

replaced by
October 2012
addendum

Area of Review

According to publicly available records for the proposed injection well area, there are no intake or discharge structures, hazardous waste treatment, storage, or disposal facilities, mines, or quarries within one mile of Seneca Well #38268, the proposed injection well. A High Quality – Cold Water Fishery (HQ-CWF) designated unnamed tributary (UNT) to the East Branch of Tionesta Creek is located approximately 0.5 miles east, a HQ-CWF designated unnamed tributary (UNT) to Wolf Run is located approximately 0.1 miles south, and a HQ-CWF designated unnamed tributary (UNT) to Wolf Run is located approximately 0.6 miles west of Seneca Well #38268.

According to publicly available records, there are no groundwater wells within the ¼ mile Area of Review for Well #38268. The nearest groundwater well is located approximately 0.8 miles to the northeast (Randy Klaiber). The only active oil and gas well located within ¼ mile of the Seneca Well #38268 is Seneca Well #38281 located approximately 0.2 miles to the southwest. A plugged gas well, Seneca Well #01328, is located approximately 1320 ft southeast of the proposed injection well. This well is discussed in greater detail in the following section of this application.

The names and addresses of residents located within ¼ mile of the proposed injection well are provided in Appendix B.

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Groundwater Wells within 1 mile of Seneca Well #38268
Highland Township, Elk County, PA

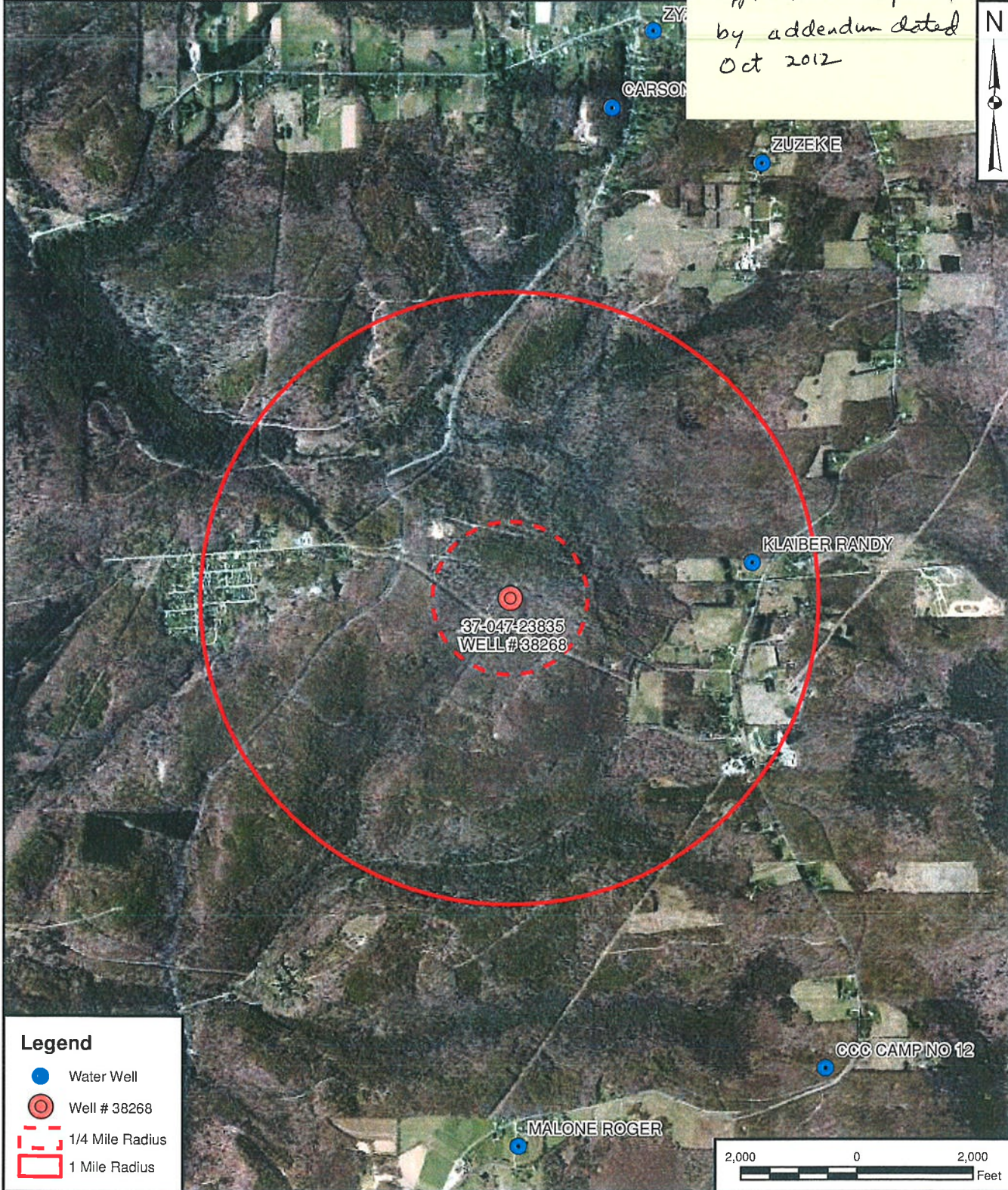
Water Wells

PAWellID	DateDrilled	Owner	WellDepth	Depth To Bedrock	WellUse	Borehole Bottom	Bore Hole Diameter	Casing Bottom	Casing Diameter
100718	8/1/1987	KLAIBER RANDY	130	28	WITHDRAWAL				

Proposed Injection and Monitoring Wells										
Operator	Cmpl Date	API	WellID	Elevation (ft. msl)	Total Depth (ft)	Last Csg (in)	Csg Depth (ft)	Completion	Comments	
SENECA RESOURCES CORP	7/3/2007	37-047-23835	38268	2040	2530	7	553.2	Notched & Frac'd: 2354-2403'	Subject of UIC Class IID permit application	
SENECA RESOURCES CORP	3/11/2008	37-047-23884	38281	2020	2544	7	602	Notched & Frac'd: 2338-2390'	Monitoring Well	
Other Existing /Former Oil and Gas Wells Within Area of Review (1/4 Mile Radius)										
Operator	CmplDate	API	WellID	Elevation	Total Depth (ft)	Last Csg (in)	Csg Depth (ft)	Completion	Comments	
SENECA RESOURCES CORP	11/21/1902	N/A	1328	2049	2433	6.25	460	Shot with 100 qts. Nitroglycerin: 2370-2400'	Plugged and Abandoned Feb. 12, 1991	
Water Wells Within 1 Mile Radius										
PAWellID	DateDrilled	Owner	WellDepth	Depth To Bedrock	WellUse	Borehole Bottom	Bore Hole Diameter	Casing Bottom	Casing Diameter	
100718	8/1/1987	KLAIBER RANDY	130	28	WITHDRAWAL					

X

Map of water wells submitted with original application. Replaced by addendum dated Oct 2012



Legend

- Water Well
- Well # 38268
- 1/4 Mile Radius
- 1 Mile Radius



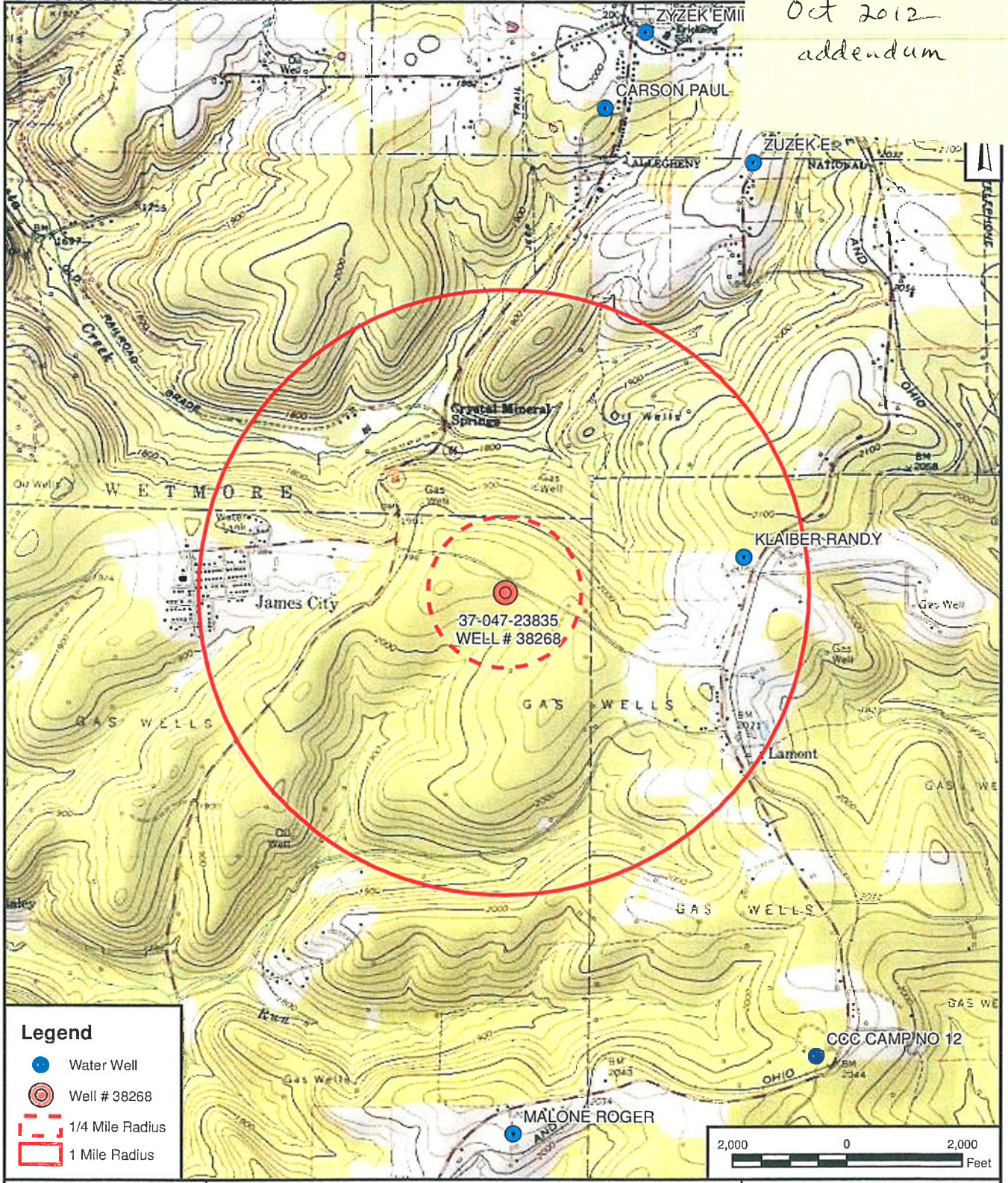
FIGURE 1
#38268 WELL LOCATION
WITH WATER WELL LOCATIONS
ELK COUNTY, PENNSYLVANIA

DRAWN BY: J. NOVAK 05/17/12
 CHECKED BY: E. BERKLITE 06/19/12
 APPROVED BY:

CONTRACT NUMBER: 112C04078

FIGURE NUMBER	1	REV	0
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replaced by
Oct 2012
addendum



Legend

- Water Well
- Well # 38268
- 1/4 Mile Radius
- 1 Mile Radius



FIGURE 2
#38268 WELL LOCATION
WITH WATER WELL LOCATIONS
ELK COUNTY, PENNSYLVANIA

DRAWN BY: J. NOVAK 05/17/12
CHECKED BY: E. BERKLITE 06/19/12
APPROVED BY:
CONTRACT NUMBER: 112C04078
FIGURE NUMBER 2
REV 0

replaced by
10/12 addendum
(See permit
application)

Underground Sources of Drinking Water – Seneca Well #38268/Highland Township,
Elk County, PA

The site lies within the Glaciated High Plateau section of the Appalachian Plateaus Physiographic province. The High Plateau Section consists of broad, rounded to flat uplands cut by deep angular valleys. The uplands are underlain by flat-lying sandstones and conglomerates. Local relief between valley bottoms and adjacent uplands can be as much as 1,000 feet, but is generally in the area of half that amount. Elevations in the area range from 980 to 2,360 feet. Drainage of the area has a dendritic pattern. The western boundary of the area is the Late Wisconsin glacial border. The area between this border and the Allegheny River a few miles to the east was glaciated by pre-Wisconsin glaciers. The area occurs in northwestern Pennsylvania and includes all of Forest County, most of Venango, Warren, and Elk Counties, and small parts of McKean, Jefferson, and Clarion Counties (<http://www.dcnr.state.pa.us/topogeo/map13>).

Bedrock is generally used for potable water in the project area. The well log for Well #38268 indicates that the uppermost bedrock unit at the site is the Allegheny Group of Pennsylvanian Age. The Allegheny Group consists of limestone, sandstone, shale, and coal deposits. At a depth of 30 to 35 feet below ground surface (bgs) the Pennsylvanian Age Pottsville Group also consists of limestone, sandstone, shale, and coal deposits. At approximately 200 feet bgs lies the Mississippian-Devonian Age Shenango through Oswayo undivided, which consist of sandstone, siltstone, and shale. The Upper Devonian siltstones, shale, and sands are present beneath the site beginning from approximately 500 feet bgs to the total depth of the borehole at 2530 feet bgs. (<http://www.dcnr.state.pa.us/topogeo/index.aspx>). The units are described further in Section 5.

The Pennsylvania Geologic Survey "Ground Water Inventory System" (PAGWIS) was accessed to determine the sources of groundwater in the site area. According to these publicly available records, there are no groundwater wells within ¼ mile of the Well #38268. The nearest groundwater well is located approximately 0.8 miles to the northeast (Randy Klaiber). The Randy Klaiber well has a listed depth of 130 feet bgs and is a domestic withdrawal well. The listed information for this well is provided in Appendix A. Although this is the only well listed, the well reporting requirement was established in 1968 and is not considered to be a complete record of water wells and other wells may be present. (PAGWIS, May 23, 2012). It is noted that PAGWIS also references a National Fuel Gas Supply Corporation well which is located approximately 0.75 miles to the southeast. The National Fuel Gas Supply Corporation Well depth is 2389 feet bgs, and according to PAGWIS, is classified as a "test well". This well is a natural gas well.

Well # 38268 is located in the northeastern corner of Highland Township of Elk County. To better understand the underground sources of drinking water, the PAGWIS was searched for all wells within Highland Township and Jones Township (bordering east of Highland Township) of Elk County, and Wetmore Township (bordering north of Highland Township) of McKean County. The PAGWIS indicated that there are 49 recorded wells in Highland Township. Twelve of these wells are owned by National Fuel Gas and according to PAGWIS are listed as test wells (i.e., natural gas wells) ranging from 1176 to 2348 feet deep. The deepest water withdrawal well is listed as 320 feet deep, with reported well depths ranging from 58 to 320 feet deep. The PAGWIS indicated that there are 155 recorded wells in Jones Township. Four of these wells are owned by National Fuel Gas and are listed as test wells ranging from 2331 to 2389 feet deep. The deepest water well is listed as 320 feet deep, with reported well depths ranging from 60 to 320 feet deep. The PAGWIS indicated that there are 41 recorded water wells in Wetmore Township. The deepest well is listed as 245 feet deep, with reported well depths ranging from 55 to 245 feet deep. Based on the available information, the Allegheny Group, Pottsville Formation, and Shenango Group are utilized as underground sources of drinking water in the site area.

In summary, PAGWIS indicates that the deepest ground water wells in the site area are approximately 320 feet deep. Based on this information and the site geologic conditions, 400 feet bgs has been identified as a conservative estimate of the base of the lowermost USDW for the proposed injection well area. It is noted that surface casing for the proposed injection well extends to 553 feet, which is greater than 200 feet deeper than the deepest groundwater drinking source in the Tri-Township Area.

Proposed Injection and Monitoring Wells										
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Operator	CmplDate	API	WellID	Elevation	Total Depth (ft)	Last Csg (in)	Csg Depth (ft)	Completion	Comments	
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Replaced by
addendum dated
Oct 2012

replaced by
Feb 4, 2013
addendum

Monitoring Program

Well #38281, located 1320 feet to the southwest of the subject injection well, will be utilized as a monitoring well for injection at Well #38268. The well construction diagram for this well is attached in Section 7. While being used as a monitoring well, if the fluid level in this well is observed to rise to within 100 feet of the base of the USDW, disposal operations in Well #38268 will be stopped immediately, EPA will be notified, and operating conditions will be evaluated in order to control the fluid levels.

Prior to monitoring being performed at Well #38281, the well will be shut-in for a period of approximately one week to allow for equilibrium in pressures and fluid levels to be attained in this producing well. Pressures and fluid levels (utilizing an Echometer) will be measured in the annulus between the 7-inch casing and tubing prior to initiation of injection at Well #38268 and semi-annually thereafter while injection is occurring at Well #38268.

Injection Well	Monitoring Well	Approximate Distance and Direction From Injection Well
Seneca #38268	Seneca #38281	1320 feet southwest

Earlier version
of monitoring program.
Replaced by Feb 4, 2013
version.

Monitoring Program Addendum

Prior to the commencement of injection operations at Well #38268, Seneca will inst cementing it back to the surface. A 2-7/8" tubing will be installed on a packer set immediately above the injection zone. This tubing will be used to convey fluid from the surface directly to the Elk 3 Sand. The annulus between the tubing and the 4-1/2" casing will be filled with anti-corrosive agents to protect both the tubing and the casing. Seneca will monitor pressure and fluid level (utilizing an Echometer) in the annulus between the 4-1/2" casing and the 2-7/8" tubing prior to injection operations and quarterly thereafter while injection is occurring at Well #38268.

Wells #38281 and #1144, located 1,090 feet southwest of the subject injection well and 2,040 feet northwest of the subject injection well, respectively, will be utilized as monitor wells for injection at Well #38268. Well construction diagrams for these wells are attached in Section 7.

Prior to monitoring being performed at Wells #1144 and #38281, each well will be shut-in and modified to isolate the Elk 3 Sand. This will be done to effectively monitor conditions in the Elk 3 Sand only.

To isolate the Elk 3 Sand in Well #38281, Seneca proposed to install 4-1/2 inch casing on a packer, set directly above the Elk 3 Sand. This well was drilled in 2008 with an air rotary rig. Once the packer is properly set, Seneca will re-install the tubing and rods inside the 4-1/2" casing.

Well #1144 was drilled in 1898 with a cable tool rig. Seneca will plug back above the Elk 3 Sand, install 4-1/2 inch casing on a formation packer, and then cement the casing in place. Subsequently, the plug, cement, and plug back material will be drilled out in order to regain full communication with the Elk 3 Sand below the production casing.

Seneca proposes to conduct quarterly monitoring at both monitor wells which are currently producing gas from the Elk 3 Sand. At the beginning of each monitoring period, both monitor wells will be shut in for a period of approximately one week to allow for equilibration with respect to pressures and fluid levels in the Elk 3 Sand. Once equilibrium has been reached in the monitor wells, Seneca will record surface pressures and downhole fluid levels. If fluid levels in the Elk 3 Sand in the monitor wells are stable, Seneca reserves the right to pump, swab, or bail the fluid out of the wellbore in order to effectively produce gas from the injection zone.

While being used as monitor wells, if the fluid level in either well is observed to rise to within 100 feet of the base of the USDW, disposal operations in Well #38268 will be stopped immediately, EPA will be notified, and operating conditions will be evaluated in order to control the fluid levels.

Injection Well	Monitoring Well	Approximate Distance and Direction From Injection Well
Seneca #38268	Seneca #1144	2,040 feet northwest
Seneca #38268	Seneca #38281	1,090 feet southwest