



**TETRA TECH**

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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:

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

$\Delta p$  = 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) ( $\text{psi}^{-1}$ )

$r$  = 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

$C$  =  $3.0 \times 10^{-6} \text{ psi}^{-1}$

$\Phi$  = 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

$C$  =  $3.0 \times 10^{-6} \text{ psi}^{-1}$

$\Phi$  = 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 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 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

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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  $\frac{1}{4}$  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**

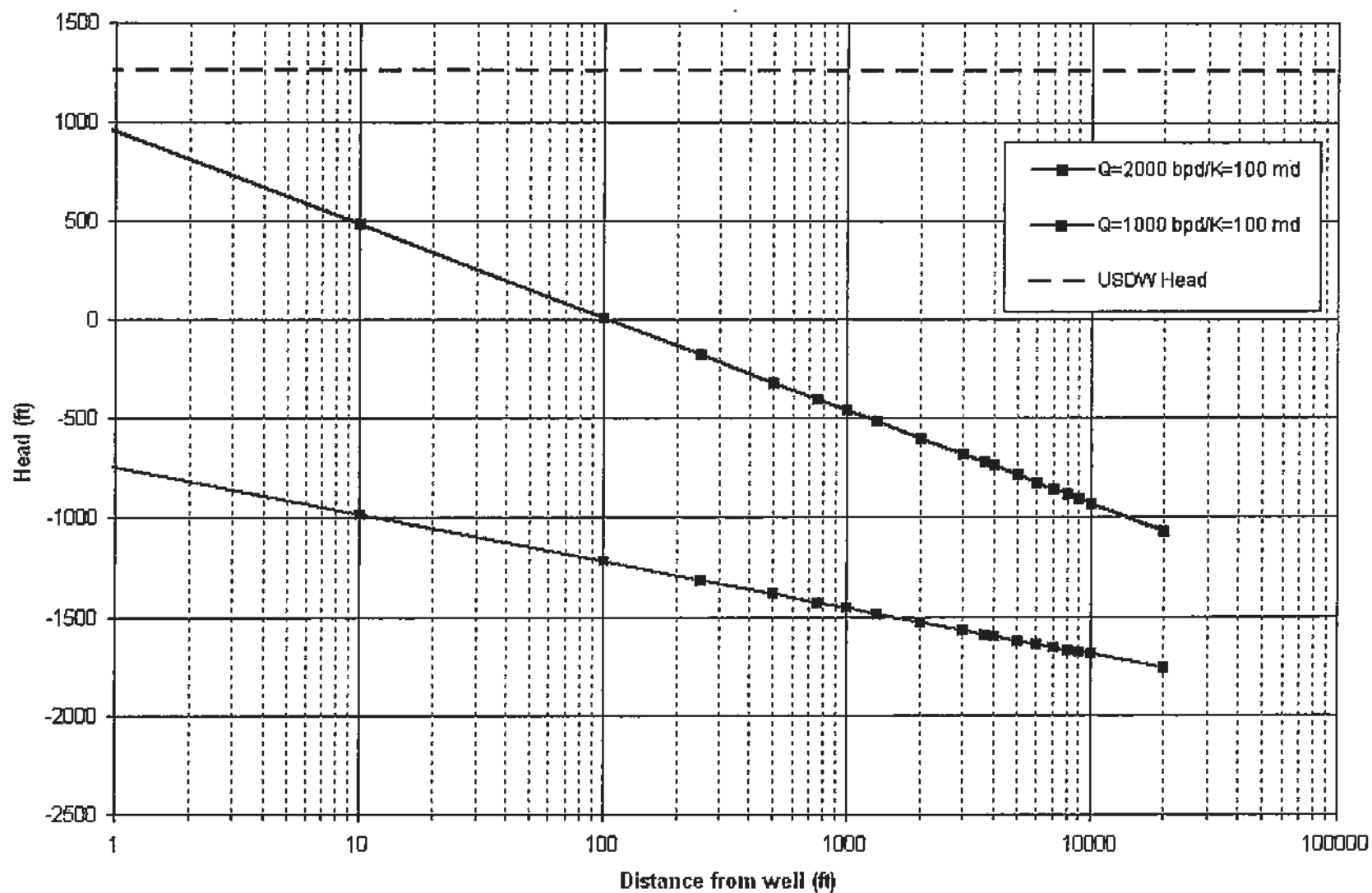


Figure 1. Feet of head of injection formation and USDW vs. distance from the well for Bittering #1 and #4 well when both wells are injecting.

**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
<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>							



## **FIGURES**

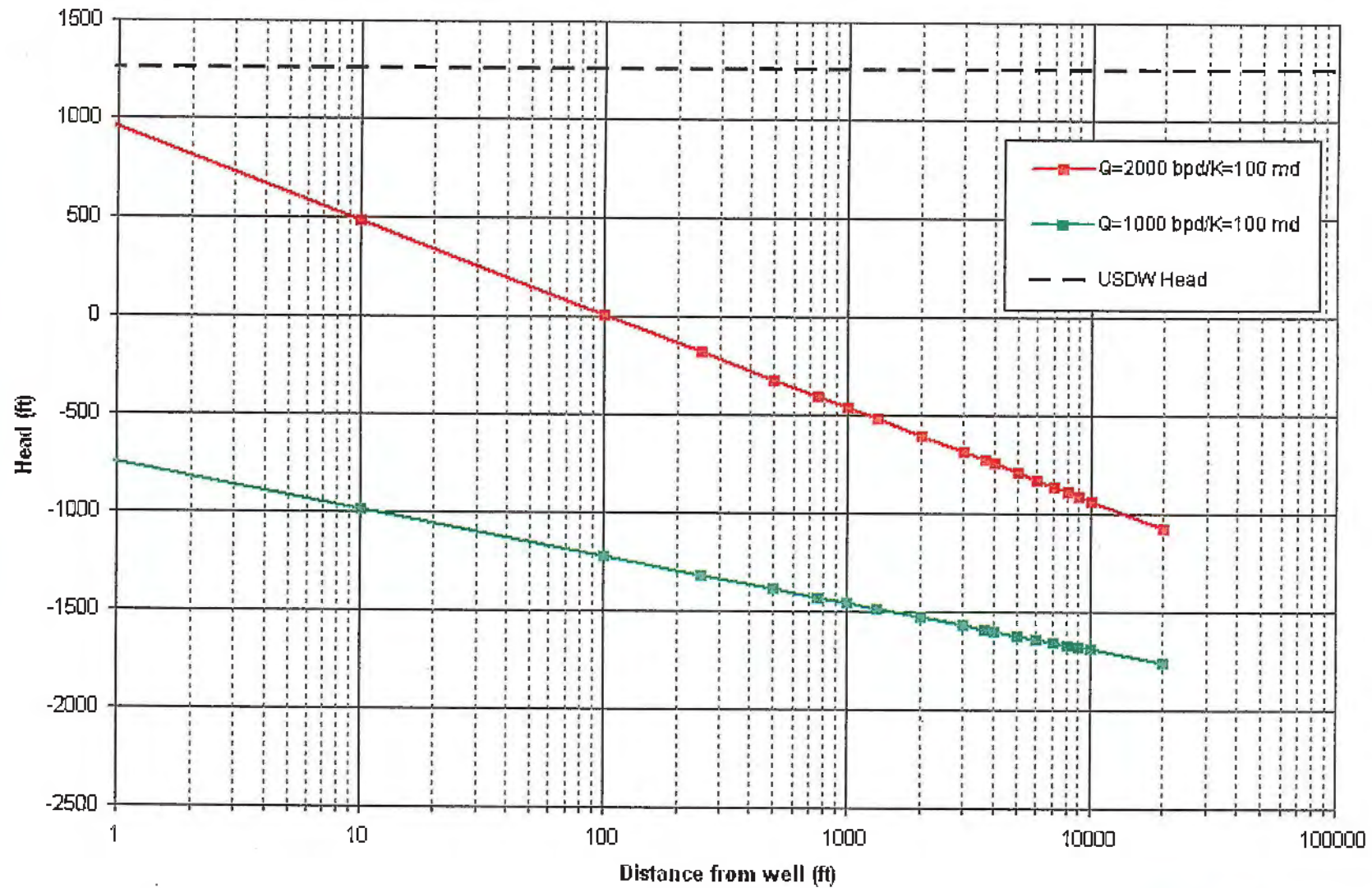


Figure 1. Feet of head of injection formation and USDW vs. distance from the well for Bittering #1 and #4 well when both wells are injecting.



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



**Bittinger Area; Columbus Twp; Warren County, PA**  
**Wells w/in 0.25 mile radius of Bittinger #1**

	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'	
Bittinger #4	123-39874	4496	8/15/1987	4.5	4455	Perf'd & Frac'd: 4285-4302'; & 4352-4365'	Subject of separate UIC Class II permit application
<b>Existing / Former Oil and Gas Wells</b>							
Bittinger #4	123-39874	4496	8/15/1987	4.5	4455	Perf'd & Frac'd: 4285-4302'; & 4352-4365'	Subject of separate UIC Class II permit application
<b>Water Wells</b>							
None							

## **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 #1 well. An intermittent unnamed tributary (UNT) to Tamarack Swamp is located just south of the Bittering #1 well. Tamarack Swamp is located approximately 0.75 to 1 mile west-southwest, Brokenstraw Creek is located approximately 0.75 miles northwest, and an UNT to Pine Valley Creek is located approximately 0.75 miles southeast of Bittering #1.

According to publicly available records, there are no groundwater wells within  $\frac{1}{4}$  mile of the Bittering #1 well. The nearest groundwater well is located approximately  $1 \frac{1}{4}$  mile to the northwest. The only oil and gas well located within  $\frac{1}{4}$  mile of the Bittering #1 is the Bittering #4 located approximately  $\frac{1}{4}$  mile to the north, 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.

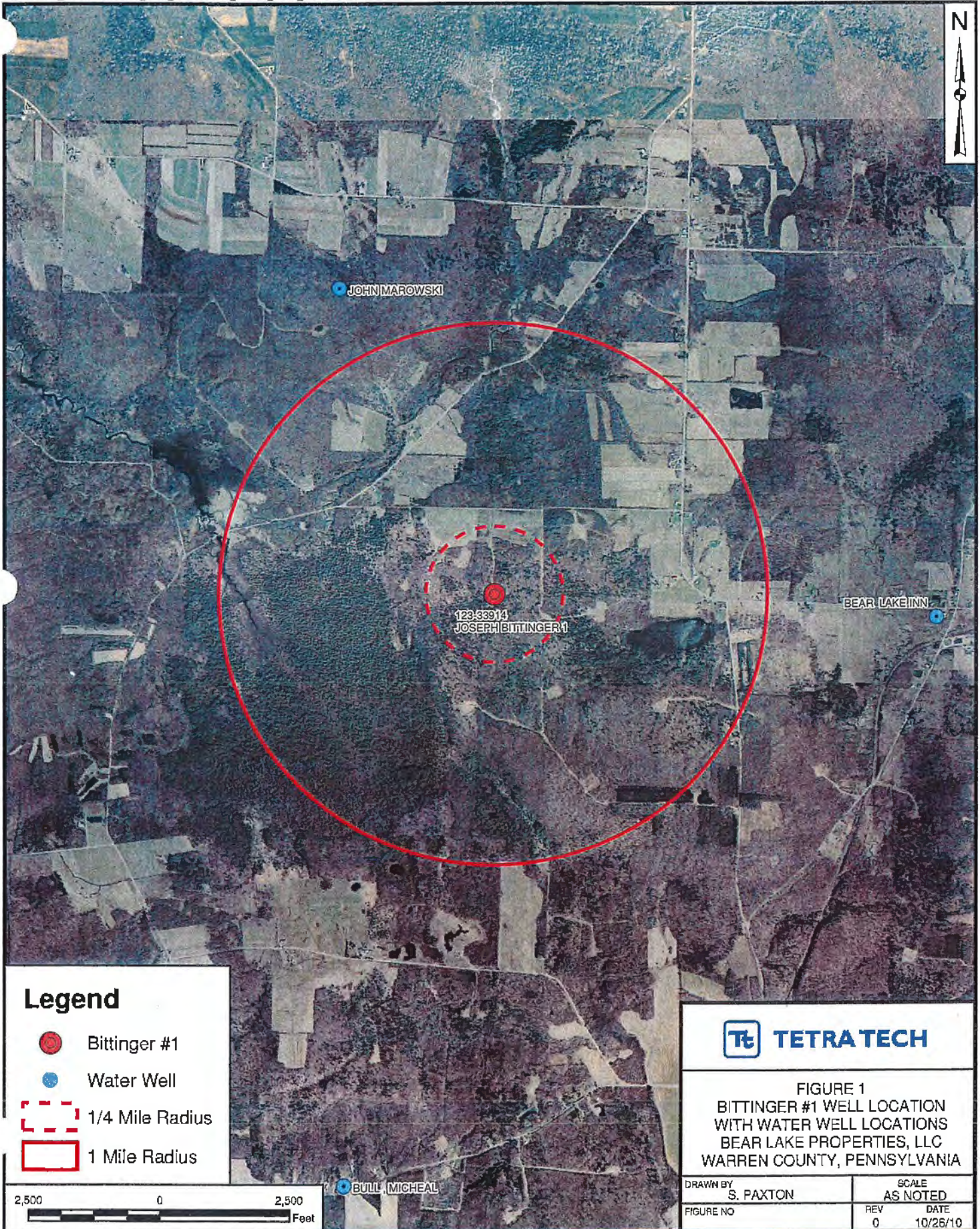


**AREA OF REVIEW MAPS**

**GROUNDWATER WELLS**



P:\GIS\BEAR\_LAKE\MXD\BEAR\_LAKE\_BITTINGER#1\_WATER\_WELL\_AERIAL.MXD 10/26/10 TW



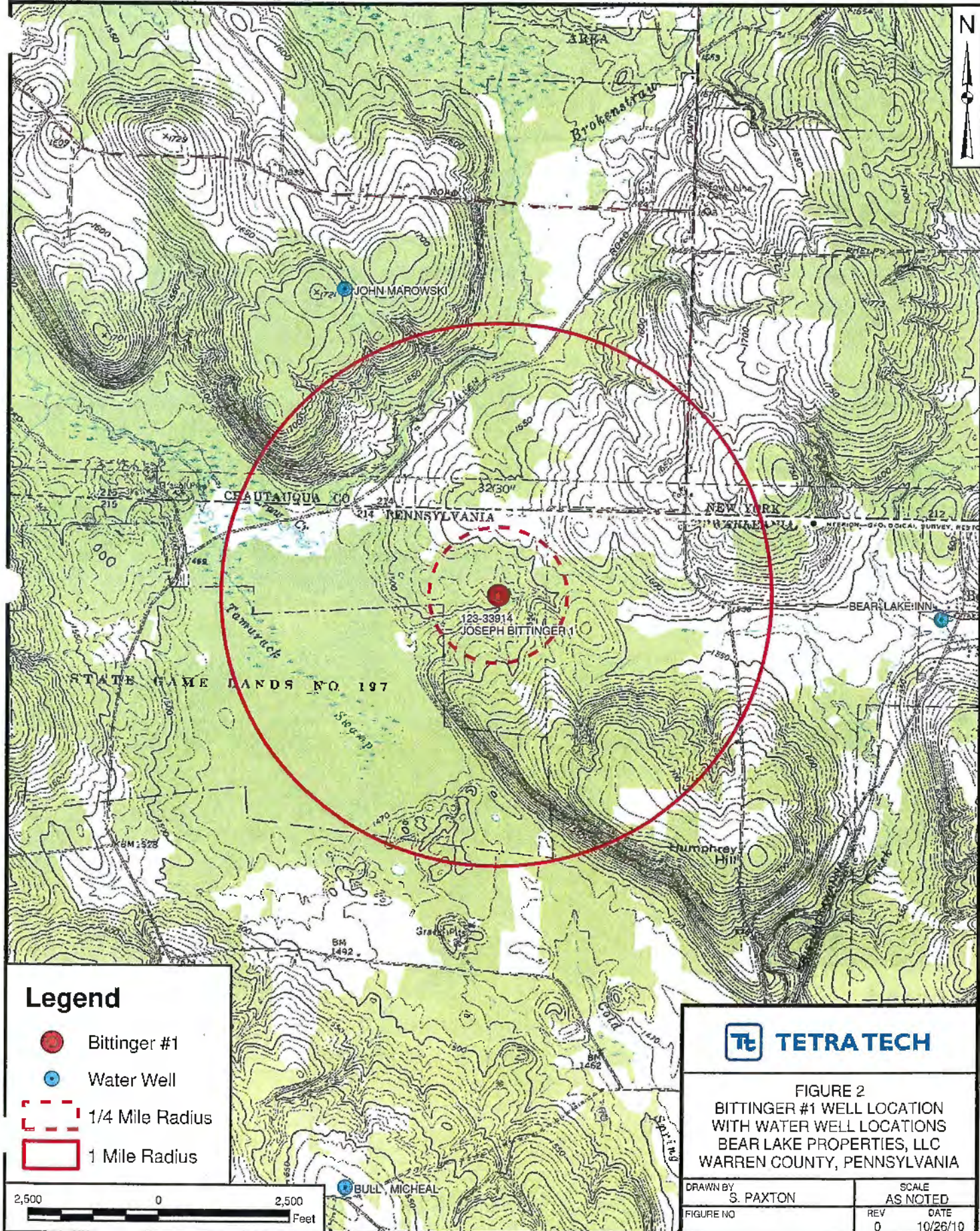


## **AREA OF REVIEW MAPS**

### **OIL AND GAS WELLS**

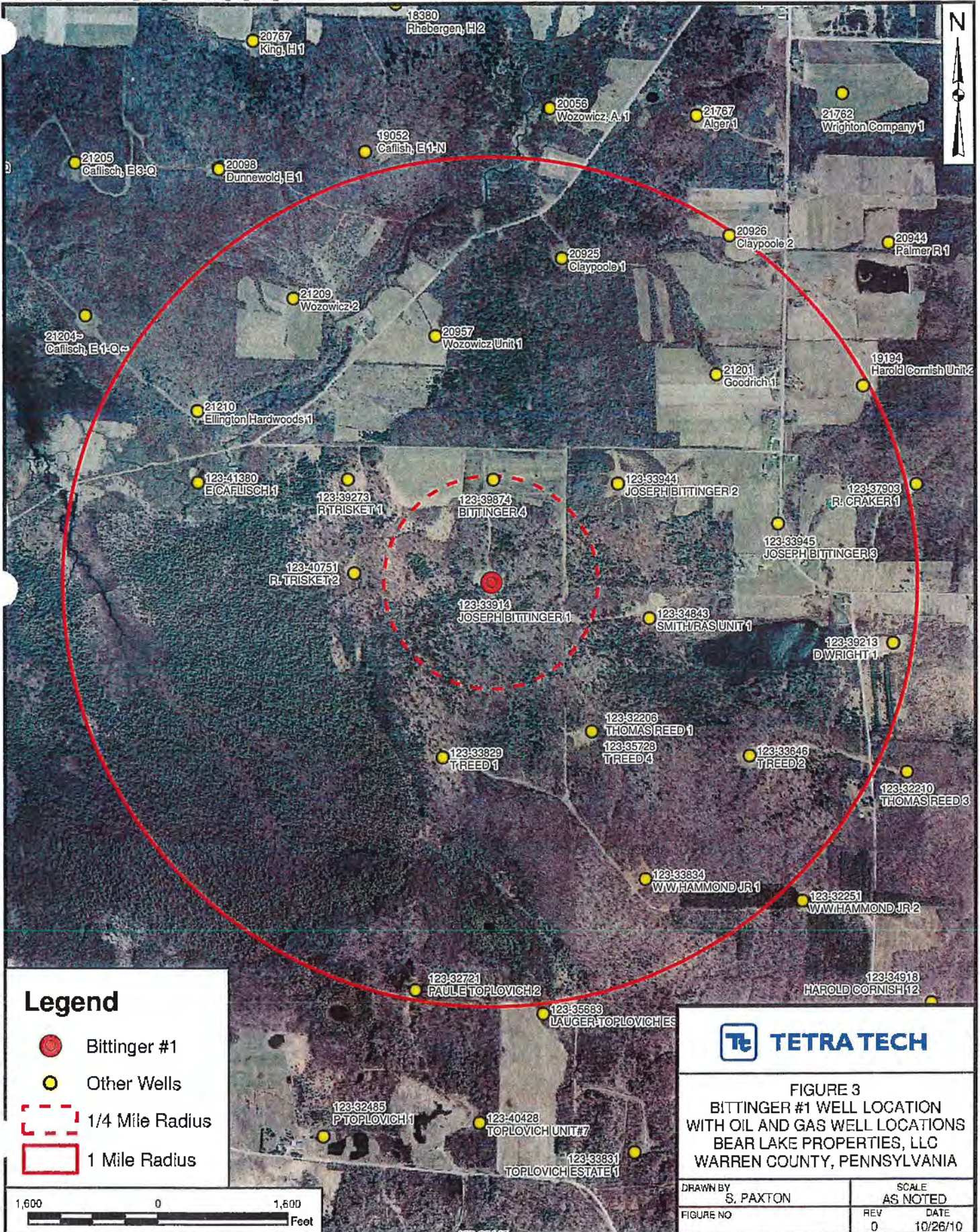


P:\GIS\BEAR\_LAKE\MXD\BEAR\_LAKE\_BITTINGER#1\_WATER\_WELL\_TOPO.MXD 10/26/10 TW



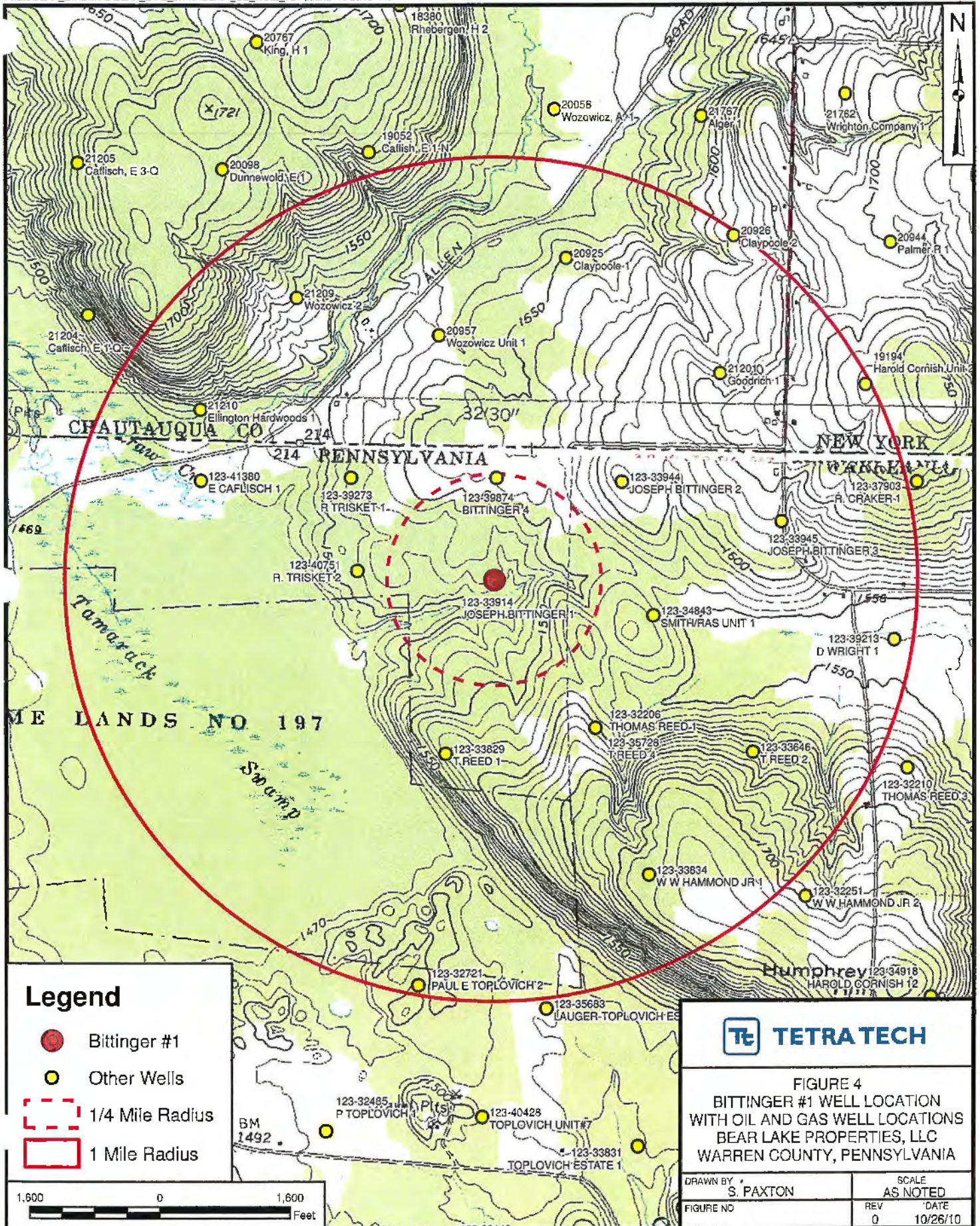


P:\GIS\BEAR LAKE\WCD\BEAR LAKE BITTINGER#1\_OG\_WELL\_AERIAL.MXD 10/26/10 TW





PAGIS\BEAR\_LAKE\MXD\BEAR\_LAKE\_BITTINGER#1\_OG\_WELL\_TOPO.MXD 10/26/10 TW





Underground Sources of Drinking Water – Bittering No. 1/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 kame deposits. Kame deposits consist primarily of sand and gravel interbedded with minor amounts of silt and clay. The well log for Bittering No. 1 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 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) database was accessed to determine the sources of groundwater sources in the site area. This data base did not contain any groundwater wells within a one-mile radius of Bittering #1 well. Although there are no 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 37 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. 1 has surface casing to a depth of 401 feet below ground surface, providing a buffer of approximately 250 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 4150 to 4330 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**  
**GROUNDWATER WELLS WITHIN 1 MILE**

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

[illegible]

### 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 4,210 to 4,327 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 #1 completion record and geophysical log,
- Maximum Injection Pressure (MIP) calculations based on Instantaneous Shut-In Pressure (ISIP) data for two nearby wells (R. Trisket #1 and #2),
- Bittinger #4 completion record,
- R. Trisket #1 and #2 treatment reports.


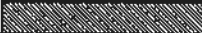



**GEOLOGIC DATA**  
**GENERALIZED STRATIGRAPHIC COLUMN**

**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	2741	2723	
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	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 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 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

# CTURING SERVICE TREATING REPORT

R. TRISKETT #2

BILLED ON  
TICKET NO. 896921-7

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.  
er Type \_\_\_\_\_ Set At \_\_\_\_\_  
om Hole Temp. \_\_\_\_\_ RBPE \_\_\_\_\_  
d Or Flange \_\_\_\_\_ Pbit \_\_\_\_\_

## WELL DATA

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

## MATERIALS

at. Fluid H<sub>2</sub>O Density 8.33 Lb./Gal. API  
al. Fluid H<sub>2</sub>O Density 8.3 Lb./Gal. API  
p. Type Sand Size 80/100 Lb. 6.2 000  
p. Type sand Size 20/40 Lb. 10.000  
ioactive 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-IV Gal.-Lb. 280 @ \_\_\_\_\_ /1000 Gal.  
aker Type GBW-30 Gal.-Lb. 4 @ \_\_\_\_\_ /1000 Gal.  
aker Type \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
er \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
r \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
ffer Type \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
ffer Type Citric Acid Gal.-Lb. 200 @ \_\_\_\_\_ /1000 Gal.  
terilacide \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
Foamer AEF-4 Gal.-Lb. 38 @ \_\_\_\_\_ /1000 Gal.  
y Control MaSta XP Gal.-Lb. 10 @ \_\_\_\_\_ /1000 Gal.  
ter CloFX II Gal.-Lb. 20 @ \_\_\_\_\_ /1000 Gal.  
ction Reducer \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
fpac Balls \_\_\_\_\_ Qty. \_\_\_\_\_ Size \_\_\_\_\_ S.G. \_\_\_\_\_  
er \_\_\_\_\_

## JOB DATA

CALLER OUT DATE	ON LOCATION DATE	JOB STARTED DATE	JOB COMPLETED DATE
01/05/90	01/05/90	01/07/90	01/07/90
TIME 0730	TIME 1200	TIME 1400	TIME 1530

## PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
B. Jackson	46175	
C. Thomas	69581	3298 H+400
R. Wheeler	87697	2683 H+400
K. Thompson	84639	5997 m+0
L. Colts	66159	3892 I+400
Caldwell	D8034	3305 S+BP
M. English	D7811	3302 S+BP
J. Piscarella	D7783	9911 T+0
J. Gould	D7896	3905 L+6
		JBP cantland

## ACID DATA

id Type \_\_\_\_\_ % \_\_\_\_\_ Gal.-Bbl. \_\_\_\_\_  
id Type \_\_\_\_\_ % \_\_\_\_\_ Gal.-Bbl. \_\_\_\_\_  
rfectant Type \_\_\_\_\_ Gal. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
rfectant Type \_\_\_\_\_ Gal. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
Agent Type \_\_\_\_\_ Gal. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
y Control Type \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
rosion Inhibitor \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
rosion Inhibitor \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
acking Inhibitor \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
in Sequester \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.  
ction Reducer \_\_\_\_\_ Gal.-Lb. \_\_\_\_\_ @ \_\_\_\_\_ /1000 Gal.

## PRESSURES IN PSI

## SUMMARY

## VOLUMES

ig \_\_\_\_\_ Displacement 3601  
in 336 Maximum 4600  
rage 3601 Fracture Gradient \_\_\_\_\_  
o 2-100 5 Min. 2180 10 Min. \_\_\_\_\_ 15 Min. \_\_\_\_\_  
HYDRAULIC HORSEPOWER  
ered 1600 Available 2180 Used 1480  
AVERAGE RATE IN BPM  
ating 16.7 Displ. 16.7 Overall 16.7

Preflush: Bbl.-Gal. \_\_\_\_\_ Type \_\_\_\_\_  
Load & Bkdn: Bbl.-Gal. 5318 Pad: Scf-Bbl.-Gal. \_\_\_\_\_  
Treatment: Bbl.-Gal. 20 400 Displ: Bbl.-Gal. 2850  
Gas Assist \_\_\_\_\_ Tons-Scf \_\_\_\_\_ @ \_\_\_\_\_ Scf./Bbl.  
Foam Quality \_\_\_\_\_ % Total Volume Foam \_\_\_\_\_ Bbl.-Gal.  
Total Volume: Bbl.-Gal. 28504 Fluid-Foam \_\_\_\_\_

## REMARKS

CUSTOMER U.S. Energy  
LEASE K. TRISKETT  
WELL NO. #2  
JOB TYPE Water Frac 4 1/2" DATE 01/01/90

# WALLBURTON SERVICES JOB LOG

WELL NO. #2 LEASE R. Trisket TICKET NO. 896925-7CUSTOMER U.S. Energy PAGE NO. 1

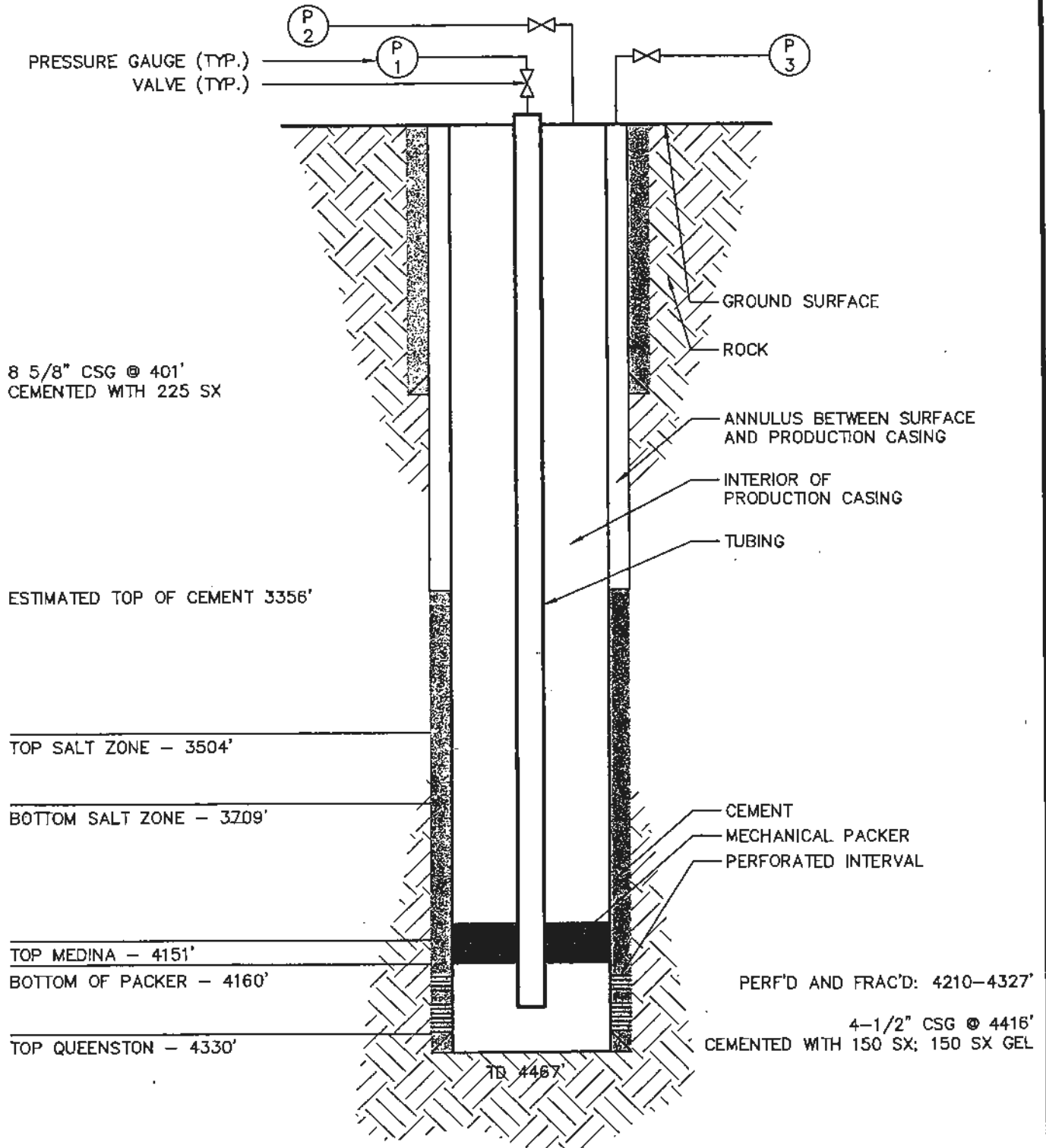
FORM 2013 R-2

JOB TYPE water Frac up 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
	4:10			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			3868		Start Sand 80/100 1PPG
	43		5000			3830		Inc Sand 80/100 2PPG
	46 3/4		7630			3206		Start Sand 20/40 2PPG
	59 1/2		5000			3551		Inc Sand 3PPG
	1:08		15200			3595		Inc Sand 4PPG
	12		17856			3523		Sand on Bottom
	15 3/4		20450			3939		Finish Sand
	19 1/2		2856			380		Finish Flush
	19 1/2					2160		ESIP
	24 1/2					2180		5min

Avg Psi 3600

HHP 1490



R:\2984\figures\2984FG002.dwg PIT CARLY KRAMER 10/26/2010 2:48:02 PM



**TETRA TECH**

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PITTSBURGH, PA 15220  
T: (412) 921-7090 | F: (412) 921-4040

**BEAR LAKE PROPERTIES, LLC**

**BITTINGER #1  
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.	
<b>FIGURE</b>	



## **Appendix A**

Appendix A contains well records and information for groundwater wells in the area surrounding Bitteringer No. 1. There are no groundwater wells located within 1 mile of the Bitteringer No. 1 well, as listed in the following table. Well records for all groundwater wells located within Columbus Township, Warren County, Pennsylvania are provided in Appendix A-1.

## **APPENDIX A**

### **GROUNDWATER WELLS WITHIN 1 MILE**

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

[illegible]



Exhibit 2  
continues

**APPENDIX A-1**

**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**.

Create List

Page 1 of 2

Next Page

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 HORNBERG		9/1/1998	HORNBERG	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 HORNBERG		8/3/1998	LAWSON	WARREN	COLUMBUS TWP.	<a href="#">View Image</a>
<input type="checkbox"/>	17	405200	DANIEL P HORNBERG		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**.

Create List

Page 2 of 2

Prev Page

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.	Image
<input type="checkbox"/>	33	405204	DANIEL P HORNBERG		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**[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

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: Diameter: 6 Material: UNKNOWN****SCREENS/SLOTS****SCREEN 1: Top: 54 Bottom: 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 Page

## 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](#)

## PA Topographic &amp; Geologic Survey

PaGWIS

## DETAILS FOR WELL 405194

Email comments to Topo Geo.

Record: 4 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: **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.)

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

## 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.)

[Print](#)[Refresh](#)[New Well](#)[Delete Well](#)[Return to Summary List](#)

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  
KNOWNStatic 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.)

[Print](#)[Refresh](#)[New Well](#)[Delete Well](#)[Return to Summary List](#)



## 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.)

First Well

Prev Well

Next Well

Last Well

Return to Summary List

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.)

First Well

Prev Well

Next Well

Last Well

Return to Summary List

## PA Topographic &amp; Geologic Survey

PaGWIS

**DETAILS FOR WELL 405195**[Menu](#)[New Section](#)[Email comments to Topo Geo.](#)

Record: 7 of 35

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

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

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



## PA Topographic &amp; Geologic Survey

PaGWIS

**DETAILS FOR WELL 405213**

Email comments to Topo Geo.

Record: 8 of 35

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

[Top Well](#) [New Well](#) [New Well](#) [New 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.)

[Top Well](#) [New Well](#) [New Well](#) [New Well](#) [Return to Summary List](#)

## 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.)

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

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



## 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.)

First Well

Prev Well

Next Well

Last Well

Return to Summary List

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: **FRONTIER 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.)

First Well

Prev Well

Next Well

Last Well

Return to Summary List



## PA Topographic &amp; Geologic Survey

PaGWIS

**DETAILS FOR WELL 405216**

Menu

New Section

Email comments to [Topo Geo.](#)

Record: 11 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: **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.)

First Well

Prev Well

Next Well

Last Well

Return to Summary List

PA Topographic & Geologic Survey

PaGWIS

**DETAILS FOR WELL 405208**

Email comments to Topo Geo.

Record: 12 of 35

(There is a total of 35 Wells in the 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, CORY**

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.)

## PA Topographic &amp; Geologic Survey

PaGWIS

**DETAILS FOR WELL 405205**Email comments to [Topo Geo.](#)

Record: 13 of 35

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

Well Driller: **DANIEL P HORNBERG**PA Well ID: **405205**License: **2043**

Driller Well ID:

Type of Activity:

Original Well By:

Date Drilled: **9/1/1998**

Drilling Method:

Owner: **HORNBERG**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.)

## PA Topographic &amp; Geologic Survey

PaGWIS

**DETAILS FOR WELL 405202**[Menu](#)[New Section](#)[Email comments to Topo Geo.](#)

Record: 14 of 35

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

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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**[Email comments to Topo Geo.](#)

Record: 15 of 35

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

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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 Measurec 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**[Email comments to Topo Geo.](#)

Record: 16 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: **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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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**Email comments to [Topo Geo.](#)

Record: 18 of 35

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

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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 & 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**Email comments to [Topo Geo.](#)

Record: 20 of 35

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

[First Well](#)[Prev Well](#)[Next Well](#)[Last Well](#)[Menu](#)[New Selection](#)[Return to Summary List](#)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**Email comments to [Topo Geo.](#)

Record: 21 of 35

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

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.)

## 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.)

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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 & 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.)

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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**

Email comments to Topo Geo.

Record: 24 of 35

(There is a total of 35 Wells in the 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**Email comments to [Topo Geo.](#)

Record: 26 of 35

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

[Topo Well](#)[Geo Well](#)[Topo Well](#)[Geo Well](#)[Return to Summary List](#)Well Driller: **MCCANDLESS 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**

Email comments to Topo Geo.

Record: 27 of 35

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

[First Well](#) [Previous 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 & 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.)

Find Well

New Well

Print Well

Save 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.)

Find Well

New Well

Print Well

Save Well

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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.)

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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 & Geologic Survey

PaGWIS

DETAILS FOR WELL 405218

Email comments to [Topo Geo.](#)

Record: 30 of 35

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

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.)

## 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.)

1st Well

2nd Well

3rd Well

4th Well

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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.)

1st Well

2nd Well

3rd Well

4th Well

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## PA Topographic &amp; Geologic Survey

PaGWIS

**DETAILS FOR WELL 33584**[Menu](#)[New Report](#)[Email comments to Topo Geo.](#)

Record: 32 of 35

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

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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 &  
BUCKETStatic 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.)

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## PA Topographic &amp; Geologic Survey

PaGWIS

**DETAILS FOR WELL 405204**[Email comments to Topo Geo.](#)

Record: 33 of 35

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

## 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.)

Topo Geo.

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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**Email comments to [Topo Geo.](#)

Record: 35 of 35

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

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.)

**Appendix B**

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







	<b>PARCEL #</b>	<b>OWNER</b>	<b>ADDRESS</b>
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	162	Commonwealth of Pennsylvania	2001 Elmerton Ave., Harrisburg, PA 17110
E	2287	Cornish Lumber Company, Inc.	P.O. Box 140, Bear Lake, PA 16402
F	2362	Jack and Marilyn McCoy	P.O. Box 112, Columbus, PA 16405