

EXHIBIT 3

Section 1



TETRA TECH

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

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

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)

μ = 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^{-1})

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

Φ = 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

μ = 1 centipoise

k = 100 md

h = 30 feet

C = $3.0e-06 \text{ psi}^{-1}$

Φ = 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

μ = 1 centipoise

k = 100 md

h = 30 feet

C = $3.0e-06 \text{ psi}^{-1}$

Φ = 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 Bittering #1 and #4 wells is approximately ¼ 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 Bittering 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 Bittering 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
Bittering #1	Bittering #4 (unless injection also being performed in Bittering #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
Bittering #4	Bittering #1 (unless injection also being performed in Bittering #1)	0.25 mi to the north
	R. Trisket 1	0.33 mi to the west
	Joseph Bittering 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 Bittering #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 ¼ mile can be used for the area of review/zone of endangerment for the Bittering #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

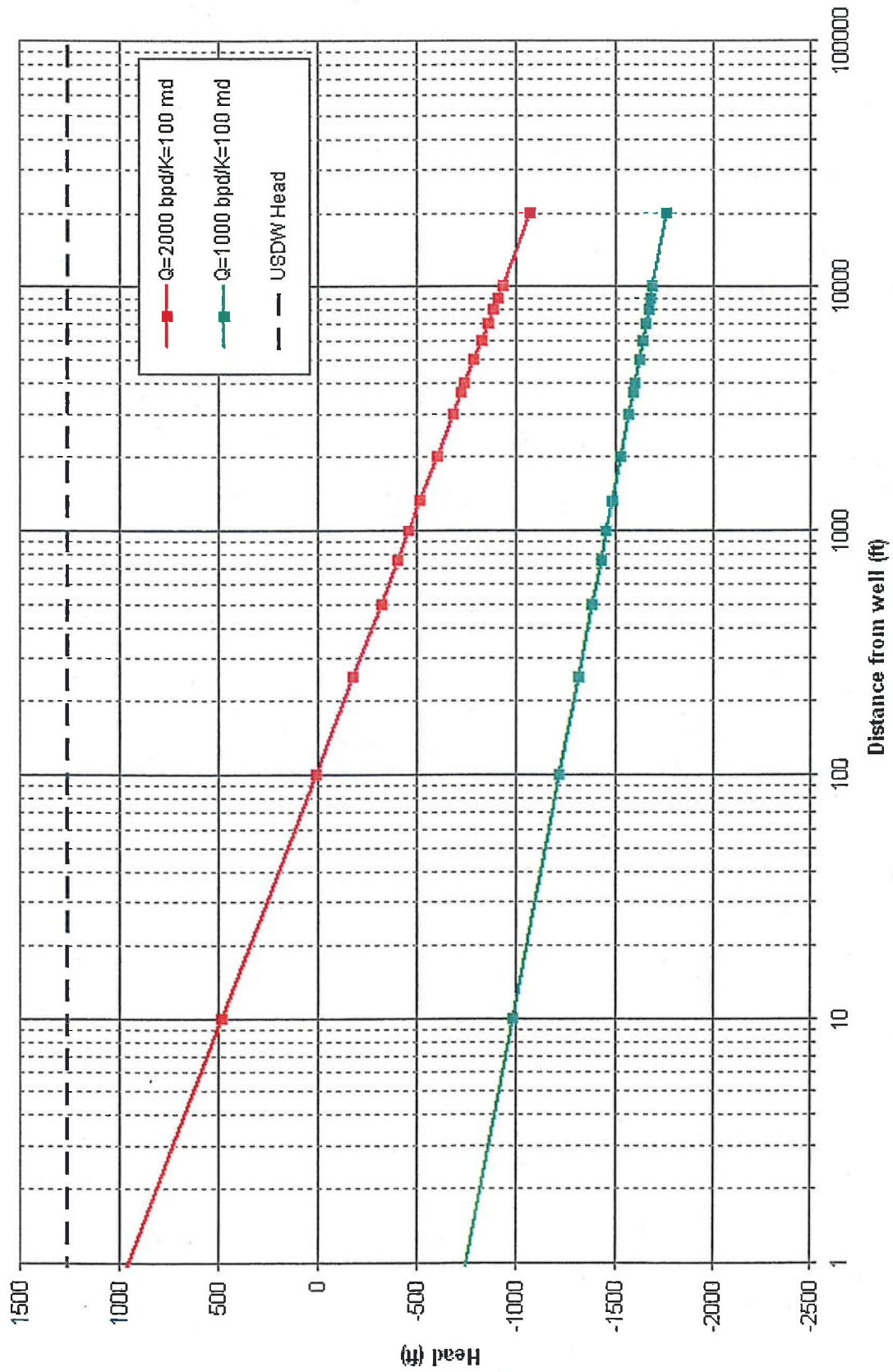
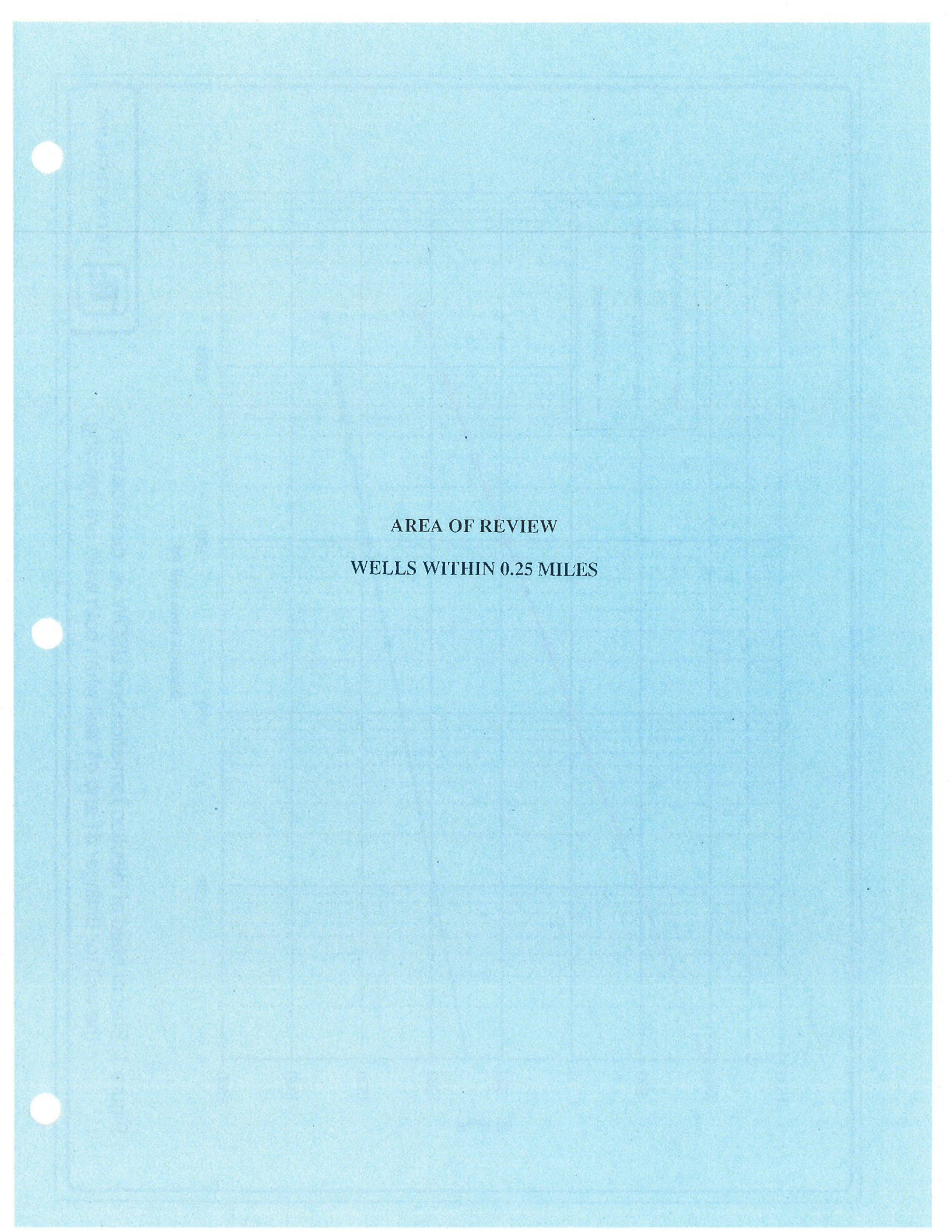


Figure 1. Feet of head of injection formation and USDW vs. distance from the well for Bittering #1 and #4 well when both wells are injecting.





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
Proposed Injection and Monitoring Wells						
Bittinger #1	4467	12/29/1983	4.5	4416	Perf'd & Frac'd: 4210-4327'	Subject of separate UIC Class II permit application
Bittinger #4	4496	8/15/1987	4.5	4455	Perf'd & Frac'd: 4285-4302'; & 4352-4365'	
Existing / Former Oil and Gas Wells						
Bittinger #1	4467	12/29/1983	4.5	4416	Perf'd & Frac'd: 4210-4327'	Subject of separate UIC Class II permit application
Water Wells						

Section 2

Area of Review

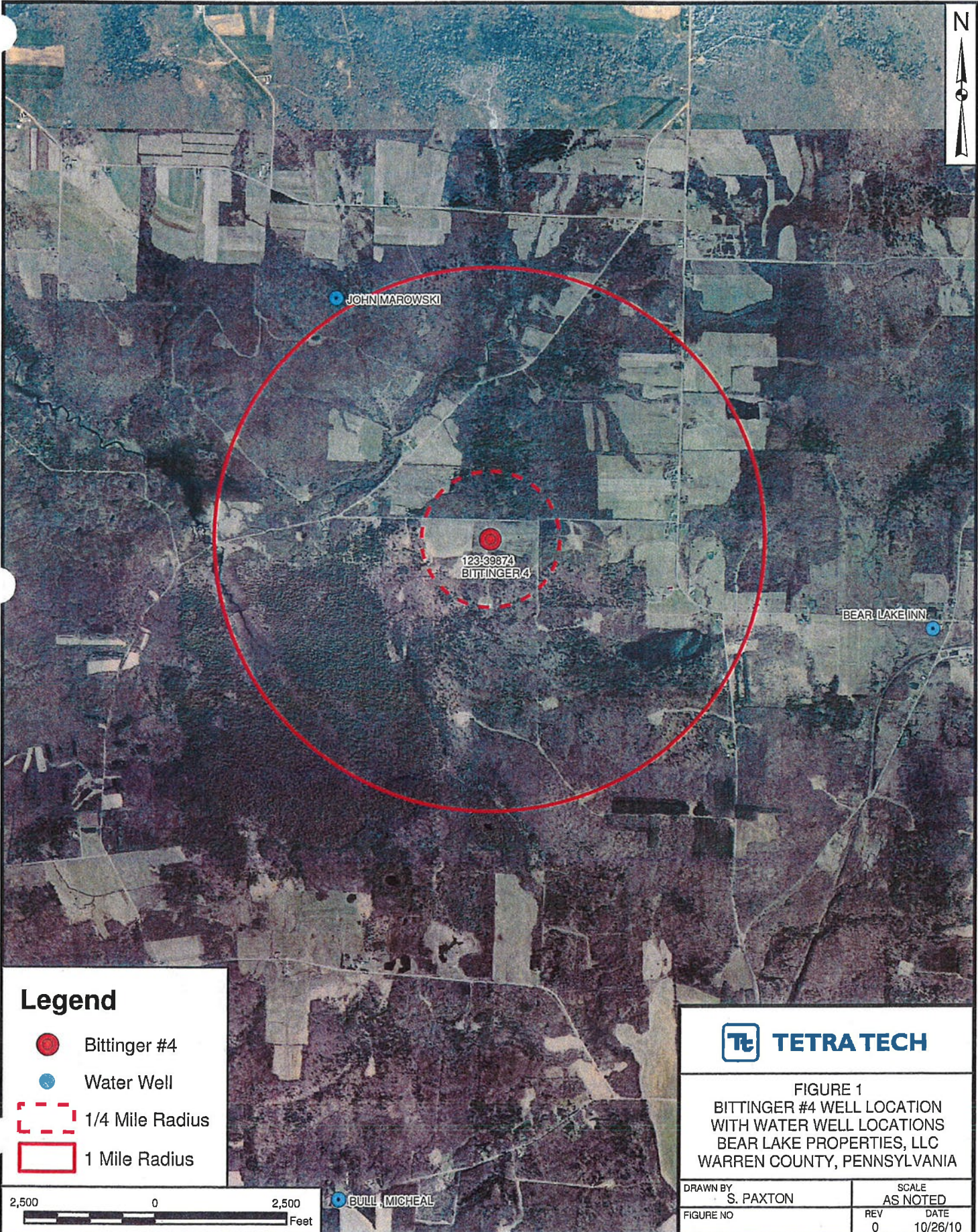
According to available records in the area, there are no intake or discharge structures, hazardous waste treatment, storage, or disposal facilities, mines, or quarries within one mile of the Bittering #4 well. An intermittent unnamed tributary (UNT) to Tamarack Swamp is located approximately 0.25 miles south of the Bittering #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 Bittering #4.

According to publicly available records, there are no groundwater wells within $\frac{1}{4}$ mile of the Bittering #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 Bittering #4 is the Bittering #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



Legend

-  Bittinger #4
-  Water Well
-  1/4 Mile Radius
-  1 Mile Radius

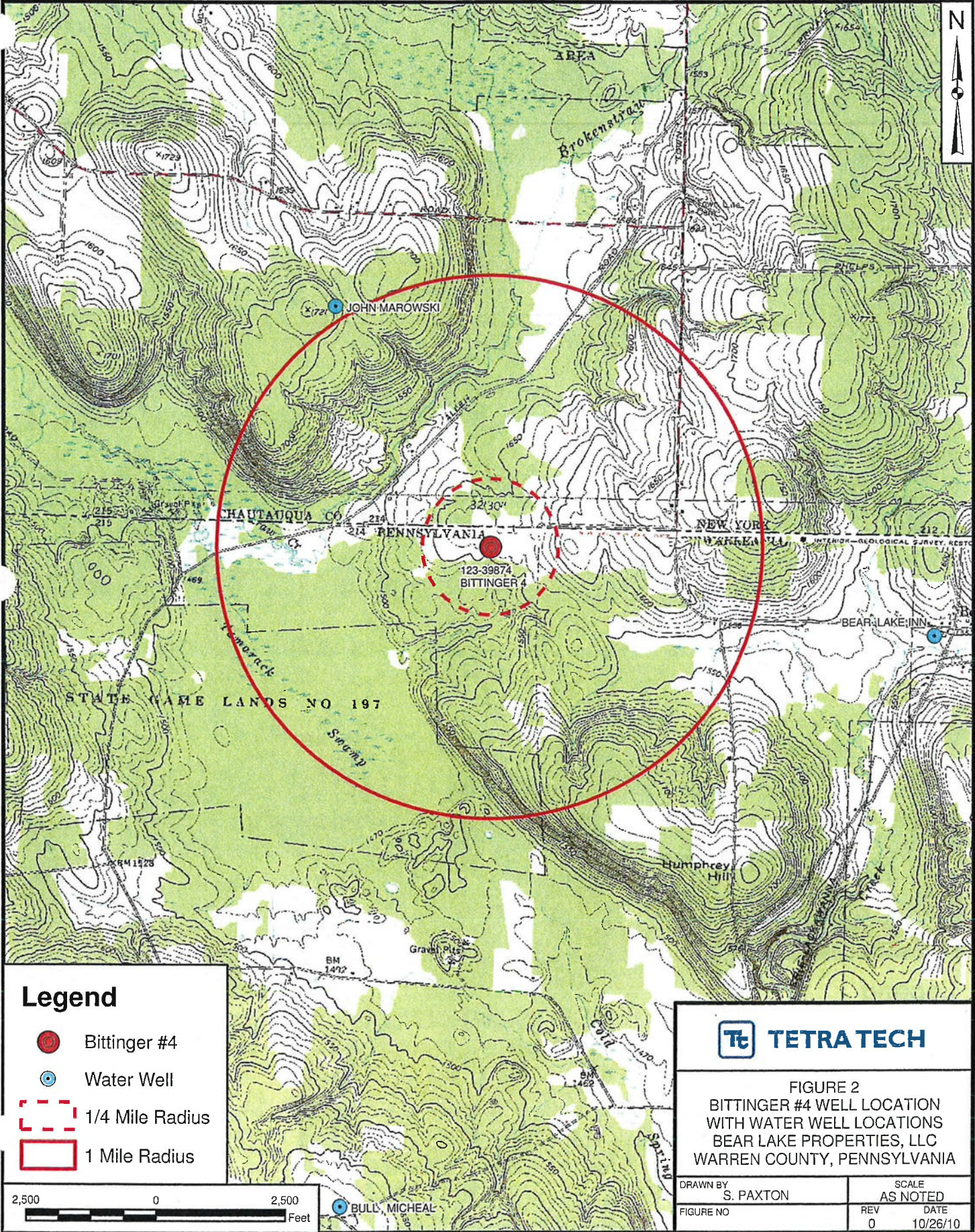


FIGURE 1
BITTINGER #4 WELL LOCATION
WITH WATER WELL LOCATIONS
BEAR LAKE PROPERTIES, LLC
WARREN COUNTY, PENNSYLVANIA

DRAWN BY S. PAXTON		SCALE AS NOTED	
FIGURE NO	REV	DATE	
	0	10/26/10	



 BULL MICHEAL



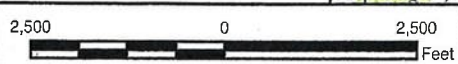
Legend

- Bittering #4
- Water Well
- 1/4 Mile Radius
- 1 Mile Radius



FIGURE 2
 BITTINGER #4 WELL LOCATION
 WITH WATER WELL LOCATIONS
 BEAR LAKE PROPERTIES, LLC
 WARREN COUNTY, PENNSYLVANIA

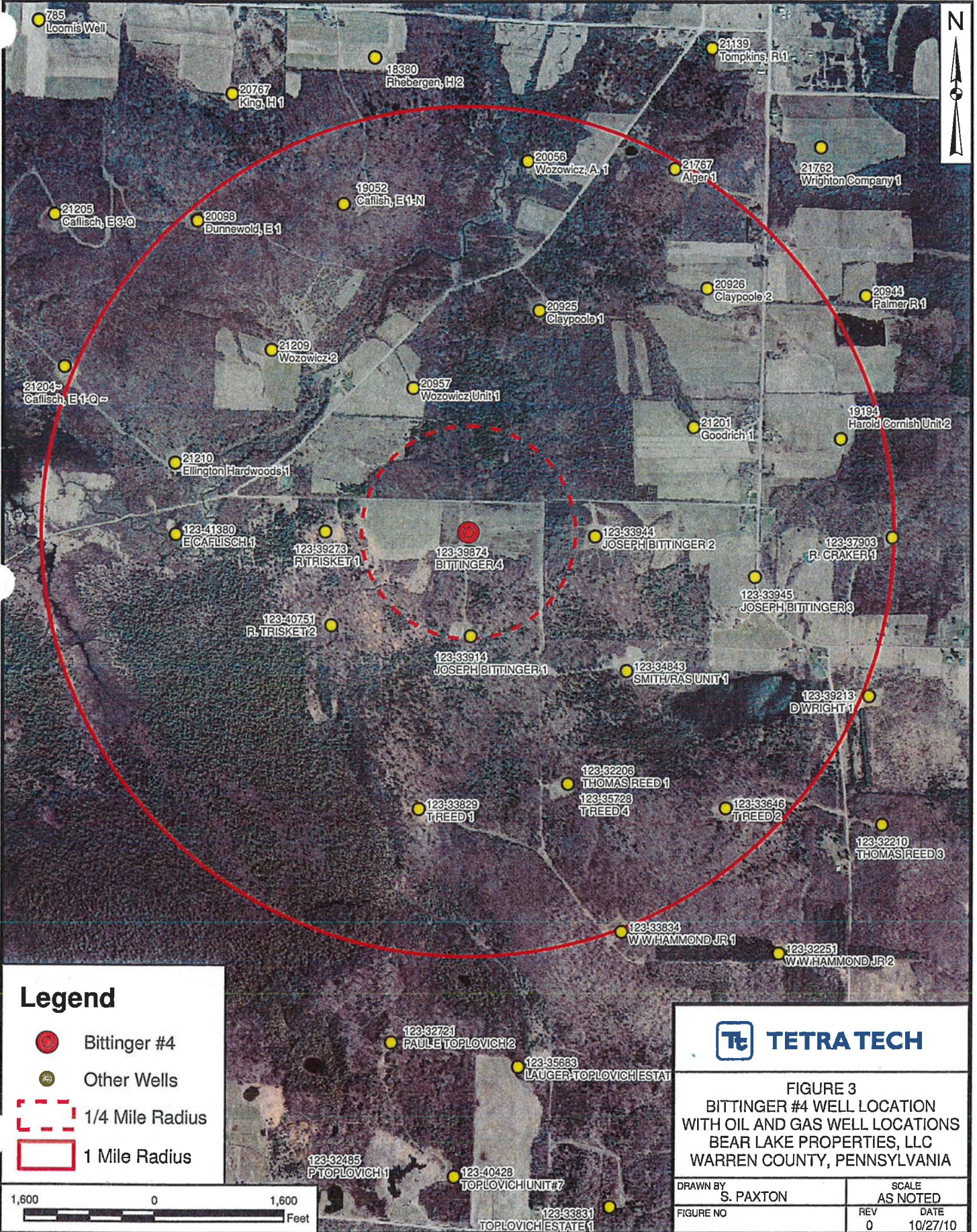
DRAWN BY S. PAXTON	SCALE AS NOTED
FIGURE NO	REV 0
	DATE 10/26/10

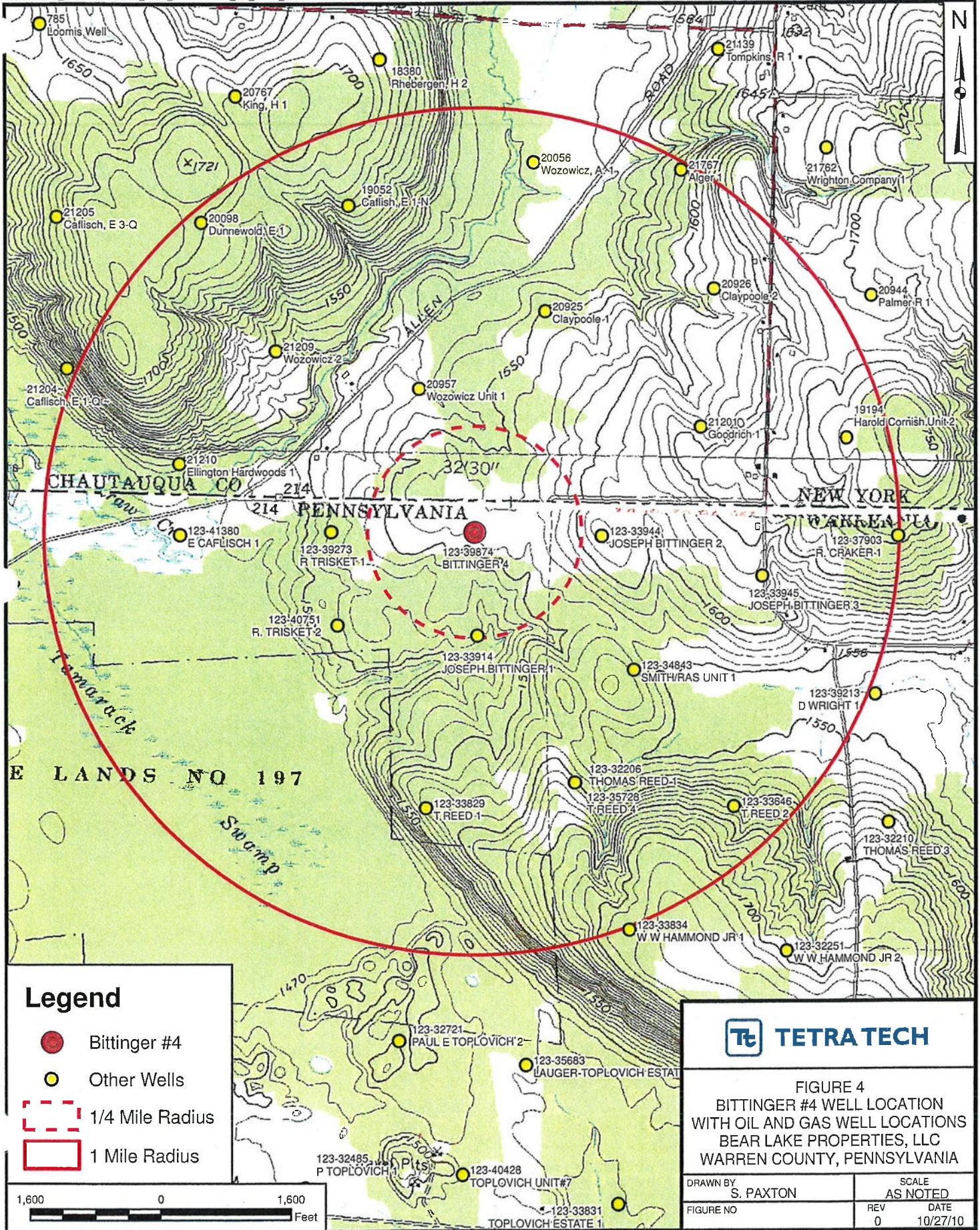


● BULL, MICHEAL

AREA OF REVIEW MAPS

OIL AND GAS WELLS





Section 4

Underground Sources of Drinking Water – Bittering 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 Bittering 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 Bittering 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 Chadokoin formation, and the underlying Bradford Group. The Bittering 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 Chadokoin 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 Bittering #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

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

Section 5

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:

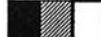
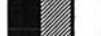
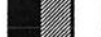
- Bittinger #4 completion record,
- Maximum Injection Pressure (MIP) calculations based on Instantaneous Shut-In Pressure (ISIP) data for two nearby wells (R. Trisket #1 and #2),
- Bittinger #1 completion record and geophysical log,
- R. Trisket #1 and #2 treatment reports.

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	2741	2723	
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	3018	170	
Upper Devonian	Hamilton	Marcellus Shale	Shale			
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, including 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

MAXIMUM INJECTION PRESSURE CALCULATIONS

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

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

R. Trisket #1

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

Where:

$$ISIP = 2150 \text{ psi}$$

$$SG = 1.218$$

$$D = 4253$$

R. Trisket #2

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

Where:

$$ISIP = 2100 \text{ psi}$$

$$SG = 1.218$$

$$D = 4254 \text{ ft}$$

Well	ISIP (psi)*	Hydrostatic Factor (psi/ft)	SG	D (ft)	Fracture Gradient (psi/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

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

	Bittering #1	Bittering #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)
Bittering #1	-	0.433	1.218	4210	1.027	2103
Bittering #4	-	0.433	1.218	4285	1.027	2141

GEOLOGIC DATA

R. TRISKET #2 WELL DATA

HALLIBURTON SERVICES

HALLIBURTON DIVISION

Pittsburgh, Pa

HALLIBURTON LOCATION

Bradford, Pa

ACTUATING SERVICE TREATING REPORT

R. TRISKETT #2

BILLED ON TICKET NO. 896921-7

2012 R-3

WELL DATA

Well Name: Columbus Sec. _____ Twp. _____ Rng. _____ County Warren State Pa

Information Name _____ Type _____

Information Thickness From _____ To _____

Initial Prod: Oil _____ Bpd. Water _____ Bpd. Gas _____ Mcfd.

Current Prod: Oil _____ Bpd. Water _____ Bpd. Gas _____ Mcfd.

Information Tool # _____ Mandrel Size _____ Extensions _____ In.

Wellbore Type _____ Set At _____

Bottom Hole Temp. _____ RBP@ _____

Wellhead Or Flange _____ Pbtid _____

	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

JOB DATA

Water Fluid: H2O Density 8.33 Lb./Gal. @ API

Oil Fluid: H2O Density 8.3 Lb./Gal. @ API

Proppant Type: Sand Size 80/100 Lb. 62,000

Proppant Type: sand Size 20/40 Lb. 10,000

Radioactive Tracer _____ Carrier _____ Units-MCI _____

Surfactant Type _____ Gal. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal. _____ @ _____ /1000 Gal.

Fluid Loss Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Scaling Agent _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Scaling Agent: LGC-IV Gal.-Lb. 280 @ _____ /1000 Gal.

Surfactant Type: GSW-30 Gal.-Lb. 4 @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type: Citric Acid Gal.-Lb. 200 @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type: AEF-4 Gal.-Lb. 38 @ _____ /1000 Gal.

Surfactant Type: Clasta xp Gal.-Lb. 10 @ _____ /1000 Gal.

Surfactant Type: Clafix II Gal.-Lb. 80 @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Qty. _____ Size _____ S.G. _____

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
B. JACKSON	46175	
C. Thomas	3298 4490	
R. Wheeler	2683 4490	
K. Thompson	5997 mvd	
L. Colts	8892 I Pac	
Caldwell	3305 SBP	
M. English	3302 SBP	
J. Pascarella	9911 TD	
J. Gould	3905 46c	
	SBP	contland

ACID DATA

Surfactant Type _____ % _____ Gal.-Bbl. _____

Surfactant Type _____ % _____ Gal.-Bbl. _____

Surfactant Type _____ Gal. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

Surfactant Type _____ Gal.-Lb. _____ @ _____ /1000 Gal.

PRESSURES IN PSI

SUMMARY

VOLUMES

Surfactant Type _____ Displacement 3601

Surfactant Type _____ Maximum 4600

Surfactant Type _____ Fracture Gradient _____

Surfactant Type _____ 5 Min. 2180 10 Min. _____ 15 Min. _____

Preflush: Bbl.-Gal. _____ Type _____

Load & Bkdn: Bbl.-Gal. 5318 Pad: Scf.-Bbl.-Gal. _____

Treatment: Bbl.-Gal. 20 450 Displ: Bbl.-Gal. 2860

Gas Assist _____ Tons-Scf _____ @ _____ Scf./Bbl.

Foam Quality _____ % Total Volume Foam _____ Bbl.-Gal.

Total Volume: Bbl.-Gal. 2860 Fluid-Foam _____

HYDRAULIC HORSEPOWER

AVERAGE RATE IN BPM

Surfactant Type _____ Available 2180 Used 1480

Surfactant Type _____ Displ. 16.7 Overall 16.7

REMARKS

DEPARTMENT: Stim

DESCRIPTION OF JOB: Water Frac

JOB DONE THRU: TUBING CASING ANNULUS TSG./ANN.

CUSTOMER: U.S. ENERGY
LEASE: K. TRISKETT
WELL NO.: #2
JOB TYPE: WATER FRACTURING
DATE: 01/05

HALLIBURTON SERVICES JOB LOG

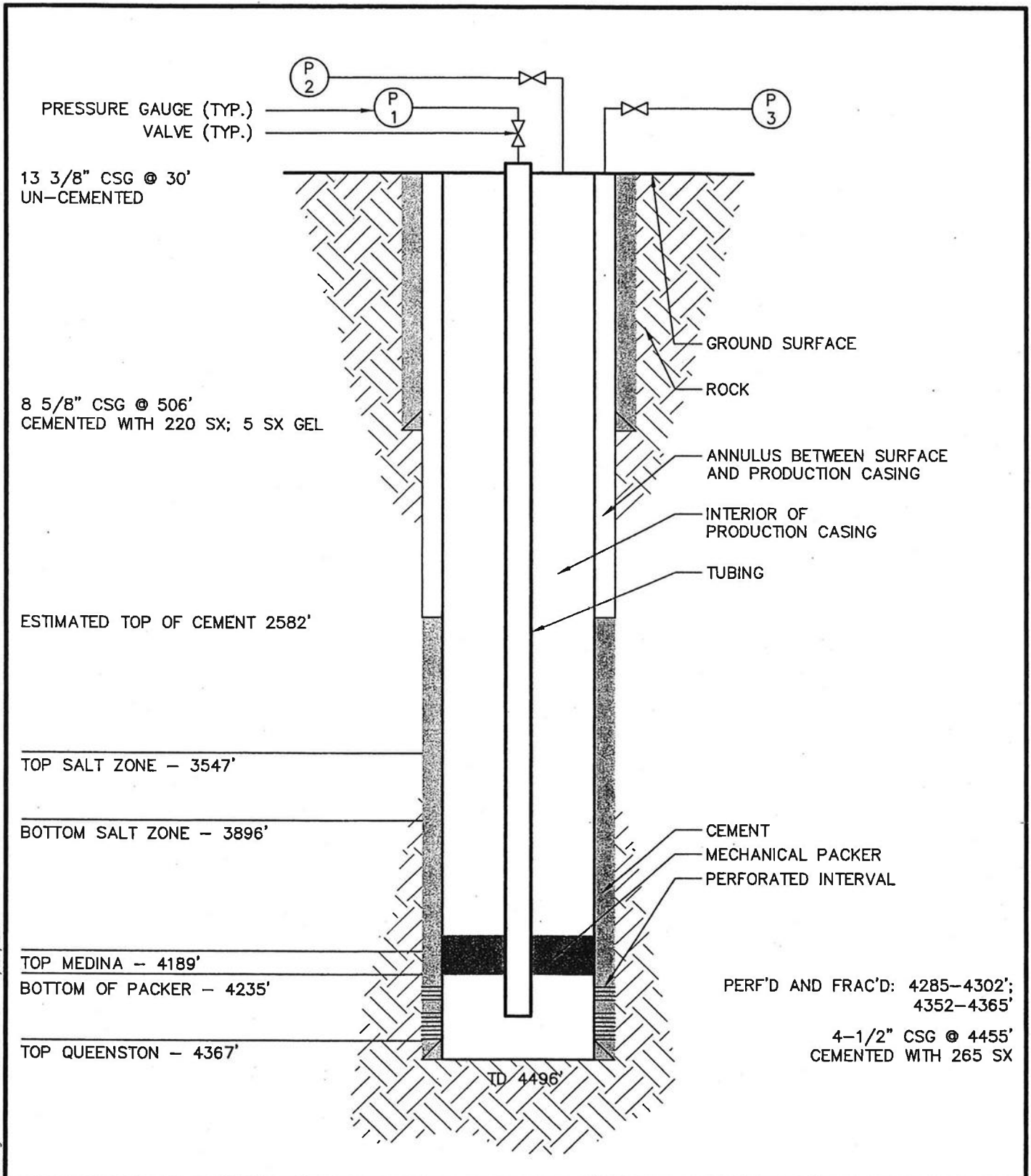
WELL NO. #2 LEASE R. Trisket TICKET NO. 896925-7
 CUSTOMER U.S. Energy PAGE NO. 1
 JOB TYPE Water Flooding DATE 01/05/90

ORM 2013 R-2

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS		PRESSURE (PSI)		DESCRIPTION OF OPERATION AND MATERIALS
				T	C	TUBING	CASING	
								Safety meeting
	14:10			4				Pick up Pump
	12 1/2			2		4176		Test Lines
	14		2462	4		577		Lead Hole
	30 3/4			4		3367		Pad
	35 1/4		2856	1		3868		Start Sand 80/100 1PP6
	43	↑	5000			3830		Inc Sand 80/100 2PP6
	46 3/4		7630			3206		Start Sand 20/40 2PP6
	59 1/2		5000			3551		Inc Sand 3PP6
	1:50		15000			3595		Inc Sand 4PP6
	12	↓	17856			3523		Sand on Bottom
	15 3/4		20450			3439		Finish Sand
	19 1/2	↓	2856			380		Finish Flush
	19 1/2					2160		FSIP
	24 1/2					2180		5min

Ave Psi 360
HHP 1480

Section 7



R:\2984_jures\2984FG001.dwg PIT CARLY.KRAMER 10/26/2010 2:44:22 PM

TETRA TECH

WWW.TETRATECH.COM

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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
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FIGURE	

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
Proposed Injection and Monitoring Wells							
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'	
Water Wells							
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 Depth to Bedrock: 98 ft
Brownell Rd	CU1709	125	Unknown	Unknown	100	Unknown	Lat: 42.01 56.3 Long: 79 34 28.1 DTW: 110 ft Depth to Bedrock: 50 ft
Clymer Hill Rd	CU2266	100	Unknown	Unknown	81	Unknown	Lat: 42 03 30.3 Long: 79 36 44 DTW: 79 ft
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**