	

## QUALIFIERS

Project: Bittinger  
Pace Project No.: 3032291

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

### LABORATORIES

PASI-I Pace Analytical Services - Indianapolis

PASI-PA Pace Analytical Services - Greensburg

### ANALYTE QUALIFIERS

M0 Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

### QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Bittinger  
Pace Project No.: 3032291

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
3032291001	Bittinger #4	EPA 200.7	MPRP/4378	EPA 200.7	ICP/3942
3032291001	Bittinger #4	ASTM D5057	WET/6579		
3032291001	Bittinger #4	EPA 9251	WETA/5063		
3032291001	Bittinger #4	ASTM D516-90,02	WETA/5039		

888353

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PA 16701

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WATER • AIR • WASTES • FOOD • PHARMACEUTICALS • NUTRACEUTICALS**CERTIFICATE OF ANALYSIS**

KCS LENAPE RESOURCES CORP.  
9489 ALEXANDER ROAD  
ALEXANDER NY 14005  
Permit No \_\_\_\_\_  
Cust P.O. \_\_\_\_\_  
*Auger-Tepenich*

Date Reported 8/10/01  
Date Received 7/13/01  
Order No 9931-00207  
Invoice No 003010  
Cust # K011  
Sampled Date 7/09/01  
Sampled Time 00:00  
Sample Id

Subject: LION ENERGY - BRINE SAMPLE SUBMITTED 7/13/01

ITEM	TEST	METHOD	RESULT	UNITS	DATE	TECH
1	LION ENERGY	BRINE SAMPLE				
	% BY WGT SALTS IN BRINE					
	CHLORIDE		53,620	MG/L	7/23/01	ERI
	SODIUM		165,000	MG/L	7/23/01	ERI
	POTASSIUM		1910	MG/L	7/23/01	ERI
	MAGNESIUM		3130	MG/L	7/23/01	ERI
	SODIUM		83,760	MG/L	7/23/01	ERI
	SPECIFIC GRAVITY		1.216		7/23/01	ERI
	CALCIUM CHLORIDE		7.55	% BY WGT.	7/23/01	ERI
	SODIUM CHLORIDE		16.82	% BY WGT.	7/23/01	ERI
	POTASSIUM CHLORIDE		9.30	% BY WGT.	7/23/01	ERI
	MAGNESIUM CHLORIDE		1.07	% BY WGT.	7/23/01	ERI
	TOTAL CHLORIDES		25.84	% BY WGT.	7/23/01	ERI
	CALCIUM CHLORIDE		6.274	LBS/GAL.	7/23/01	ERI
	SODIUM CHLORIDE		1.797	LBS/GAL.	7/23/01	ERI
	POTASSIUM CHLORIDE		0.030	LBS/GAL.	7/23/01	ERI
	MAGNESIUM CHLORIDE		0.102	LBS/GAL.	7/23/01	ERI
	TOTAL CHLORIDES		2.62	LBS/GAL	7/23/01	ERI
	WEIGHT OF 1 GALLON OF BRINE		10.15	LBS/GAL	7/23/01	ERI

ANALYSIS BY NYS LAB: 10121

$$S.G. = \frac{10.15 \text{ #/gal}}{8.33 \text{ #/gal}} = 1.218$$

Certificate of Analysts Continued On Next Page

The data and other information contained on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon the condition that it is not to be reproduced wholly or in part for advertising or other purposes without written approval from the laboratory

USDA-EPA-NIOSH Testing Food Sanitation Consulting Chemical and Microbiological Analyses and Research

MEMBER  
**ACIL**

## Microbac

BRADFORD DIVISION  
P.O. BOX 489  
BRADFORD PA 16701  
(814)368-6087

<http://www.microbac.com>

**CHEMISTRY • MICROBIOLOGY • FOOD SAFETY • CONSUMER PRODUCTS  
WATER • AIR • WASTES • FOOD • PHARMACEUTICALS • NUTRACEUTICALS**

# CERTIFICATE OF ANALYSIS

ABC 2001

KCS LENAPE RESOURCES CORP.

Date Reported 8/10/01  
Date Received 7/13/01  
Order No 9931-00207  
Invoice No 008010  
Cust # K011  
Sampled Date 7/09/01  
Sampled Time 00:00  
Sample Id

Permit No.  
Gust R.O.

Subject: LION ENERGY - BRINE SAMPLE SUBMITTED 7/13/01

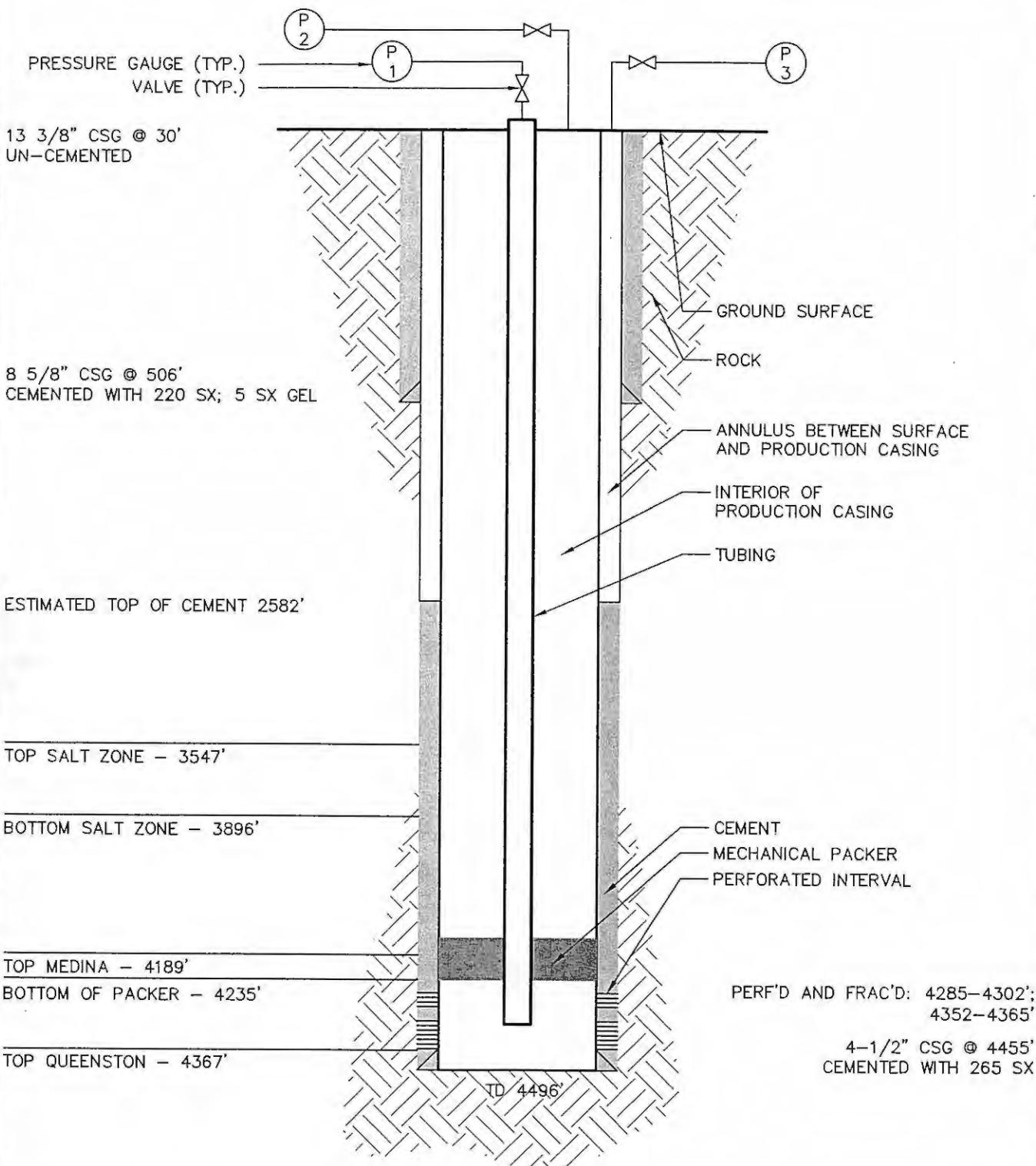
EMP TEST METHOD RESULT UNITS DATE TECG

*Opie E. Lang*  
MICROBAG BRADFORD DIVISION

The data and other information contained on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon the condition that it is not to be reproduced wholly or in part for advertising or other purposes without written approval from the laboratory.

**WELL CONSTRUCTION**

**INJECTION WELL CONFIGURATION**



**TETRA TECH**

WWW.TETRATECH.COM

661 ANDERSEN DRIVE - FOSTER PLAZA 7  
PITTSBURGH, PA 15220  
T: (412) 921-7090 | F: (412) 921-4040

BEAR LAKE PROPERTIES, LLC

BITTINGER #4  
INJECTION WELL CONFIGURATION  
SCALE: NOT TO SCALE

DATE:	9-30-10
PROJECT NO.:	112C02984
DESIGNED BY:	
DRAWN BY:	CK
CHECKED BY:	
SHEET: 1 OF 1	
COPYRIGHT TETRA TECH INC.	
FIGURE	

**WELL CONSTRUCTION**

**BITTINGER #4 COMPLETION RECORD**

ER-DG-4, Rev. 1/82

RB

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL RESOURCES  
BUREAU OF OIL AND GAS REGULATION  
PITTSBURGH, PENNSYLVANIA 15222

REG-I/NLII

Office Use Only

970' S 42° 00' 00"  
11240' W 79° 30' 00"  
(C)

## WELL RECORD

L123-39874  
7/12/74

7/12/75

PERMIT NO 37-123-39874-00

PROJECT NO DEET

TYPE OF WELL

Gas

## COLUMBUS FIELD, DEWEY CORNERS POOL DEU

WELL OPERATOR  
U. S. Energy Development Corporation

TELEPHONE NO  
(716)856-9764

## ADDRESS

670 Statler Towers, Buffalo, NY 14202-9990

ZIP

## FARM NAME

Bittinger

FARM NO

4

SERIAL NO

ACRES  
62

## TOWNSHIP

Columbus

## COUNTY

Warren

## DRILLING COMMENCED

8/11/87

## DRILLING COMPLETED

8/15/87

## ELEVATION

1561'

## QUADRANGLE

Columbus

 7 1/2' 15'

## CASING AND TUBING RECORD

PIPE SIZE	AMOUNT IN WELL	MATERIAL BEHIND PIPE		PACKER			DATE RUN
		CEMENT (SKS)	GEL (SKS)	TYPE	SIZE	DEPTH	
13 3/8"	30'	NA					8/11/87
8 5/8"	506'	220	5				8/12/87
4 1/2"	4454.9'	265					11/5/87
		T.D.	B.D.	D.P.I.	Class	O/G Lease	
		4496		4362	0	0/1/	

## PERFORATION RECORD

## STIMULATION RECORD

DATE	INTERVAL PERFORATED		DATE	INTERVAL TREATED	AMOUNT FLUID	AMOUNT SAND	INJECTION RATE
	FROM	TO					
8/19	4459'	4362'	8/20/87	Same	840 bbls.	67,000#	20.7

NATURAL OPEN FLOW

3000 MCF

MMCFD

NATURAL ROCK PRESSURE

NA

HRS

DAYS

AFTER TREATMENT OPEN FLOW

6,600 MCFD

AFTER TREATMENT ROCK PRESSURE

1100

72

HRS

DAYS

REMARKS:

MEDINA

RECEIVED  
PA GEOLOGICAL SURVEY  
SEP 30 1988

BUREAU OF OILS & GASES  
ENVIRONMENTAL REGULATIONS

(FORMATION ON REVERSE SIDE)

A WELL RECORD SHALL BE FILED WITHIN 30 DAYS OF CESSATION OF DRILLING. IF THE WELL IS NOT COMPLETED WITHIN 30 DAYS OF CESSATION OF DRILLING, AN UPDATED WELL RECORD MUST BE SUBMITTED UPON COMPLETION OF THE WELL.

CDM  
3-18-88

ER-OG-4: Rev. 10/82  
(pg 2)

122-39874

FORMATIONS						
NAME	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (FRESH OR SALT WATER)	SOURCE OF DATA
Unconsolidated Gravel	0	18'				Driller's Record & Geophysical Logs
Devonian Shale	18'	2741'				
Tully Limestone	2741'	2848'				
Hamilton Shale	2848'	3018'				
Onondaga Limestone	3018'	3182'				
Bois Blanc	3182'	3211'				
Akron Dol	3211'	3292'				
Camillus	3292'	3366'				
Syracuse	3366'	3547'				
Salt	3547'	3896'				
Lockport Dol	3896'	4067'			Salt water	
Rochester Shale	4067'	4151'				
Packer Shell	4151'	4189'				
Grimsby Sandstone	4189'	4304'	Gas			
Power Glen Shale	4304'	4350'				
Whirlpool Sandstone	4350'	4367'	Gas			
Queenston Shale	4367'	4496'				
		T.D.				

RECEIVED

August 30 1987  
SEP 30 1988

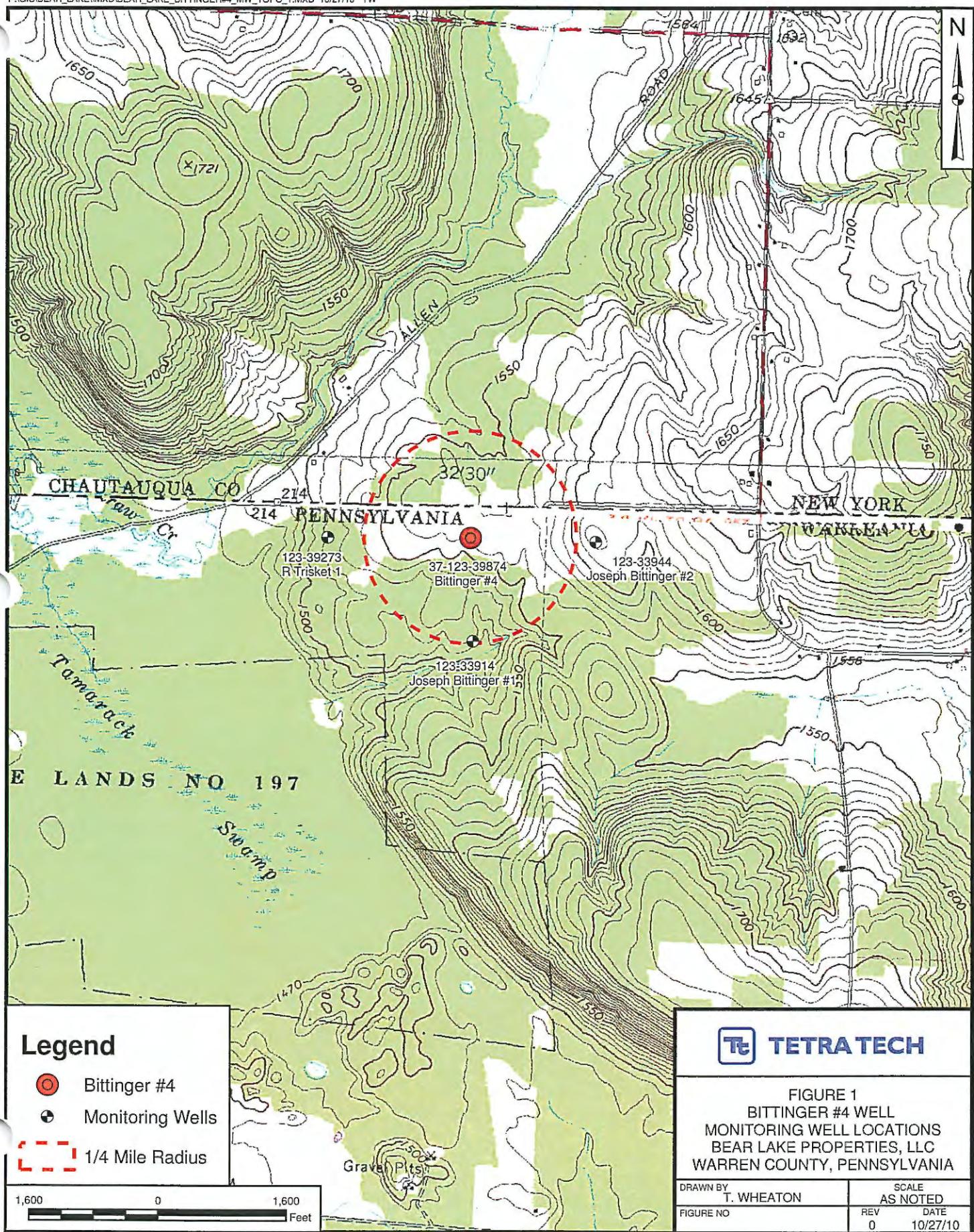
APPROVED BY: *Mark H. Heggen*  
U.S. GEOLOGICAL SURVEY  
104 & Gas Geology Division  
TITLE: *Geological Survey*

### Monitoring Program

The liquid levels in nearby depleted natural gas wells will be measured and recorded semi-annually, at a minimum. For the Bittinger No. 4 well the Bittinger No. 1, R. Trisket 1, and the Joseph Bittinger 2 wells will be monitored. Bittinger No. 1 will be monitored until such time as the well is placed into operation as an injection well.

<b>Injection Well</b>	<b>Monitoring Well</b>	<b>Approximate Distance and Direction From Injection Well</b>
Bittinger #4	Bittinger #1(unless injection also being performed in Bittinger #1)	0.25 mi to the south
	R. Trisket 1	0.33 mi to the west
	Joseph Bittinger 2	0.37 mi to the east

P:\\GIS\\BEAR\_LAKE\\MXD\\BEAR\_LAKE\_BITTINGER#4\_MW\_TOPO\_1.MXD 10/27/10 TW



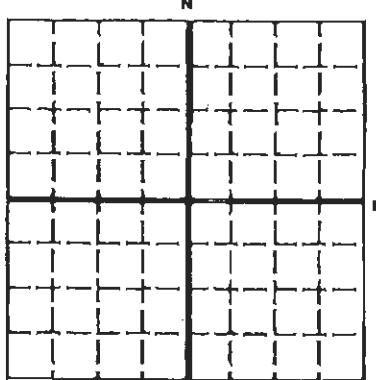
**Section 9 – Plugging and Abandonment Plan**

**Revised Pages**



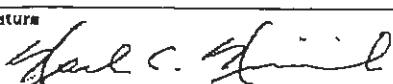
United States Environmental Protection Agency  
Washington, DC 20460

## PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility Bear Lake Properties, LLC Columbus Township, PA		Name and Address of Owner/Operator Bear Lake Properties, LLC 3000 Village Run Road, Unit 103, #223, Wexford, PA 15090						
Locate Well and Outline Unit on Section Plat - 840 Acres		State PA	County Warren					
		Surface Location Description 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 Surface Location ft. from (N/S) Line of quarter section and ft. n. from (E/W) Line of quarter section.		TYPE OF AUTHORIZATION <input checked="" type="checkbox"/> Individual Permit <input type="checkbox"/> Area Permit <input type="checkbox"/> Rule Number of Wells 1  Lease Name Bittinger Well Number Bittinger #4						
<b>CASING AND TUBING RECORD AFTER PLUGGING</b>		<b>METHOD OF EMPLACEMENT OF CEMENT PLUGS</b>						
SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE	<input checked="" type="checkbox"/> The Balance Method <input type="checkbox"/> The Dump Baller Method <input type="checkbox"/> The Two-Plug Method <input type="checkbox"/> Other			
13 3/8			30					
8 3/8			506					
4 1/2			2455 (after cutting)					
<b>CEMENTING TO PLUG AND ABANDON DATA:</b>		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	8 5/8		
Depth to Bottom of Tubing or Drill Pipe (ft.)		4286	2000	900	550	50		
Backs of Cement To Be Used (each plug)		32	30	43	30	14		
Slurry Volume To Be Pumped (cu. ft.)		37.8	35.4	50.7	35.4	16.5		
Calculated Top of Plug (ft.)		4085	1900	750	450	0		
Measured Top of Plug (ft. if tagged ft.)		4085	1900	750	450	0		
Slurry Wt. (Lb./Gal.)		15.6	15.6	15.6	13.6	15.6		
Type Cement or Other Material (Class III)		Class A	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>								
From	To			From			To	
506	2000 (open hole - csg cut)							
<b>Estimated Cost to Plug Wells</b> \$30,000								

### Certification

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 144.22)

Name and Official Title (Please type or print)	Signature	Date Signed
Karl Kimmich, President		12/07/2010



**Mr. Dale Skoff**  
Tetra Tech  
661 Anderson Drive  
Foster Plaza 7  
Pittsburgh, Pa. 15220

Dear Dale,

This bid is the Approximate Cost and Procedure to plug this well. Actual plug as follows

4286 to 4085 feet	Cement plug to plug off perforations	32 Sacks
4085 to 2000 feet	Bentonite gel 6% spacer	
2000 feet	cut 4 1/2 inch casing or above salt	
2000 to 1900 feet	Cement plug	30 Sacks
1900 to 900 feet	Bentonite gel 6% spacer	
900 to 750 feet	Cement plug over shale zone	43 Sacks
750 to 550 feet	Bentonite gel 6% spacer	
550 to 450 feet	Cement plug 50 ft in open hole 50 ft inside 8 5/8 casing	30 Sacks
450 to 50 feet	fill up with pea gravel	
50 to 0 feet	Cement plug to surface	15 Sacks

P.S. If there is any Ononadaga in this well it will require a plug also.  
Bentonite is mixed 100 lbs to 6 bbls water

Sincerley,

David Cook  
Field Sales Rep.

Prepared for  
Tetra Tech  
661 Anderson Drive  
Foster Plaza 7  
Pittsburgh, Pa. 15220  
December 7, 2010  
Bid #0006133



Prepared by  
Daniel R Simmons  
159 Northwood Dr.  
Meadville, PA 16335  
(814) 337-1115  
Dan.Simmons@univwell.com

Plug to abandon well.  
Plug to abandon Medina well in N. Warren county.

Product #	Description	Qty	Units of Sale	Unit Price	Total Price
A0035	MISCELLANEOUS PUMP 1ST 4 HRS	1.0	EA	\$2,410.00	\$2,410.00
T0002	EQUIPMENT MILEAGE CHARGE	40.0	TRK/MI	\$7.50	\$300.00
M0001	CEMENT - CLASS A	150.0	SK	\$17.50	\$2,625.00
M0040	BENTONITE GEL	25.0	CWT	\$33.50	\$837.50
M0050	UNICELE	25.0	LB	\$4.00	\$100.00
F0032	CEMENT BLENDING CHARGE	150.0	SK	\$2.35	\$352.50
T0003	CEMENT DELIVERY CHARGE	540.0	SK-MI/10	\$1.10	\$594.00

Gross Price: \$7,219.00

20.00% Special Discount Applied: \$5,775.20

Comments:

- Plug to abandon Medina well in northern Warren county. We would use Class A cement. Overtime would start after 4 hour at the rate of \$590.00 per hour. The lease name is Bittinger # 4.
- Payment Terms: 30days with credit
- This price quote is valid through 12/31/2010. Actual job scheduling is based upon equipment availability.

### 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. With regard to PADEP regulations, this currently includes providing a "Notice of Intent to Plug a Well" no less than 3 days and no more than 30 days prior to abandoning the well, to allow a PADEP inspector to be present during the plugging procedure. The PADEP may waive the notification period. The notification will include well location plat, well logs, production logs, injection logs, construction details, and proposed abandonment method. After receiving approval from PADEP to proceed, the well will be abandoned and the abandonment procedures will be documented on a "Certificate of Plugging".

The USEPA will be notified of the plugging activity at least 45 days prior to commencing activities. This notification will include USEPA Form No. 7514-20. A proposed plugging plan (Form 7514-20) is attached based on the current PADEP and USEPA regulations. However, this may be modified prior to plugging in order to meet the requirements at the time of the plugging activity. A contractor cost estimate to perform plugging and abandonment according to the proposed plugging plan is attached. The contractor estimate is \$30,000 for these services.

**PLUGGING AND ABANDONMENT PLAN**

**PLUGGING AND ABANDONMENT ESTIMATED COSTS**



PO Box 40, 5296 Bly Hill Road  
Ashville, NY 14710  
Phone 716-410-0204 or 716-410-0028  
Fax 716-526-4080

October 13, 2010

To: Mr. Karl Kimmich  
Bear Lake Properties, LLC

Re: Estimated plugging cost

The estimated cost to plug to abandon your Bittinger # 1 and 4 wells is \$30,000.00 per well.

Please see attached itemized estimate.

Thank You for the opportunity to be of service to Bear Lake Properties.

Regards,  
Chuck DuBose  
DLH Energy Service, LLC

## DLH Energy Service, LLC

Project		Projected Plug to Abandon Cost		Date: 10/12/2010	
AFE Number:		Lease Name: Bittinger		Well Number: 1 & 4	
Billing Code No.	Description of the Billing Codes	Contractor's Company Name	Contractor's Bid Cost	In - House Cost	Cost Per Billing Code No.
100-01	Intang - Legal				\$0.00
100-02	Intang - Engineering				\$0.00
100-03	Intang - Geology				\$0.00
100-04	Intang - Supervision		\$1,000.00		\$1,000.00
100-05	Intang - Permits			\$500.00	\$500.00
100-06	Intang - Surveying				\$0.00
100-07	Intang - Water Testing				\$0.00
100-08	Intang - Environmental Assessment				\$0.00
100-09	Intang - Road & Loc. Construction	Roustabout	\$1,000.00		\$1,000.00
100-10	Intang - Timbering				\$0.00
100-11	Intang - Drilling				\$0.00
100-12	Intang - Cement Casing		\$9,100.00		\$9,100.00
100-13	Intang - Wire line Logging		\$6,500.00		\$6,500.00
100-14	Intang - Notching				\$0.00
100-15	Intang - Perforating				\$0.00
100-16	Intang - Fracturing				\$0.00
100-17	Intang - Water Pumping				\$0.00
100-18	Intang - Water Hauling		\$1,600.00		\$1,600.00
100-19	Intang - Service Rig Notching				\$0.00
100-20	Intang - Service Rig Frac				\$0.00
100-21	Intang - Water Disposal		\$1,000.00		\$1,000.00
100-22	Intang - Service Rig Completion	Plugging	\$4,100.00		\$4,100.00
100-23	Intang - Trucking		\$1,700.00		\$1,700.00
100-24	Intang - Dozer / Excavator		\$500.00		\$500.00
100-25	Intang - Site Restoration		\$500.00		\$500.00
100-26	Intang - Gathering Line Installation				\$0.00
100-27	Intang - Electric line / Transformer Install				\$0.00
100-28	Intang - Well head / Jack Install				\$0.00
100-29	Intang - Rentals tanks/frac pipe/tbg				\$0.00
100-30	Intang - Frac Packer Re - Dress				\$0.00
100-31	Intang - Prod Equip & Tank Battery Install				\$0.00
100-32	Intang - MISC		\$2,500.00		\$2,500.00
200-01	Tang - Materials Road & Location				\$0.00
200-02	Tang - Casing Conductor				\$0.00

200-03	Tang - Casing Surface				\$0.00
200-04	Tang - Casing Production				\$0.00
200-05	Tang - Frac Packer				\$0.00
200-06	Tang - Tubing				\$0.00
200-07	Tang - Rods				\$0.00
200-08	Tang - Rod Pump/Downhole Equip				\$0.00
200-09	Tang - Well head / Valves / Fittings				\$0.00
200-10	Tang - Pump Jack				\$0.00
200-11	Tang - Electric Motor / Panel				\$0.00
200-12	Tang - Plumbing Fittings / Valves				\$0.00
200-13	Tang - Tank Battery				\$0.00
200-14	Tang - Oil / Water Separator				\$0.00
200-15	Tang - Gas Separator				\$0.00
200-16	Tang - Gathering Line Material				\$0.00
200-17	Tang - Electric Line				\$0.00
200-18	Tang - Gas Sales Meter				\$0.00
200-19	Tang - Pump Off Controller				\$0.00
200-20	Tang - MISC				\$0.00
Contractor's Total Costs		\$29,500.00			
In House Total Costs			\$500.00		
Grand Total				\$30,000.00	



10/6/2010

**Mr. Dale Skoff**  
Tetra Tech  
661 Anderson Drive  
Foster Plaza 7  
Pittsburgh, Pa. 15220

Dear Dale;

This bid is the approximate cost and procedure to plug this well. Actual  
PLUG AS FOLLOWS

4286 to 4085 feet	Cement plug to plug off perforations.	32 sacks
4085 to 2000 feet	Bentonite gel 6% spacer	
2000 feet cut 4 1/2 inch casing or above the salt.		
2000 to 1900 feet	Cement plug	30 sacks
1900 to 900 feet	Bentonite spacer	
900 to 750 feet	Cement plug over shale zone	43 sacks
750 to 550 feet	Bentonite spacer	
550 to 450 feet	Cement plug 50ft. In open hole and 50 ft. inside 8 5/8 casing	30 sacks
450 to surface	Fill up with pea gravel	

P. S. — If there is any Ononadaga in this well it will require a plug also.  
Bentonite is mixed 100 pounds to 6 lbs. Water

Sincerely,

**Daniel R. Simmons**  
Sales Rep.

Prepared for  
Tetra Tech  
661 Anderson Drive  
Foster Plaza 7  
Pittsburgh, Pa. 15220  
October 6, 2010  
Bid #0006133



Prepared by  
Daniel R. Simmons  
159 Northwood Dr.  
Meadville, PA 16335  
(814) 337-1115  
Dan.Simmons@univwell.com

Plug to abandon well.  
Plug to abandon Medina well in N. Warren county.

Product #	Description	Qty	Units of Sale	Unit Price	Total Price
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M0001	CEMENT - CLASS A	135.0	SK	\$17.50	\$2,362.50
M0040	BENTONITE GEL	25.0	CWT	\$33.50	\$837.50
M0050	UNICELE	25.0	LB	\$4.00	\$100.00
F0032	CEMENT BLENDING CHARGE	135.0	SK	\$2.35	\$317.25
T0003	CEMENT DELIVERY CHARGE	540.0	SK-MI/10	\$1.10	\$594.00

**Gross Price:** \$6,921.25  
**20.00% Special Discount Applied:** \$5,537.00

Comments:

- Plug to abandon Medina well in northern Warren county. We would use Class A cement. Overtime would start after 4 hour at the rate of \$590.00 per hour. The lease name is Bittinger # 4.
- Payment Terms: 30days with credit
- This price quote is valid through 12/31/2010. Actual job scheduling is based upon equipment availability.

**PLUGGING AND ABANDONMENT PLAN**

**EPA FORM 7520-14**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

**PLUGGING AND ABANDONMENT PLAN**

Name and Address of Facility  
Bear Lake Properties, LLC  
Columbus Township, PA

Name and Address of Owner/Operator  
Bear Lake Properties, LLC  
3000 Village Run Road, Unit 103, #223  
Wexford, PA 15090

Locate Well and Outline Unit on Section Plat - 640 Acres		State PA	County Warren	Permit Number																																																																								
Surface Location Description 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																																																																												
Surface Location _____ ft. From (N/S) _____ Line of Quarter Section And _____ ft. From (E/W) _____ Line of Quarter Section																																																																												
<b>TYPE OF AUTHORIZATION</b> <input checked="" type="checkbox"/> Individual Permit <input type="checkbox"/> Area Permit <input type="checkbox"/> Rule			<b>WELL ACTIVITY</b> <input type="checkbox"/> Class I <input type="checkbox"/> Hazardous <input type="checkbox"/> Nonhazardous <input type="checkbox"/> Class II <input checked="" type="checkbox"/> Brine Disposal <input type="checkbox"/> Enhanced Recovery <input type="checkbox"/> Hydrocarbon Storage <input type="checkbox"/> Class III																																																																									
Number of Wells _____ 1			Well Number Bittinger #4																																																																									
<b>CASING AND TUBING RECORD AFTER PLUGGING</b> <table border="1"> <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>13/38</td> <td></td> <td></td> <td>30</td> <td></td> </tr> <tr> <td>8 5/8</td> <td></td> <td></td> <td>506</td> <td></td> </tr> <tr> <td>4 1/2</td> <td></td> <td></td> <td>2455 (after cutting)</td> <td></td> </tr> </tbody> </table>					SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE	13/38			30		8 5/8			506		4 1/2			2455 (after cutting)																																																					
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4 1/2			2455 (after cutting)																																																																									
<b>METHOD OF EMPLACEMENT OF CEMENT PLUGS</b> <input checked="" type="checkbox"/> Balance Method <input type="checkbox"/> Dump Bailer Method <input type="checkbox"/> Two Plug Method <input type="checkbox"/> Other																																																																												
<b>CEMENT TO PLUG AND ABANDON DATA:</b> <table border="1"> <thead> <tr> <th>Size of Hole or Pipe in Which Plug Will Be Placed (inches)</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>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> <td></td> </tr> <tr> <td>4286</td> <td>2000</td> <td>900</td> <td>550</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>32</td> <td>30</td> <td>43</td> <td>30</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>37.8</td> <td>35.4</td> <td>50.7</td> <td>35.4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4085</td> <td>1900</td> <td>750</td> <td>450</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4085</td> <td>1900</td> <td>750</td> <td>450</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>15.6</td> <td>15.6</td> <td>15.6</td> <td>15.6</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Class A</td> <td>Class A</td> <td>Class A</td> <td>Class A</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Size of Hole or Pipe in Which Plug Will Be Placed (inches)	Plug #1	Plug #2	Plug #3	Plug #4	Plug #5	Plug #6	Plug #7	4 1/2	7 7/8	7 7/8	8 5/8					4286	2000	900	550					32	30	43	30					37.8	35.4	50.7	35.4					4085	1900	750	450					4085	1900	750	450					15.6	15.6	15.6	15.6					Class A	Class A	Class A	Class A				
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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> <table border="1"> <thead> <tr> <th>From</th> <th>To</th> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td>506</td> <td>2000 (open hole - csg cut)</td> <td></td> <td></td> </tr> </tbody> </table>					From	To	From	To	506	2000 (open hole - csg cut)																																																																		
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<b>Estimated Cost to Plug Wells</b> \$30,000																																																																												

**CERTIFICATION**

I certify under the penalty of law that I have 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)	Signature	Date Signed
---	-----------	-------------

### **Necessary Resources**

Bear Lake Properties, LLC will obtain a Letter of Credit to verify that they have the resources necessary to plug and abandon the well. This documentation will be provided under a separate cover at a later date.

### **Plan for Well Failures**

The pressure in the annulus between the tubing and production (4 1/2 inch) casing in the injection well will be continuously monitored. Likewise, the pressure between the 4 1/2 and 8 5/8 inch casing will be continuously monitored. Should a pressure increase occur in either monitored space, injection will cease and EPA will be verbally notified within 24 hours and notified in writing within 7 days. The cause of the pressure increase will be investigated by Bear Lake Properties and remedial measures implemented following discussions with EPA on the proposed approach.

**Section 11 – Plans for Well Failures**

**Revised Pages**

### **Plan for Well Failures**

The pressure in the annulus between the tubing and production (4 1/2 inch) casing in the injection well will be continuously monitored. A minimum pressure of approximately 100 psi will be maintained on the annulus. The pressure between the 4 1/2 and 8 5/8 inch casing will also be continuously monitored. The annulus will be equipped with an automated well shut-off device which will shut down the well if pressure indicative of well failure occurs. Should a pressure change indicative of well failure occur in either monitored space, injection will cease and EPA will be verbally notified within 24 hours and notified in writing within 7 days. The cause of the pressure change will be investigated by Bear Lake Properties and remedial measures implemented following discussions with EPA on the proposed approach.

**Set of Revisions**

**Bittinger #4 UIC Class II-D Permit Application**

## Appendix A

Appendix A contains well records and information for groundwater wells in the area surrounding Bittinger No. 4. Groundwater wells located within 1 mile of the Bittinger No. 4 well are listed in the following table, and well records data is provided in Appendix A-1 (Pennsylvania) and A-2 (New York). Well records for all groundwater wells located within Columbus Township, Warren County, Pennsylvania are provided in Appendix A-3.

**APPENDIX A**

**GROUNDWATER WELLS WITHIN 1 MILE**

Bittinger Area; Columbus Twp; Warren County, PA  
 Wells w/in 1 mile radius of Bittinger #4

	API #	TD	Drilling Completed	Last Csg	Csg depth	Completion	Comments
<b>Proposed Injection and Monitoring Wells</b>							
Bittinger #1	123-33914	4467	12/29/1983	4.5	4416	Perf'd & Frac'd: 4210-4327'	Subject of separate UIC Class II permit application
Bittinger #4	123-39874	4496	8/15/1987	4.5	4455	Perf'd & Frac'd: 4285-4302'; & 4352-4365'	
<b>Water Wells</b>							
John Marowski	423207	60	8/18/2003	8	39	Perforated or Slotted	Drilled by Action Drilling Inc. Lat: 42.01002 Long: -79.55246 Water Bearing Zone 1: 37 - 39 feet
Brownell Rd	CU1709	125	Unknown	Unknown	100	Unknown	Depth to Bedrock: 98 ft DTW: 110 ft Lat: 42 01 58.3 Long: 79 34 28.1
Clymer Hill Rd	CU2266	100	Unknown	Unknown	81	Unknown	Depth to Bedrock: 50 ft DTW: 79 ft Lat: 42 03 30.3 Long: 79 36 44
Clymer Sherman Rd	CU2229	107	Unknown	Unknown	18	Unknown	Depth to Bedrock: 14 ft Lat: 42 02 15.8 Long: 79 37 46.6
Rt 474	CU1124	105	Unknown	Unknown	80	Unknown	Depth to Bedrock: 90 ft DTW: 100 ft Lat: 42 04 37 Long: 79 32 22.3

**APPENDIX A-1**

**PENNSYLVANIA GROUNDWATER INFORMATION SYSTEM  
WELL RECORDS WITHIN 1 MILE**

## DETAILS FOR WELL 423207

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 1 of 1

(There is a total of 1 Wells in the list.)

[First Well](#)[Prev. Well](#)[Return to Summary List](#)

Well Driller: ACTION DRILLING, INC.

PA Well ID: 423207

License: 2323

Driller Well ID: 0331

Type of Activity: New Well

Original Well By:

Date Drilled: 8/18/2003

Drilling Method: CABLE TOOL

Owner: JOHNMAROWSKI

Address of Well: LAKE PLEASANT RD

Zipcode:

County: ERIE

Municipality: GREENE TWP.

Quadrangle:

Latitude: 42.01002

Longitude: -79.55246

Well Depth (ft): 60

Well Finish: PERFORATED  
OR SLOTTED

Depth to Bedrock(ft): 37

Did Not Encounter Bedrock:

Well Yield (gpm): 5

Yield Measure Method: BAILER

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well: WITHDRAWAL

Use of Water: DOMESTIC

## DRILLER'S LOG

## DEPTH OF UNIT    DESCRIPTION OF UNITS PENETRATED

Beginning Depth: 0

Unit 1: BROWN TIL

Base of Unit 1: 10

Unit 2: GREY TIL

Base of Unit 2: 37

Unit 3: SHALE

## BOREHOLE

	Top	Bottom	Diameter
SECTION 1:	0	60	8

## CASING

CASING 1: Top: 0 Bottom: 39 Diameter: 8 Material: STEEL

## WATER BEARING ZONE

WATER BEARING ZONE 1: Top: 37 Bottom: 39 Yield: 5

Record: 1 of 1

(There is a total of 1 Wells in the list.)

[First Well](#)

[Prev Well](#)

[Return to Summary List](#)

**APPENDIX A-2**

**NEW YORK GROUNDWATER WELL DATABASE  
WELL RECORDS WITHIN CLYMER, NY**

## Water Well Information - Search Results

Search By County Name: Chautauqua

Search By Town/City/Village Name: Clymer

\* = No value available.

NR = Rock was not encountered.

Town/ City/ Village	County	Well#	FOIL Address	Latitude (D/M/S)	Longitude (D/M/S)	Well Depth (FT)	Rock Depth (FT)	GW Depth (FT)	Casing Length (FT)	Screen Used	Yield (GPM)	Registration Number
Clymer	Chautauqua	CU1709	BROWNELL RD	42 01 58.3	79 34 28.1	125	98	110.0	100.0	NO	3.0	NYRD10203
Clymer	Chautauqua	CU2266	CLYMER HILL RD	42 03 30.3	79 36 44.0	100	50	79.0	81.0	NO	30.0	NYRD10203
Clymer	Chautauqua	CU2229	CLYMER SHERMAN RD	42 02 15.8	79 37 46.6	107	14	*	18.0	NO	16.0	NYRD10084
Clymer	Chautauqua	CU1124	RT 474	42 04 37.0	79 32 22.3	105	90	100.0	80.0	NO	25.0	NYRD10084

Records 1 through 4 of 4

[Water Well Search Home](#)

[Search for Contractors](#)

[Search for Wells](#)

[Contact Us](#)

**APPENDIX A-3**

**PENNSYLVANIA GROUNDWATER INFORMATION SYSTEM  
WELL RECORDS WITHIN COLUMBUS TOWNSHIP, PA**

## PA Topographic &amp; Geologic Survey

PaGWIS

## SELECTED WELLS

Menu

New Selection

Email comments to Topo Geo.

You have selected 35 Well(s). To create a comma separated list of all these wells, click **Create List**. If you want to limit the list, place check marks next to the wells you want to have included, and then click **Create List**.

Page 1 of 2

Record	PA Well ID	Driller	Driller Well ID	Date Drilled	Owner	County	Municipality	Image
<input type="checkbox"/> 1	<a href="#">405210</a>	ELIASON WATER WELL DRILLING		2/7/1994		WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 2	<a href="#">33539</a>	ALFRED L BURCH		5/1/1966	ALLEN , BRUCE C	WARREN	COLUMBUS TWP.	No Image
<input type="checkbox"/> 3	<a href="#">405201</a>	MCCRAY WELL DRILLING		10/1/1998	AYERS	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 4	<a href="#">405194</a>	CLEARWATER DRILLING COMPANY		11/18/2002	BECKWITH	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 5	<a href="#">33614</a>	YORK WATER WELL DRILLING CO INC		6/1/1979	BEDJORSKI , C	WARREN	COLUMBUS TWP.	No Image
<input type="checkbox"/> 6	<a href="#">33629</a>	ACKERMAN DRILLING		10/1/1980	BULL , MICHEAL	WARREN	COLUMBUS TWP.	No Image
<input type="checkbox"/> 7	<a href="#">405195</a>	SAXTON WELL SERVICE, INC.		1/1/2002	BYERS	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 8	<a href="#">405213</a>	MCCRAY WELL DRILLING		7/1/1990	CORTER	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 9	<a href="#">33531</a>	JOHNSON'S DRILLING		4/1/1986	EASTMAN , S	WARREN	COLUMBUS TWP.	No Image
<input type="checkbox"/> 10	<a href="#">146667</a>	MCCRAY WELL DRILLING		6/1/1988	FRONTERY DAVID	WARREN	COLUMBUS TWP.	No Image
<input type="checkbox"/> 11	<a href="#">405216</a>	JOHNSON DRILLING		4/25/1994	GADES	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 12	<a href="#">405208</a>	JOHNSON DRILLING		7/1/1997	HILL FARM	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>

<input type="checkbox"/>	13	405205	DANIEL P HORNBURG		9/1/1998	HORNBURG	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	14	405202	JEFFREY COBB DRILLING		7/15/1999	JENSON	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	15	405198	CLEARWATER DRILLING COMPANY		6/21/2000	JOGAITH	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	16	405203	DANIEL P HORNBURG		8/3/1998	LAWSON	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	17	405200	DANIEL P HORNBURG		6/18/1999	MCCLAIN	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	18	405212	JENNINGS & SON DRILLING		5/1/1991	MCGURK	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	19	405196	MCCRAY WELL DRILLING		10/1/2001	MICK	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	20	405214	MCCRAY WELL DRILLING		9/1/1993	MIKE	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>

## PA Topographic &amp; Geologic Survey

PaGWIS

## SELECTED WELLS

Menu

New Selection

Email comments to Topo Geo.

You have selected 35 Well(s). To create a comma separated list of all these wells, click **Create List**. If you want to limit the list, place check marks next to the wells you want to have included, and then click **Create List**.

Page 2 of 2

Record	PA Well ID	Driller	Driller Well ID	Date Drilled	Owner	County	Municipality	Image
<input type="checkbox"/> 21	146668	JOHNSON DRILLING		8/1/1988	MILLER LAWRENCE	WARREN	COLUMBUS TWP.	No Image
<input type="checkbox"/> 22	405197	CLEARWATER DRILLING COMPANY		9/21/2001	MOWAR	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 23	405211	MCCRAY WELL DRILLING		7/1/1992	NAGEL	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 24	146665	YORK WATER WELL DRILLING CO INC		5/1/1979	PEHY D	WARREN	COLUMBUS TWP.	No Image
<input type="checkbox"/> 25	405199	GILLIS BROTHERS INC		9/1/1986	RAYMOND	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 26	405217	MCCANDLESS WELL DRILLING INC		7/30/1996	RAYMOND	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 27	33599	YORK WATER WELL DRILLING CO INC		5/1/1985	REIFF, WILLIAM	WARREN	COLUMBUS TWP.	No Image
<input type="checkbox"/> 28	405206	JOHNSON DRILLING		4/1/1999	SCAMENS	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 29	405207	JOHNSON DRILLING		8/1/1998	SEYMOUR	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 30	405218	JOHNSON DRILLING		12/1/1993	SINGH	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/> 31	405209	MCCRAY WELL DRILLING			SONDSTROM	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
		MCCRAY			STOCTON,		COLUMBUS	No

<input type="checkbox"/>	32	33584	BROS		12/1/1979	CHARLES	WARREN	TWP.	<a href="#">Image</a>
<input type="checkbox"/>	33	405204	DANIEL P HORNBURG		9/1/1998	TAYDUS	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	34	405215	MCCRAY WELL DRILLING		6/1/1993	TRESSLEY	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	35	146666	YORK WATER WELL DRILLING CO INC		5/1/1985	ZEIH C	WARREN	COLUMBUS TWP.	No Image

PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405210

Menu

New Selection

[Email comments to Topo Geo.](#)

Record: 1 of 35

(There is a total of 35 Wells in the list.)

[Next Well](#)[Last Well](#)[Return to Summary List](#)

Well Driller: ELIASON WATER WELL DRILLING

PA Well ID: 405210

License: 2094

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 2/7/1994

Drilling Method:

Owner:

Address of Well: 20 ACRE QUADRIN

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 1 of 35

(There is a total of 35 Wells in the list.)

[Next Well](#)[Last Well](#)[Return to Summary List](#)

## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 33539

Menu

New Selection

Email comments to [Topo Geo](#).

Record: 2 of 35

(There is a total of 35 Wells in the list.)

First Well

Prev. Well

Next Well

Last Well

Return to Summary List

Well Driller: **ALFRED L BURCH**PA Well ID: **33539**License: **0975**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **5/1/1966**Drilling Method: **CABLE TOOL**Owner: **ALLEN, BRUCE C**

Address of Well:

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**Quadrangle: **COLUMBUS**Latitude: **41.90667**Longitude: **-79.55778**Well Depth (ft): **58**Well Finish: **UNKNOWN**

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm): **12**Yield Measure Method: **BAILER**Static Water Level: **12**  
(ft below land surface)Water level after yield test: **18**  
(ft below land surface)Length of Yield Test: **2**  
(minutes)

Saltwater Zone(ft):

Use of Well: **WITHDRAWAL**Use of Water: **DOMESTIC**

## Description of Well Location and Other Notes:

**SAMPLE 9203230**

## BOREHOLE

Top      Bottom      Diameter

SECTION 1:    **0**      **58**      **6**

## CASING

CASING 1: Top: **0** Bottom: **54** Diameter: **6** Material: **UNKNOWN**

## SCREENS/SLOTS

SCREEN 1:      Top: **54** Bottom: **0** Diameter:Type: **OTHER**Material: **UNKNOWN** Slot Size: **0**

**Record: 2 of 35****(There is a total of 35 Wells in the list.)**[First Well](#)[Prev Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)

PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405201

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 3 of 35

(There is a total of 35 Wells in the list.)

First Well

Prev. Well

Next Well

Last Well

Return to Summary List

Well Driller: **MCCRAY WELL DRILLING**PA Well ID: **405201**License: **1664**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **10/1/1998**

Drilling Method:

Owner: **AYERS**Address of Well: **SC HILL RD, COLUMBUS**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 3 of 35

(There is a total of 35 Wells in the list.)

First Well

Prev. Well

Next Well

Last Well

Return to Summary List

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
<i>Dele (Wag)</i>	1	7/15/13 2:25		2	
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
<i>Wenji Fernandes</i>	3	7/12	10:10	4	
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	5			6	
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	7			8	

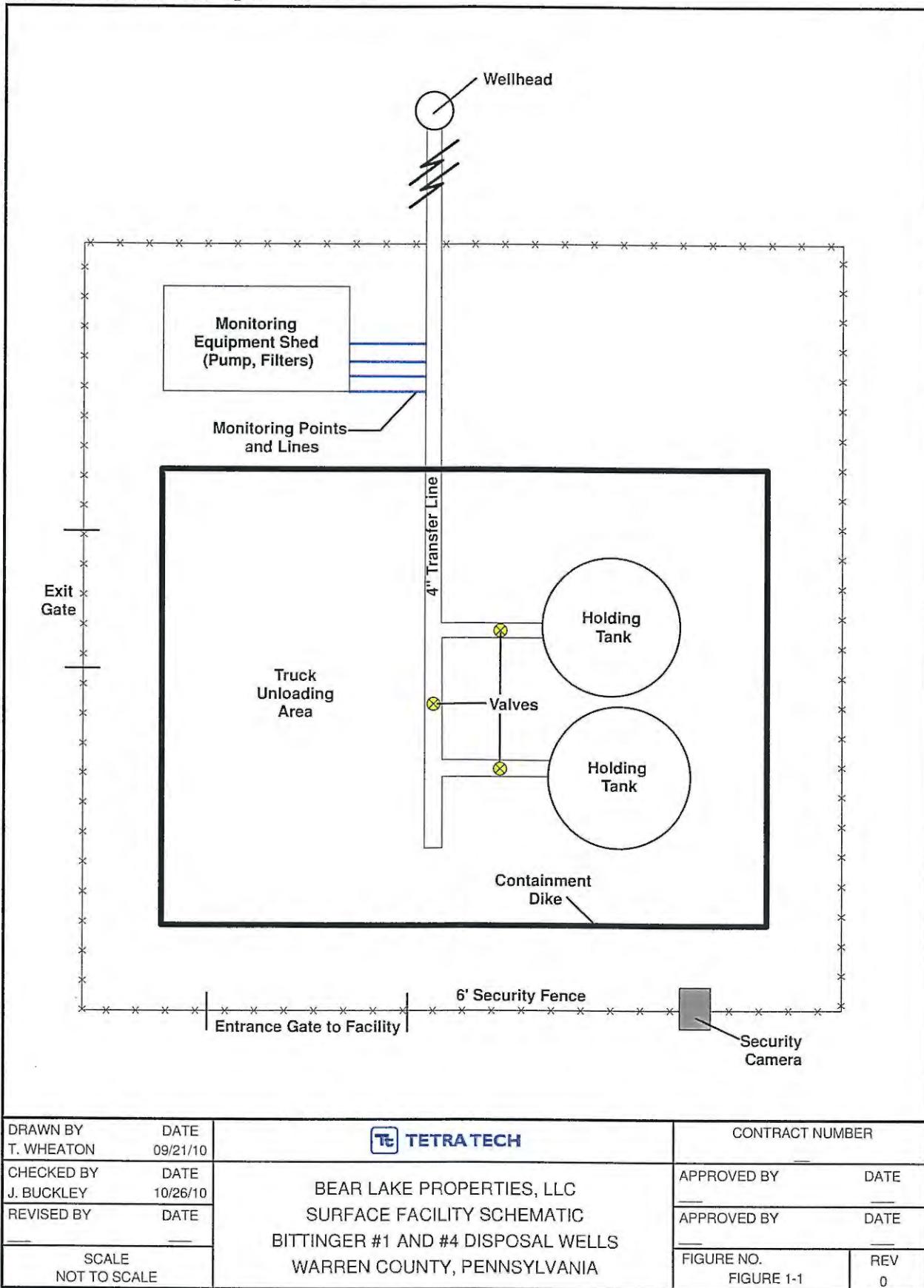
Comments or Special Hazards:

### pH-Field:

for Special Hazards: Darlene,  
This is the sample  
we discussed on phone 7/11/01.  
Customer wants  
includes 9 factors - see our  
package - attached 100-

**OPERATING DATA**  
**SURFACE FACILITY SCHEMATIC**

P:\GIS\BEAR\_LAKE\MAPDOCS\XDISCHÉMATIC\_DIAGRAM.MXD 10/26/10 TW



**OPERATING DATA**  
**TYPICAL CORROSION INHIBITOR**

# AQUACLEAR PRODUCT INFORMATION

608 Virginia Street East, Charleston, WV 25301-2199  
(304) 345-4781 Fax (304) 345-3835



## Corrosion Inhibitor Sticks™

### WHAT ARE CORROSION INHIBITOR STICKS™?

Corrosion Inhibitor Sticks™ are water soluble or oil soluble sticks that contain a blend of Imidazolines which have excellent filming characteristics and low emulsion tendencies. This unique blend gives effective corrosion control for most oil field corrosion problems.

### CORROSION INHIBITOR STICK™ USES

Corrosion Inhibitor Sticks™ are primarily used to control common corrosion problems found in producing oil and gas well systems. They can be used to treat hard to reach 'dead' areas such as the annulus space above the packer, rat-hole, or the bottom of water supply tanks.

### ADVANTAGES OF CORROSION INHIBITOR STICKS™

Corrosion Inhibitor Sticks™ can provide corrosion control throughout the entire production system. Regular usage will help control corrosion at the point they begin - down-hole.

They are available in two different formulations (oil soluble and water dispersable) or (water soluble and oil dispersable). The oil soluble type is soluble in oil, condensate and wet gas and can slowly disperse inhibitor into the water phase. The water soluble type is soluble in water and can slowly disperse inhibitor into the oil phase.

Corrosion Inhibitor Sticks™ can effectively inhibit corrosion in wells that produce both water and distillate or oil phases. In this case, it may be desirable to treat the well with both types of sticks by first dropping water soluble sticks and allowing them to fall through the oil into the water, thus dissolving and releasing inhibitor in

### TREATMENT DETERMINATION

The number of Corrosion Inhibitor Sticks™ used is based on the volume of total fluid produced (oil or condensate plus water). Field experience indicates that for most corrosive environments the best results are achieved by using a larger initial slug treatment (80 PPM daily) until the problem is under control then reduce to smaller periodic treatments (40 PPM daily) thereafter. EXAMPLE: An initial slug treatment of 80 PPM would require 0.64 lbs of Corrosion Inhibitor Stick™ per 24 BBL (1000 gallons) of total fluid produced.

COR. INH. STICK™ SIZES	STICKS PER BBL
SENIOR (1 5/8" x 18")	1 per 58 bbls
JUNIOR (1 3/8" x 16")	1 per 40 bbls
JUNIOR (1 1/4" x 15")	1 per 29 bbls
THRIFTY (1" x 15")	1 per 18 bbls
MIDGET (5/8" x 15")	1 per 7 bbls

NOTE: To successfully control any corrosion problem, the inhibitor insertion into the fluid stream must be constant. For intermittent treatment or extreme corrosive environments increase the number of sticks accordingly.

THE MOST COMMON PROCEDURE for producing wells is to shut-in well and drop sticks through lubricator. Leave well shut until sticks fall to the bottom. The time in minutes for the sticks to fall to the bottom (assuming well is shut-in with fluid at surface) is equal to the depth divided by 100. (Time, min. = Depth, ft / 100).

FOR WATER INJECTION SYSTEMS drop the sticks into the water supply tank to inhibit more of the system.

the water column). Then drop the oil soluble sticks which will "FLOAT" at where the oil and water contact thus slowly dissolving and releasing inhibitor in the oil column.

The sticks are economical when compared to conventional corrosion control operations and therefore save investment in pumps, drums of chemical, and equipment maintenance.

Corrosion Inhibitor SticksTM may be used in wells with bottom hole temperatures (BHT) of up to 375 degrees Fahrenheit.

#### PRODUCTION SPECIFICATIONS

**OIL SOLUBLE:** The stick will dissolve in 20 to 120 minutes (in moving diesel) depending on temperature, salt content, and relative fluid motion. The stick will melt at 135 degrees Fahrenheit and the specific gravity is 0.95.

**WATER SOLUBLE:** The stick will dissolve in 12 to 24 hours (in 60,00 PPM moving brine water) depending on temperature, salt content, and relative fluid motion. The stick will melt at 125 degrees Fahrenheit and the specific gravity is 1.10.

#### PRODUCT PACKAGING

<b>SENIOR</b>	<b>1.55 lb/stick</b>	<b>24/case</b>	<b>31/pail</b>	<b>48/chest</b>
<b>JUNIOR(1)</b>	<b>1.20 lb/stick</b>	<b>36/case</b>	<b>n/a</b>	<b>72/chest</b>
<b>JUNIOR(2)</b>	<b>0.76 lb/stick</b>	<b>36/case</b>	<b>52/pail</b>	<b>72/chest</b>
<b>THRIFTY</b>	<b>0.49 lb/stick</b>	<b>49/case</b>	<b>72/pail</b>	<b>98/chest</b>
<b>MIDGET</b>	<b>0.19 lb/stick</b>	<b>108/case</b>	<b>204/pail</b>	<b>216/chest</b>

#### WHERE TO BUY

All good oil field supply stores carry Aqua-Clear, Inc. Corrosion Inhibitor SticksTM, but you can also buy direct from us.

## Ordering Information

Should you wish to speak to a sales representative about any of our products, you can call or email Tommy Halloran Jr., Ronald "Buster" Wilson, or Russell Cook directly:

#### **Tommy Halloran Jr.**

**W** 304-343-4792  
**H** 304-345-5152  
**C** 304-546-8526  
[tom@aquaclear-inc.com](mailto:tom@aquaclear-inc.com)

#### **Ronald "Buster" Wilson**

**W** 304-546-8518  
**H** 304-965-7996  
**Fax** 304-965-2713  
[buster@aquaclear-inc.com](mailto:buster@aquaclear-inc.com)

#### **Russell Cook**

**W** 304-546-2940  
**H** 304-842-7050  
**Fax** 304-842-7050  
[russell@aquaclear-inc.com](mailto:russell@aquaclear-inc.com)

PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405194

Menu

New Selection

Email comments to [Topo Geo](#).

Record: 4 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: **CLEARWATER DRILLING COMPANY**PA Well ID: **405194**License: **2073**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **11/18/2002**

Drilling Method:

Owner: **BECKWITH**Address of Well: **BOX 22, BEAR LAKE**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 4 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 33614

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 5 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: **YORK WATER WELL DRILLING CO INC**PA Well ID: **33614**License: **1378**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **6/1/1979**Drilling Method: **OTHER/UNKNOWN**Owner: **BEDJORSKI, C**

Address of Well:

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**Quadrangle: **COLUMBUS**Latitude: **41.95139**Longitude: **-79.50417**Well Depth (ft): **130**Well Finish: **OPEN HOLE**

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm): **50**Yield Measure Method: **REPORTED,  
METHOD NOT  
KNOWN**Static Water Level: **60**  
(ft below land surface)Water level after yield test: **60**  
(ft below land surface)Length of Yield Test: **0.3**  
(minutes)

Saltwater Zone(ft):

Use of Well: **WITHDRAWAL**Use of Water: **DOMESTIC****CASING**CASING 1: Top: **0** Bottom: **39** Diameter: **6** Material: **UNKNOWN**

Record: 5 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 33629

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 6 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: **ACKERMAN DRILLING**PA Well ID: **33629**License: **1094**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **10/1/1980**Drilling Method: **OTHER/UNKNOWN**Owner: **BULL, MICHEAL**

Address of Well:

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**Quadrangle: **COLUMBUS**Latitude: **41.96222**Longitude: **-79.55083**Well Depth (ft): **65**Well Finish: **OPEN HOLE**

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm): **30**Yield Measure Method: **BAILER**Static Water Level: **13**  
(ft below land surface)Water level after yield test: **45**  
(ft below land surface)Length of Yield Test: **3**  
(minutes)

Saltwater Zone(ft):

Use of Well: **WITHDRAWAL**Use of Water: **DOMESTIC**

## BOREHOLE

Top Bottom Diameter

SECTION 1: **0 65 0**

## CASING

CASING 1: Top: **0** Bottom: **12** Diameter: **6** Material: **UNKNOWN**

Record: 6 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405195

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 7 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: SAXTON WELL SERVICE, INC.

PA Well ID: 405195

License: 2272

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 1/1/2002

Drilling Method:

Owner: BYERS

Address of Well: RD 1 BOX 34 I, SPRINGCREEK

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 7 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405213

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 8 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **MCCRAY WELL DRILLING**PA Well ID: **405213**License: **1664**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **7/1/1990**

Drilling Method:

Owner: **CORTER**Address of Well: **RD 1 BOX 31, COLUMBUS**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 8 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 33531

Menu

New Selection

Email comments to [Topo Geo](#).

Record: 9 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: JOHNSON'S DRILLING

PA Well ID: 33531

License: 1708

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 4/1/1986

Drilling Method: OTHER/UNKNOWN

Owner: EASTMAN, S

Address of Well:

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle: COLUMBUS

Latitude: 41.90778

Longitude: -79.56583

Well Depth (ft): 70

Well Finish: OPEN HOLE

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm): 11.8

Yield Measure Method: BAILER

Static Water Level: 30  
(ft below land surface)Water level after yield test: 70  
(ft below land surface)Length of Yield Test: 0.3  
(minutes)

Saltwater Zone(ft):

Use of Well: WITHDRAWAL

Use of Water: DOMESTIC

## BOREHOLE

Top Bottom Diameter

SECTION 1: 0 70 6

## CASING

CASING 1: Top: 0 Bottom: 60 Diameter: 6 Material: STEEL

## WATER BEARING ZONE

WATER BEARING ZONE 1: Top: 62 Bottom: Yield:

WATER BEARING ZONE 2: Top: 68 Bottom: Yield:

Record: 9 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 146667

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 10 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: MCCRAY WELL DRILLING

PA Well ID: 146667

License: 1664

Driller Well ID:

Type of Activity: New Well

Original Well By:

Date Drilled: 6/1/1988

Drilling Method:

Owner: FRONTERY DAVID

Address of Well:

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle: COLUMBUS

Latitude: 41.89722

Longitude: -79.56528

Well Depth (ft): 59

Well Finish: OPEN HOLE

Depth to Bedrock(ft): 20

Did Not Encounter Bedrock:

Well Yield (gpm): 10.

Yield Measure Method: BAILER

Static Water Level: 20  
(ft below land surface)Water level after yield test: 35  
(ft below land surface)Length of Yield Test: 1  
(minutes)

Saltwater Zone(ft):

Use of Well: WITHDRAWAL

Use of Water: DOMESTIC

## CASING

CASING 1: Top: 0 Bottom: 21 Diameter: 6 Material:

SEAL 1 Top: Bottom: Type: NONE

Record: 10 of 35

(There is a total of 35 Wells in the list.)

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PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405216

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 11 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: **JOHNSON DRILLING**PA Well ID: **405216**License: **0761**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **4/25/1994**

Drilling Method:

Owner: **GADES**Address of Well: **SIMMONS RD, COLUMBUS**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 11 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405208

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 12 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **JOHNSON DRILLING**PA Well ID: **405208**License: **0761**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **7/1/1997**

Drilling Method:

Owner: **HILL FARM**Address of Well: **RD 2 BOX 121, CORRY**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 12 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405205

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 13 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: DANIEL P HORNBURG

PA Well ID: 405205

License: 2043

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 9/1/1998

Drilling Method:

Owner: HORNBURG

Address of Well: COLUMBUS

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 13 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405202

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 14 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: JEFFREY COBB DRILLING

PA Well ID: 405202

License: 2273

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 7/15/1999

Drilling Method:

Owner: JENSON

Address of Well: BOX 109

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 14 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405198

Menu

New Selection

[Email comments to Topo Geo.](#)

Record: 15 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: CLEARWATER DRILLING COMPANY

PA Well ID: 405198

License: 2073

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 6/21/2000

Drilling Method:

Owner: JOGAITH

Address of Well: RD 2 BOX 283

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 15 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405203

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 16 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: DANIEL P HORNBURG

PA Well ID: 405203

License: 2043

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 8/3/1998

Drilling Method:

Owner: LAWSON

Address of Well: RD 1, COLUMBUS

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 16 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405200

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 17 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: DANIEL P HORNBURG

PA Well ID: 405200

License: 2043

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 6/18/1999

Drilling Method:

Owner: MCCLAIN

Address of Well: BOX 99M, COLUMBUS

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 17 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405212

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 18 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: JENNINGS &amp; SON DRILLING

PA Well ID: 405212

License: 0067

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 5/1/1991

Drilling Method:

Owner: MCGURK

Address of Well: RD 2 BOX 249, CORRY

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 18 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405196

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 19 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: MCCRAY WELL DRILLING

PA Well ID: 405196

License: 1664

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 10/1/2001

Drilling Method:

Owner: MICK

Address of Well: HERDFORD RD

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 19 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405214

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 20 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: MCCRAY WELL DRILLING

PA Well ID: 405214

License: 1664

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 9/1/1993

Drilling Method:

Owner: MIKE

Address of Well: 9696 BAKER HILL RD

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 20 of 35

(There is a total of 35 Wells in the list.)

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PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 146668

Menu

New Selection

Email comments to [Topo Geo](#).

Record: 21 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: JOHNSON DRILLING

PA Well ID: 146668

License: 0761

Driller Well ID:

Type of Activity: New Well

Original Well By:

Date Drilled: 8/1/1988

Drilling Method:

Owner: MILLER LAWRENCE

Address of Well:

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle: COLUMBUS

Latitude: 41.9725

Longitude: -79.60667

Well Depth (ft): 62

Well Finish: OPEN HOLE

Depth to Bedrock(ft): 6

Did Not Encounter Bedrock:

Well Yield (gpm): 20

Yield Measure Method: BAILER

Static Water Level: 12  
(ft below land surface)Water level after yield test: 40  
(ft below land surface)Length of Yield Test: 1.42  
(minutes)

Saltwater Zone(ft):

Use of Well: WITHDRAWAL

Use of Water: STOCK

## CASING

CASING 1: Top: 0 Bottom: 23 Diameter: 8 Material:

SEAL 1 Top: Bottom: Type: UNKNOWN

## WATER BEARING ZONE

WATER BEARING ZONE 1: Top: 32 Bottom: Yield:

WATER BEARING ZONE 2: Top: 46 Bottom: Yield:

Record: 21 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405197

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 22 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **CLEARWATER DRILLING COMPANY**PA Well ID: **405197**License: **2073**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **9/21/2001**

Drilling Method:

Owner: **MOWAR**Address of Well: **RT 417 W PO BOX 189**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 22 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

## PaGWIS

## DETAILS FOR WELL 405211

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 23 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)

Well Driller: MCCRAY WELL DRILLING

PA Well ID: 405211

License: 1664

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 7/1/1992

Drilling Method:

Owner: NAGEL

Address of Well: COTTAGE PARK, COLUMBUS

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 23 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 146665

Menu

New Selection

Email comments to [Topo Geo](#).

Record: 24 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **YORK WATER WELL DRILLING CO INC**PA Well ID: **146665**License: **1378**

Driller Well ID:

Type of Activity: **New Well**

Original Well By:

Date Drilled: **5/1/1979**

Drilling Method:

Owner: **PEHY D**

Address of Well:

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**Quadrangle: **COLUMBUS**Latitude: **41.91778**Longitude: **-79.50445**Well Depth (ft): **100**Well Finish: **OPEN HOLE**Depth to Bedrock(ft): **77**

Did Not Encounter Bedrock:

Well Yield (gpm): **7**Yield Measure Method: **VOLUMETRIC,  
WATCH &  
BUCKET**Static Water Level: **60**  
(ft below land surface)Water level after yield test: **60**  
(ft below land surface)Length of Yield Test: **0.25**  
(minutes)

Saltwater Zone(ft):

Use of Well: **WITHDRAWAL**Use of Water: **DOMESTIC**

Description of Well Location and Other Notes:

**3/4 WAY UP HILL SIDE LOT 3322****CASING****CASING 1:** Top: **0** Bottom: **78.7** Diameter: **6** Material:**WATER BEARING ZONE****WATER BEARING ZONE 1:** Top: **77** Bottom: **Yield:****WATER BEARING ZONE 2:** Top: **90** Bottom: **Yield:****Record: 24 of 35**

(There is a total of 35 Wells in the list.)

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PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405199

Menu

New Selection

Email comments to [Topo Geo](#).

Record: 25 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: **GILLIS BROTHERS INC**PA Well ID: **405199**License: **0649**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **9/1/1986**

Drilling Method:

Owner: **RAYMOND**Address of Well: **COLUMBUS RD, COLUMBUS**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 25 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405217

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 26 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **MCCANDELL WELL DRILLING INC**PA Well ID: **405217**License: **1393**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **7/30/1996**

Drilling Method:

Owner: **RAYMOND**Address of Well: **COLUMBUS**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 26 of 35

(There is a total of 35 Wells in the list.)

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PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 33599

Menu

New Selection

Email comments to [Topo Geo](#).

Record: 27 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **YORK WATER WELL DRILLING CO INC**PA Well ID: **33599**License: **1378**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **5/1/1985**Drilling Method: **OTHER/UNKNOWN**Owner: **REIFF, WILLIAM**

Address of Well:

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**Quadrangle: **COLUMBUS**Latitude: **41.94361**Longitude: **-79.56973**Well Depth (ft): **60**Well Finish: **OPEN HOLE**

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level: **9.7**  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well: **WITHDRAWAL**Use of Water: **DOMESTIC**

## BOREHOLE

Top    Bottom    Diameter

SECTION 1:    0    60    0

## CASING

CASING 1: Top: **0** Bottom: **37** Diameter: **6** Material: **STEEL**

Record: 27 of 35

(There is a total of 35 Wells in the list.)

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PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405206

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 28 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **JOHNSON DRILLING**PA Well ID: **405206**License: **0761**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **4/1/1999**

Drilling Method:

Owner: **SCAMENS**Address of Well: **RD 1 BLUE EYE RD, COLUMBUS**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 28 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405207

[Menu](#)[New Selection](#)Email comments to [Topo Geo.](#)

Record: 29 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **JOHNSON DRILLING**PA Well ID: **405207**License: **0761**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **8/1/1998**

Drilling Method:

Owner: **SEYMOUR**Address of Well: **RR 1 BOX 30A PINE VALLEY RD,  
COLUMBUS**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 29 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405218

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 30 of 35

(There is a total of 35 Wells in the list.)

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Well Driller: JOHNSON DRILLING

PA Well ID: 405218

License: 0761

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 12/1/1993

Drilling Method:

Owner: SINGH

Address of Well: BESE LAKE

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 30 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405209

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 31 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **MCCRAY WELL DRILLING**PA Well ID: **405209**License: **1664**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled:

Drilling Method:

Owner: **SONDSTROM**Address of Well: **SPENCER RD**

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 31 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 33584

[Menu](#)[New Selection](#)[Email comments to Topo Geo.](#)

Record: 32 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)Well Driller: **MCCRAY BROS**PA Well ID: **33584**License: **0224**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **12/1/1979**Drilling Method: **CABLE TOOL**Owner: **STOCTON, CHARLES**

Address of Well:

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**Quadrangle: **COLUMBUS**Latitude: **41.93444**Longitude: **-79.58167**Well Depth (ft): **42**Well Finish: **UNKNOWN**

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm): **2**Yield Measure Method: **VOLUMETRIC,  
WATCH &  
BUCKET**Static Water Level: **20**  
(ft below land surface)Water level after yield test: **40**  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well: **WITHDRAWAL**Use of Water: **DOMESTIC****BOREHOLE**

Top      Bottom      Diameter

SECTION 1:    0      42      0

**CASING**CASING 1: Top: **0** Bottom: **42** Diameter: **8** Material: **UNKNOWN**

Record: 32 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)

## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405204

Menu

New Selection

[Email comments to Topo Geo.](#)

Record: 33 of 35

(There is a total of 35 Wells in the list.)

[First Well](#)[Prev. Well](#)[Next Well](#)[Last Well](#)[Return to Summary List](#)

Well Driller: DANIEL P HORNBURG

PA Well ID: 405204

License: 2043

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 9/1/1998

Drilling Method:

Owner: TAYDUS

Address of Well: RD 1, COLUMBUS

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 33 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

## PaGWIS

## DETAILS FOR WELL 405215

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 34 of 35

(There is a total of 35 Wells in the list.)

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Return to Summary List

Well Driller: MCCRAY WELL DRILLING

PA Well ID: 405215

License: 1664

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: 6/1/1993

Drilling Method:

Owner: TRESSLEY

Address of Well: RD 1, COLUMBUS

Zipcode:

County: WARREN

Municipality: COLUMBUS TWP.

Quadrangle:

Latitude:

Longitude:

Well Depth (ft):

Well Finish:

Depth to Bedrock(ft):

Did Not Encounter Bedrock:

Well Yield (gpm):

Yield Measure Method:

Static Water Level:  
(ft below land surface)Water level after yield test:  
(ft below land surface)Length of Yield Test:  
(minutes)

Saltwater Zone(ft):

Use of Well:

Use of Water:

Record: 34 of 35

(There is a total of 35 Wells in the list.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 146666

Menu

New Selection

Email comments to [Topo Geo.](#)

Record: 35 of 35

(There is a total of 35 Wells in the list.)

First Well

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Well Driller: **YORK WATER WELL DRILLING CO INC**PA Well ID: **146666**License: **1378**

Driller Well ID:

Type of Activity: **New Well**

Original Well By:

Date Drilled: **5/1/1985**

Drilling Method:

Owner: **ZEIH C**

Address of Well:

Zipcode:

County: **WARREN**Municipality: **COLUMBUS TWP.**Quadrangle: **COLUMBUS**Latitude: **41.94361**Longitude: **-79.57**Well Depth (ft): **60**Well Finish: **OPEN HOLE**Depth to Bedrock(ft): **35**

Did Not Encounter Bedrock:

Well Yield (gpm): **9**Yield Measure Method: **VOLUMETRIC,  
WATCH &  
BUCKET**Static Water Level: **48**  
(ft below land surface)Water level after yield test: **48**  
(ft below land surface)Length of Yield Test: **0.33**  
(minutes)

Saltwater Zone(ft):

Use of Well: **WITHDRAWAL**Use of Water: **DOMESTIC****CASING****CASING 1:** Top: **0** Bottom: **37** Diameter: **6** Material:**WATER BEARING ZONE****WATER BEARING ZONE 1:** Top: **45** Bottom: **Yield:****WATER BEARING ZONE 2:** Top: **51** Bottom: **Yield:****Record: 35 of 35**

(There is a total of 35 Wells in the list.)

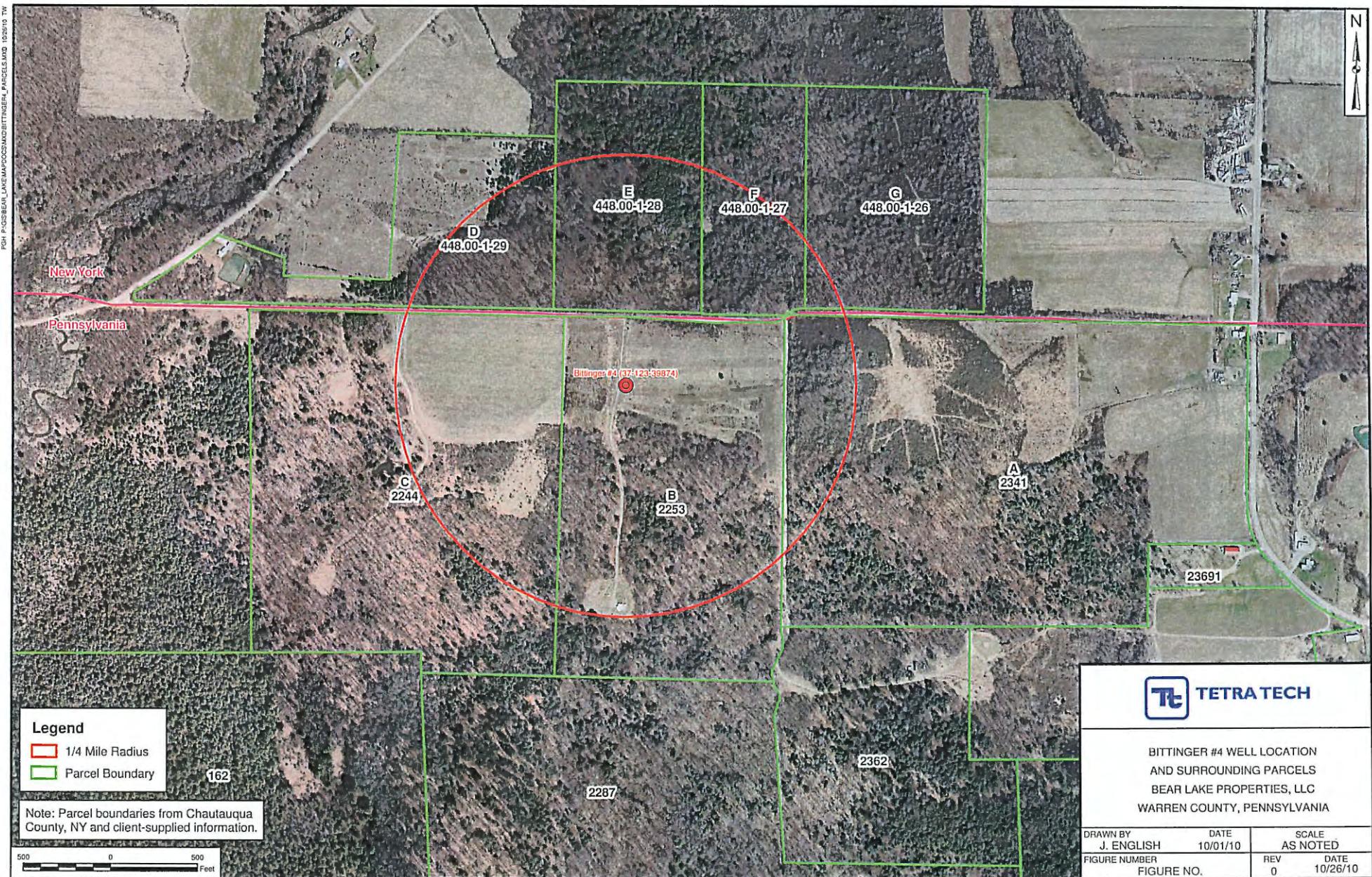
First Well

Prev.Well

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Appendix B

Appendix B contains the names and address of residents located within  $\frac{1}{4}$  mile of the proposed injection well.



PARCEL #	OWNER	ADDRESS
A 2341	Bear Lake Properties, LLC	3010 Village Run, Suite 103, Wexford, PA 15090
B 2253	Miles and Joyce Sampsel	8353 Pagan Road, Erie, PA 16509
C 2244	John R. and Kathryn Triskett	P.O. Box 88, Ashville, NY 14710
D 448.00-1-29	David Beres	4318 Oakwood Ave, Blasdell, NY 14219
E 448.00-1-28	David Beres	4318 Oakwood Ave, Blasdell, NY 14219
F 448.00-1-27	David Beres	4318 Oakwood Ave, Blasdell, NY 14219
G 448.00-1-26	Kenneth Stefanski	473 Fairmont Ave N., Tonawanda, NY 14120

DOCUMENTATION OF CEMENT RETURNS ON SURFACE CABLES

Cement evaluation was on 4 1/2"

STANDS OF MONITORING WELLS - ARE THEY ACTIVE WITH THIS BC  
ACTIVE, SIGHTING STRIKE

SEMI-ANNUAL? FOR MONITORING WELLS

QUARTERLY MAY BE MORE APPROPRIATE

## 1.0 FRAC GRAPING

4285' TOP OF PFR's

BOTTOM HOLE

3904' BOTTOM HOLE PRESSURE

1726' SURFACE PRESSURE

AT -

**Section 6 – Operating Data**

**Revised Pages**

## **Operating Data**

The proposed commercial brine disposal well will primarily be utilized to inject produced and flow-back water from wells completed in the Marcellus Shale, the Medina Group and other natural gas and oil producing formations. Other oil and gas related wastewaters associated with the production of oil and natural gas or natural gas storage operations, which are approved by EPA for injection under a UIC Class II D injection well, may also be injected. According to Title 40 Chapter I Sec. 144.6 (b)(1), such fluids include those "Which are brought to the surface in connection with natural gas storage operations, or conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection."

### **Injection Rate**

Injectivity testing performed on the proposed injection well (Bittinger #4) indicated the well may be capable of sustaining injection rates on at least a short-term basis on the order of 3 bbl/min or approximately 4,300 bbl/day. Considering this was a relatively short-term test, a maximum injection rate of 2,000 bbl/day is proposed for operation of the facility, with an average injection rate of 1,000 bbl/day expected.

### **Maximum Allowable Surface Injection Pressure (MASIP) and Average Surface Injection Pressure**

MASIP calculations based on EPA approved equations are included in the "Geologic Data" section of this application. Based on these calculations, the proposed MASIP is 1736 psi. It is estimated that the average surface injection pressure will be approximately 1000 psi.

### **Laboratory Analysis of Injection Fluid Samples**

Laboratory samples representative of the types of brine which will be injected into the proposed injection well are attached. Samples were collected from produced water generated from gas wells in the vicinity of the injection well. The samples are characterized by chloride concentrations in the 200,000 mg/L range and specific gravity of approximately 1.2.

### **Monitoring of Injection Fluid Samples and Well**

The following identifies the UIC Class II underground injection well regulatory requirements and operational procedures which will be conducted to meet the subject requirements:

- 1. Monitoring of the nature of injected fluids at time intervals sufficiently frequent to yield data representative of their characteristics.** An initial sample of fluid will be collected and analyzed from initial loads proposed for disposal from new disposal customers. In addition, samples will be collected for analysis from new types of sources (e.g., from different geologic formations, geographic regions, etc.) which would be expected to differ significantly from brine previously characterized for disposal at the facility. Samples will be analyzed for the following parameters at a minimum: specific gravity, total dissolved solids, total organic carbon, and pH.
- 2. Observation of injection pressure, flow rate, and cumulative volume at least weekly based on the regulatory requirements for produced fluid disposal operations.** Injection pressures, flow rate, and cumulative volume will be continuously recorded electronically.

3. **A demonstration of mechanical integrity pursuant to 40 CFR Sec. 146.8 at least once every five years during the life of the injection well.** A mechanical integrity test will be performed prior to initiating injection and at least once every five years.
4. **Maintenance of the results of all monitoring until the next permit review.** All monitoring records will be maintained throughout the life of the well.

Reporting requirements consist of the following:

An annual report will be submitted to EPA summarizing the results of the required monitoring, including monthly records of injected fluids, and any major changes in characteristics or sources of injected fluid.

#### **Proposed Annulus Fluid**

The proposed annulus fluid for the proposed injection well will consist of fresh water and a water soluble corrosion inhibitor. The corrosion inhibitor will be mixed in accordance with the manufacturer's recommendations then loaded into the well annulus prior to conducting injection operations. Product information for the type of corrosion inhibitor which will be utilized is attached. A similar type product may be used instead of the example product referenced.

#### **Facility Layout and Operation**

As indicated in the attached facility layout diagram, the injection well facility will include a truck unloading area and holding tanks connected by piping with associated valves, all of which will be situated in a diked containment area. The containment area will be properly sized to account for the entire volume of the largest container, plus 10% freeboard, in the event of a leak. The brine will be transferred to the injection well utilizing injection pumps situated in the Equipment Shed along with filters and monitoring equipment. Automatic shut-off valves will be incorporated into the tank design to prevent overflow during filling operations. The facility will be surrounded by a fence having locking entrance and exit gates. A security camera will also be strategically situated on the site. The facility will be continually manned during unloading and injection operations. As indicated above, injection rate, cumulative volume and pressures will be continuously measured and recorded.

**Section 9 – Plugging and Abandonment Plan**

**Revised Pages**



United States Environmental Protection Agency  
Washington, DC 20460

## PLUGGING AND ABANDONMENT PLAN

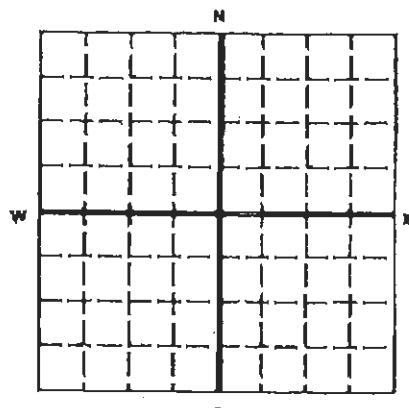
### Name and Address of Facility

Bear Lake Properties, LLC  
Columbus Township, PA

### Name and Address of Owner/Operator

Bear Lake Properties, LLC  
3000 Village Run Road, Unit 103, #223, Wexford, PA 15090

Locate Well and Outline Unit on  
Section Plot - 640 Acres



State

PA

County

Warren

Permit Number

### Surface Location Description

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

### Surface

Location  ft. from (N/S)  Line of quarter section  
and  n. from (E/W)  Line of quarter section.

### TYPE OF AUTHORIZATION

- Individual Permit
- Area Permit
- Rule

Number of Wells

### WELL ACTIVITY

- CLASS I
- CLASS II
- Brine Disposal
- Enhanced Recovery
- Hydrocarbon Storage
- CLASS III

Well Number

Locate Name

### CASING AND TUBING RECORD AFTER PLUGGING

### METHOD OF EMPLACEMENT OF CEMENT PLUGS

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
13 3/8			30	
8 5/8			506	
4 1/2			2455 (After cutting)	

- The Balance Method
- The Dump Beller Method
- The Two-Plug Method
- Other

### CEMENTING TO PLUG AND ABANDON DATA:

PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
4 1/2	7 7/8	7 7/8	8 5/8	8 5/8		
4286	2000	900	550	50		
32	30	43	30	14		
37.8	35.4	50.7	35.4	16.5		
4085	1900	750	450	0		
4085	1900	750	450	0		
15.6	15.6	15.6	15.6	15.6		
Class A						

### LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (If any)

From	To	From	To
506	2000 (open hole - csg cut)		

### Estimated Cost to Plug Wells

\$30,000

### Certification

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)

Karl Kimmich, President

Signature

Date Signed

12/07/2010



**Mr. Dale Skoff**

Tetra Tech  
661 Anderson Drive  
Foster Plaza 7  
Pittsburgh, Pa. 15220

Dear Dale,

This bid is the Approximate Cost and Procedure to plug this well. Actual plug as follows

4286 to 4085 feet	Cement plug to plug off perforations	32 Sacks
4085 to 2000 feet	Bentonite gel 6% spacer	
2000 feet	cut 4 1/2 inch casing or above salt	
2000 to 1900 feet	Cement plug	30 Sacks
1900 to 900 feet	Bentonite gel 6% spacer	
900 to 750 feet	Cement plug over shale zone	43 Sacks
750 to 550 feet	Bentonite gel 6% spacer	
550 to 450 feet	Cement plug 50 ft in open hole 50 ft inside 8 5/8 casing	30 Sacks
450 to 50 feet	fill up with pea gravel	
50 to 0 feet	Cement plug to surface	15 Sacks

P.S. If there is any Ononadaga in this well it will require a plug also.  
Bentonite is mixed 100 lbs to 6 bls water

Sincerley,

David Cook  
Field Sales Rep.

Prepared for  
Tetra Tech  
661 Anderson Drive  
Foster Plaza 7  
Pittsburgh, Pa. 15220  
December 7, 2010  
Bid #0006133



Prepared by  
Daniel R Simmons  
159 Northwood Dr.  
Meadville, PA 16335  
(814) 337-1115  
Dan.Simmons@univwell.com

Plug to abandon well.  
Plug to abandon Medina well in N. Warren county.

Product #	Description	Qty	Units of Sale	Unit Price	Total Price
A0035	MISCELLANEOUS PUMP 1ST 4 HRS	1.0	EA	\$2,410.00	\$2,410.00
T0002	EQUIPMENT MILEAGE CHARGE	40.0	TRK/MI	\$7.50	\$300.00
M0001	CEMENT - CLASS A	150.0	SK	\$17.50	\$2,625.00
M0040	BENTONITE GEL	25.0	CWT	\$33.50	\$837.50
M0050	UNICELE	25.0	LB	\$4.00	\$100.00
F0032	CEMENT BLENDING CHARGE	150.0	SK	\$2.35	\$352.50
T0003	CEMENT DELIVERY CHARGE	540.0	SK-MI/10	\$1.10	\$594.00

**Gross Price:** \$7,219.00  
**20.00% Special Discount Applied:** \$5,775.20

Comments:

- Plug to abandon Medina well in northern Warren county. We would use Class A cement. Overtime would start after 4 hour at the rate of \$590.00 per hour. The lease name is Bittinger # 4.
- Payment Terms: 30days with credit
- This price quote is valid through 12/31/2010. Actual job scheduling is based upon equipment availability.

**Section 11 – Plans for Well Failures**

**Revised Pages**

### **Plan for Well Failures**

The pressure in the annulus between the tubing and production (4 1/2 inch) casing in the injection well will be continuously monitored. A minimum pressure of approximately 100 psi will be maintained on the annulus. The pressure between the 4 1/2 and 8 5/8 inch casing will also be continuously monitored. The annulus will be equipped with an automated well shut-off device which will shut down the well if pressure indicative of well failure occurs. Should a pressure change indicative of well failure occur in either monitored space, injection will cease and EPA will be verbally notified within 24 hours and notified in writing within 7 days. The cause of the pressure change will be investigated by Bear Lake Properties and remedial measures implemented following discussions with EPA on the proposed approach.