Sampling QA/QC Work Plan

Kiskimere Groundwater Well Investigation Site

Parks Township, Armstrong County, Pennsylvania

Contract No: EP-S3-10-04

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EPA Region III

START IV - West

Superfund Technical Assessment and Response Team

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Prepared for:

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Philadelphia, PA

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SECTION 1
INTRODUCTION

TechLaw, Inc. (TechLaw) has been tasked by the U.S. Environmental Protection Agency (EPA), Region 3, to conduct a Site Inspection (SI) at the Kiskimere Groundwater Well Investigation Site (Site) in Parks Township, Armstrong County, Pennsylvania. Field work for this SI is projected to be completed during August, 2011.

This Field Sampling Plan (FSP) is designed to guide field operations during the focused SI, and has been prepared in accordance with Technical Direction Document (TDD) # TL03-11-03-003, the EPA "Guidance for Performing Site Inspections Under CERCLA," Interim Final, September 1992, the "Region 3 Supplement to Guidance for Performing Site Inspections Under CERCLA" and the "TechLaw Generic Quality Assurance Project Plan" (QAPP) (U.S. Environmental Protection Agency (EPA) 1992. The SI field work will include sampling and non-sampling data collection. Sampling activities will include groundwater collection from residential homes and collection of surface water and sediment the Kiskiminetas River. Sampling procedures will adhere strictly to those outlined in the TechLaw Standard Operating Procedures (SOPs) for field operations at hazardous waste sites.

Site and study area characterization samples will potentially include as many as 35 groundwater samples from residential homes in the Vandergrift and Leechburg areas and 5 surface water and sediment samples from the Kiskiminetas River. All samples will be analyzed through the EPA Contract Laboratories Program (CLP), Routine Analytical Services (RAS) for Target Analyte List (TAL) Metals, plus mercury and uranium, volatile organic compounds (VOCs), gross alpha/beta, gamma spec, and radium 226/228.

Non-sampling data collection activities scheduled will include identification of sensitive environments including the delineation and characterization of wetlands; verification of surface water diversions; verification of fishery use along stream courses; identification of the recreational use of source areas and surface water courses; identification of residences proximal to source areas; photographic documentation; and Global Positioning System (GPS) sample station locations.

SECTION 2
OBJECTIVES

The purpose of this SI is to gather information for the evaluation of this Site with regard to the EPA's HRS criteria. The specific objectives of this SI are:

- Determine if contamination exists in the groundwater of the Parks Township Area;
- Determine if contamination exists in the surface water and/or sediment of the Kiskiminetas River;
- Define the Groundwater Pathway and Surface Water Pathway in the Parks Township area;
- Evaluate contaminant migration through the Surface Water Pathway;
- Evaluate the impact on groundwater and surface water receptor targets.

SECTION 3
BACKGROUND INFORMATION

3.1 SITE LOCATION AND DESCRIPTION

The area of concern (AOC) "Site" primarily encompasses the residential area of the Community of Kiskimere in Parks Township, Armstrong County, Pennsylvania, as depicted in Figure 1: Site Location Map. It is located to the southwest of the Shallow Land Disposal Area (SLDA) and Parks Township Sites which are active remediation sites. The Site includes the residential neighborhood located to the south of the former SLDA Site, though properties outside of Kiskimere may also be included for collection of field and/or background groundwater samples. The SLDA is a 44-acre Site nuclear burial site undergoing cleanup in Parks Township, located approximately 23 miles east-northeast of Pittsburgh, Pennsylvania. The Parks Township site is undergoing remediation due in part to groundwater and soil contamination from the operation of a nuclear fuel facility. The Kiskiminetas River flows adjacent to these cleanups and communities, along the southwest border. The Kiskiminetas River is formed at Saltsburg, on the border between Westmoreland and Indiana Counties, by the confluence of the Conemaugh River and Loyalhanna Creek. It flows northwest, past Kiskimere, in a meandering course until it joins the Allegheny River, approximately eight miles downstream from Kiskimere. The Kiki-Conemaugh watershed includes much of the historical coal-producing region of Western Pennsylvania. There are two major streams, Dry Run and Carnahan Run that flow from the AOC into the Kiskiminetas River.

3.2 SITE HISTORY

The Site is located directly to the south of the former SLDA Site. The former SLDA Site was used for disposal of radioactive waste generated by the Nuclear Materials and Equipment Company (NUMEC) between 1961 and 1970. NUMEC operated the nearby Apollo nuclear fuel fabrication facility beginning in the late 1950s to convert enriched uranium to naval reactor fuel. In 1957, the Nuclear Materials and Equipment Company (NUMEC) initiated small-scale production of high- and low-enriched uranium and thorium fuel in Apollo, Pennsylvania. The Apollo facility was located approximately 2.5 miles (4 kilometers) south of the SLDA site. Waste from this facility was disposed of in 10 trenches at the SLDA in accordance with the United States Atomic Energy Commission (AEC) regulation in effect at the time, 10 CFR 20.304 (this regulation was rescinded

in 1981). In 1970, NUMEC discontinued use of the SLDA for radioactive waste disposal. In 1971, the Babcock & Wilcox Company (B&W) acquired NUMEC. In 1997, BWX Technologies, Inc. (BWXT) assumed ownership of the SLDA as well as the Apollo and Parks properties. Until 1995, the SLDA Site was included under a license issued by the United States Nuclear Regulatory Commission (NRC) for the adjacent Parks nuclear fuel fabrication facility (Spent Nuclear Material [SNM]-414). In 1995, to facilitate the decommissioning of the Parks facility, the SLDA Site was issued a separate license (SNM-2001). BWXT is the current licensee for the SLDA Site and is responsible for compliance with the terms and conditions of NRC License SNM-2001.

The United States Army Corps of Engineers (USACE) conducted an investigation of the radiological contamination at the SLDA site consistent with guidance issued by the EPA. The results of these investigations are presented in a Remedial Investigation (RI) report, which was issued in October 2005. To support preparation of the RI report, USACE conducted a number of field investigations from August 2003 through January 2004 to determine the nature and extent of radioactive contamination at the SLDA Site. These field investigations were conducted in accordance with field sampling plans that were provided to the Pennsylvania Department of Environmental Protection (PADEP) and NRC, and were discussed with local regulatory agencies prior to implementation. All input received from these oversight agencies was reflected in the characterization process. Prior to this fieldwork, in-depth historical record searches and analyses were conducted, and detailed interviews performed with individuals familiar with disposal operations at the SLDA. In conducting the RI, USACE collected samples from surface and subsurface soils, trench waste, the five water-bearing geologic units, sediment, surface water, and groundwater seeps. This sampling program indicated that surface water and sediment in Carnahan Run were uncontaminated, while low levels of radioactive contamination were present at on-site locations in Dry Run and groundwater seeps in the upper trench area. This indicated that the radioactive wastes in the trenches may be impacting on-site surface water and sediment in Dry Run. Such impacts were not noted at off-site locations. Groundwater at the SLDA Site, outside of perched areas within the trenches, did not appear to be contaminated, other than some localized areas in the upper trench area in the upper shallow bedrock water-bearing zone downgradient of disposal trenches 1 and 2. Some low levels of contamination were identified at this location, which may have been associated with the radioactive wastes in these two trenches. In summary, the

contaminated media identified at the SLDA Site were the trench wastes, surface and subsurface soils, and sediment in Dry Run.

Residents from both the Community of Kiskimere and its adjacent neighboring towns (Vandergrift and Leechburg), have contacted EPA and expressed concern that their well water may have been and may currently be contaminated by leachate from the disposed materials at the SLDA and Parks Township clean-up Sites. EPA is investigating these concerns and is proceeding with collection of groundwater samples from residential homes that currently use well water and are located in the vicinity of the nearby cleanups. In addition, EPA is investigating the impact of the materials that were disposed of at the SLDA Site on the Kiskiminetas River.

3.3 SITE CHARACTERISTICS

Physical Geography

The Site is located on a hillside near the Kiskiminetas River which slopes from the southeast to the northwest. Obtained through field instrumentation during the Site Reconnaissance conducted by TechLaw on July 15, 2011, topographic relief at the site ranges from approximately 942 feet above mean sea level (MSL) in the southeast to about 820 feet above MSL in the northwestern portion of the Site, which includes the bank of the Kiskiminetas River. There is an elevation change of approximately 122 feet from the highest residential location in Kiskimere to the Kiskiminetas River.

Geology

The Site is located southwest of the glaciated area of the state in the central portion of the Pittsburgh Low Plateau Physiographic Section of the Appalachian Plateau Physiographic Province. This region is characterized by rolling upland surfaces cut by numerous, narrow, relatively shallow valleys. The near-surface geologic units in the region are Pennsylvanian in age and belong to the Allegheny and Conemaugh groups, which lithologically consist of cyclic sequences of sandstone, siltstone, shale, claystone, and coal. The basal sandstones and shales are interpreted as river and delta deposits, whereas the coals formed in coastal swamps and the limestones formed in either shallow marine or freshwater swamps. Facies and lithologic changes occur rapidly in both horizontal and vertical directions. Mines located in Armstrong County

extract Allegheny Group coals; the upper-most coal member of the sequence is the Upper Freeport Coal. (USACE, 2005)

Bedrock Lithology

The subsurface bedrock lithology includes a series of interbedded horizontal sedimentary rocks including sandstone, siltstone, claystone, coal, and shale. Beneath the unconsolidated overburden at the site, weathered bedrock with a clayey matrix including bedrock fragments and weathering products may be inconsistently present across the site. The weathered zone may form a confining unit that limits downward percolation of groundwater by plugging the rock fractures in the upper portion of the bedrock. Beneath the weathered zone, sequences of alternating bands of siltstone, claystone, fine sandstone, and shale may be present. (USACE, 2005)

Bedrock Stratigraphy

The bedrock units lying above the Upper Freeport Coal at the Site belong to the Conemaugh Group (Glenshaw Member). The Allegheny Group exists beneath the Conemaugh formation and the top of this formation includes the Freeport member which in turn includes the shale directly above the coal, the Upper Freeport coal, and the claystone (underclay) beneath the coal. The bedrock units beneath also belong to the Allegheny Group and include the Butler and Freeport Sandstones. (USACE, 2005)

Hydrogeology

Regionally, drainage basins tend to be small with marked relief, which in conjunction with a humid climate generally produce a three-part groundwater system. The local or shallow flow system underlies hills and discharges to streams and springs and may in some cases be perched above beds of lower permeability. The hills may be considered "hydrologic islands" where discrete localized groundwater flow systems exist. The intermediate flow system is recharged by the shallow systems and recharge generally occurs at or near the drainage basin divide. Flow may pass below the two or more hydrologic islands and discharge in valleys above the lowest level of the drainage basin. The regional flow systems are deep flow systems with groundwater flow occurring beneath the level of the shallow and intermediate flow systems. These groundwater

systems operate independently of the other systems but receive recharge from major drainage divides and from the upper systems. (USACE, 2005)

Five principal hydrogeologic units have been identified during previous investigations:

- The overburden materials lying immediately over the weathered bedrock;
- The first shallow bedrock consisting of interbedded siltstone, sandstone, and shales;
- The second shallow bedrock consisting of similar interbeds as in the first shallow bedrock, but with slightly lower hydraulic conductivity;
- The Upper Freeport coal (including the mine workings); and
- The deep bedrock beneath the mine, consisting of siltstone and shale interbeds generally beneath the mine workings and gradually transitioning into sandstones at deeper depths.

(USACE, 2005)

Two short, unnamed streams flow from the Community of Kiskiminetas downgradient into the Kiskiminetas River. These streams were identified during the Site Reconnaissance that was conducted by TechLaw, Inc. on July 14, 2011. The Community of Kiskiminetas borders River Road, which directly borders the banks of the Kiskiminetas River. The Kiskiminetas River flows in a northerly direction, at a mean annual rate of 3,100 ft3/sec, and enters the Allegheny River eight miles northwest of the Site.

Soils

The soils in the vicinity of the site belong primarily to the Allegheny and Rainsboro series. Whereas the Allegheny soils generally occur on gently or sloping terrain, the Rainsboro soils are most often terrace deposits. Both series are described as silt loam and are moderately drained. These soils are formed from material weathered from the interbedded shale, siltstone, and sandstone parent rock. Depth to bedrock for both soil series is described to be generally greater than six feet. (USACE, 2005)

The Site has a combination of the Allegheny silt loam (AlB) and the Rainsboro silt loam. The Allegheny silt loam (AlB), which has 3-8 percent slopes; is a deep, well-drained, gently sloping soil on terraces which is formed in loamy alluvium derived from sandstone, siltstone, and shale.

The Rainsboro silt loam, which is a deep, moderately well drained, nearly level to sloping soil on undulating to rolling stream terraces, is formed in underlying loamy sediment that commonly grades to sandy or gravelly material. (USACE, 2005)

Meteorology

Armstrong County is situated along the northern border of the Southwest Plateau climatic division where the climate is humid continental. Most weather systems that affect this area develop in the Central Plains or Midwest and are driven eastward by the prevailing winds. Cold air comes down from Canada to the north and warm air and moisture comes mainly from the Gulf of Mexico to the south.

Based on Ford City, PA records, Armstrong County receives an average of 39.6 inches (101 centimeters) of precipitation (equivalent rainfall) annually, including 40.1 inches (102 centimeters) of snow. The average daily maximum temperature is 61°F and the average daily minimum is 37°F. The highest and lowest temperatures on record are 98°F and - 23°F, respectively. The National Oceanographic and Atmospheric Agency (NOAA) weather station located in Pittsburgh indicates Pittsburgh receives an average of 37.85 inches (96 centimeters) of precipitation (equivalent rainfall) annually, including 43.0 inches (109 centimeters) of snow (NOAA website 2004). The annual average maximum wind speed was reported to be 58 miles per hour (mph) (93 kilometers per hour) and the average wind speed as 9.0 mph (15 kilometers per hour) at this station.

SECTION 4
PRELIMINARY PATHWAY ANALYSIS

4.1 SOURCE CHARACTERIZATION

No sample data to date is available for the drinking water/groundwater in the Kiskimere/Parks Township Area. There is no known contamination in the drinking water/groundwater at the Site. Therefore, a source area for the Site is unknown.

4.2 GROUNDWATER PATHWAY

The hydraulic gradient in the shallow bedrock is in the direction of Dry Run, adjacent to and to the north-northeast of the SLDA, and away from the Community of Kiskimere. There are groundwater seeps along Dry Run, where groundwater from the upper trench area drains. Groundwater flow and storage in the shallow bedrock layer is primarily in secondary features such as fractures, joints, and dissolution cavities.

Although municipal water supply is available in the nearby community of Kiskimere, records indicate that there are at least five residential wells there (ARCO, 1995). These residential wells are believed to be screened in the Glenshaw Formation, above the Freeport Coal Seam and their status is unknown. Although these wells are located upgradient of the SLDA with respect to groundwater flow in the shallow bedrock zones, it is unknown what aquifer the wells of the Community of Kiskimere draw groundwater from. An inventory of wells within approximately 1.2 miles of the SLDA show groundwater for domestic use to be obtained also from wells screened below the Upper Freeport coal seam (ARCO, 1995). The exact number of drinking water wells that are present and/or in use is unknown. Municipal drinking water is available to the residents of the community of Kiskimere.

4.3 SURFACE WATER PATHWAY

The principal surface water feature at the Site is the Kiskiminetas River. There are two unnamed runoff streams that flow from the Community of Kiskimere, downgradient into the Kiskiminetas River. These runoff streams were identified both as a Probable Point of Entry (PPE). The

distance from the downstream PPE to the confluence of the Kiskiminetas and Allegheny Rivers is eight miles.

The following information was obtained from the 2008 Safe Drinking Water Information System (targeting all water surface intakes within 15 miles of the Site):

[redacted]

4.4 SUBJECT PROPERTY HISTORICAL USE INFORMATION

The Community of Kiskimere is located directly adjacent (in a southern direction) to the SLDA Site. Some of the residences are located within 100 feet of the SLDA Site. By observation during the July 15, 2011 Site reconnaissance, all of the residences in the community of Kiskimere appear to be inhabited. There is a children's playground at the southeastern edge of the community. No industries were observed in the area.

Figure 3: 4-mile Distance Ring Map, depicts target distance rings up to four miles from the center of the Site, which was chosen as the intersection of Johnson and Eisenhower Streets.

The following table shows population density within a four-mile radius of the Site (U.S. Census Bureau 2000):

TABLE 1
Population Density within 4 Mile Radius

Radius	Population
0 - 0.25	52
0.25 - 0.50	134
0.50 - 1.0	1,523
1.0 - 2.0	11,888
2.0 - 3.0	7,744
3.0 - 4.0	5,298
Total Population	**26,639**

SECTION 5
DATA QUALITY OBJECTIVES PROCESS

5.1 EPA DQO PROCESS

The EPA DQO Process is a seven-step systematic planning approach to develop acceptance or performance criteria for EPA-funded projects. The seven steps of the DQO process are:

Step 1 The Problem Statement;
Step 2 Identifying the Decision;
Step 3 Identifying the Decision Inputs;
Step 4 Defining the Study Boundaries;
Step 5 Developing a Decision Rule;
Step 6 Defining Tolerance Limits on Decision Errors; and
Step 7 Optimizing the Sample Design.

These DQOs were developed by TechLaw based on historical Site information and reports prepared by the USACE concerning the SLDA Site. During a Site reconnaissance conducted by TechLaw, Inc. on July 14, 2011, the project team identified groundwater as the primary pathway of potential concern at the Site.

TABLE 2
Data Quality Objectives Seven-Step Planning Approach

Step 1 Problem Statement	Step 2 Identifying the Decisions	Step 3 Decision Inputs	Step 4 Study Boundaries	Step 5 Decisions Rules	Step 6 Tolerance Limits on Errors	Step 7 Optimization of Sample Design
Based upon the available information and history of the past and present environmental clean-up sites in the area, the ground water pathway is the primary pathway of concern at the site. Prior sample collection data from the past and present clean-up sites in the area confirmed elevated levels of metals, volatile organics, and radionuclides, including radium, and uranium.	Identification of contaminants of concern at levels that exceed EPA's Drinking Water Standards in the groundwater of the site to evaluate risk to human receptors.	As many as 49 field samples will be collected from the Site and study area in order to characterize contamination. These samples will potentially include as many as five surface water and five collocated sediment samples that will be collected from the Kiskiminetas River. Two sediment samples will be collected from Carnahan Run and Lee Lake. As many as 37 samples will be collected from residential homes whose residents use well water as a drinking water source. All samples will be analyzed for: TAL metals, mercury, and total uranium; volatile organics; radium 226/228; gross alpha and beta; and gamma spec. Analytical results will be compared to site specific background samples and EPA Maximum Contaminant Levels. Additional benchmarks and regulatory levels may also be used once analytical results are reviewed.	The site located just southwest of the SLDA Site and can be accessed by Kiskimere Road. Additional residents who use well water as their drinking water source will be included in the study boundary. These residents are located in the Vandergrift and Leechburg Areas.	Analytical results for each sample will be directly compared to site specific background samples in addition to surface water or soil/sediment benchmarks as appropriate. The EPA and other appropriate agencies and their representatives will work together to evaluate the site data obtained during field activities to determine if additional information is required to characterize the site or migration of the waste from the Site.	Judgmental sampling practices will be used during the SI sampling event. There are very few data upon which to construct a statistically based sampling design. Limits on sampling, measurement, and decision errors will be minimized by using standard field and laboratory operating procedures, collecting an appropriate number of quality control samples, meeting standard holding times, and ensuring that samples are representative of site conditions. If possible, sample locations will be biased to collect information from areas with the greatest potential for contamination. Sampling activities will adhere to the Sampling and Analysis Plan. Unless specified otherwise by the EPA task monitor, all data will be validated in accordance with CLP National Functional Guidelines to document data quality.	Sample locations and sampling frequency may be modified in the field by the EPA WAM, TechLaw Project Manager, or the leader of the field sampling crew based on their understanding of known environmental conditions and additional information obtained during field activities.

SECTION 6
FIELD PROCEDURES

6.1 CONCEPT OF OPERATIONS

Schedule

Field work is scheduled for August 30, 2011, through August 31, 2011. Sampling is estimated to be completed in approximately two days. Non-sampling data collection will be performed as appropriate. Sample packaging and shipping to the designated laboratories for analysis will be conducted in TechLaw's office in Wheeling, WV.

Collection of groundwater from a residential well takes approximately 45-90 minutes, in consideration of travel time, an attempt to achieve stabilization of water parameters, and actual collection of the sample. Therefore, it is estimated that one sampling team can collect approximately six groundwater samples per day. The proposed schedule for sample collection is projected as follows:

Table 3

Schedule for Sampling Activities

Task Description	Start Date	End Date
Teams 1, 2, and 3: Mobilize to Site	8/30/11	8/30/11
Team 1: Collection of surface water and sediment (weather pending)	8/30/11	8/30/11
Team 1: Collection of groundwater	8/31/11	8/31/11
Team 2: Collection of groundwater	8/30/11	8/31/11
Team 3: Collection of groundwater	8/30/11	8/31/11
Teams 1, 2, and 3: Demobilize from Site	8/31/11	8/31/11
Sample Packaging and Shipping	8/30/11	9/1/11

Safety

EPA approved, or TechLaw Standard Operating Procedures (SOPs), will be utilized whenever possible. TechLaw will conduct all field activities as described in TechLaw's Site-Specific health and safety plan (HASP), which will be completed prior to the sampling investigation. Sample collection activities will be conducted in Level D personal protective equipment (PPE). Radiation detection equipment will be utilized during all sample collection activities, also as described in the HASP. Field personnel will wear dosimeter badges in accordance with TechLaw's corporate health and safety procedures.

Site Logistics and Access

EPA WAM Lisa Johnson, will provide overall direction to TechLaw (START) staff concerning project sampling requirements, objectives, and schedule. START Site Leader [redacted] is the primary point of contact with the EPA WAM. The Site Leader is responsible for the development and completion of the Sampling QA/QC Work Plan, project team organization, and supervision of all project tasks, including reports and deliverables. The following TechLaw personnel will work on this project:

Personnel	Responsibility
[redacted]	Site Leader (Team 1)/Environmental Engineer
[redacted]	Sample Collection (Team 1)/Sampling Coordinator
[redacted]	Sample Collection (Team 2)/Chemist
[redacted]	Sample Collection (Team 2)/Field Technician
[redacted]	Sample Collection (Team 3)/Environmental Scientist
To Be Determined	Sample Collection (Team 3)/Field Technician

EPA has obtained access to over 34 homes in the Parks Township Area (14 from Vandergrift, 5 from Leechburg, and 15+ from Kiskimere) for collection of groundwater samples.

All surface water and sediment samples will be collected from locations along the Kiskiminetas River. EPA will coordinate access for collection of these samples from Parks Township Officials.

6.2 SAMPLE LOCATIONS

EPA has access to collect groundwater samples from over 34 residential homes, to date. Five of these homes are located along Hungry Hollow Road, which is approximately 1.26 miles from the Site. The elevation of the homes located along Hungry Hollow Road is approximately 827 feet, which is similar to that of the residence located at 1118 Kiskimere Road. The residents along Hungry Hollow Road and the resident at 1118 Kiskimere Road claim that their well depths are approximately 40 feet. Therefore, background groundwater samples will be chosen from two of the five residences along Hungry Hollow Road. The two background locations will be determined by EPA on-Site during the sampling event, through observation of the wells and in consideration of access to the wells. Determination of the well locations in Kiskimere that will be sampled will also be conducted by EPA on Site, following investigation of current well use, proximity of the wells to each other, and access to the wells' water. The proposed total number of groundwater samples to be collected during the sampling event is 31, plus four duplicate samples and two field and trip blank samples, where appropriate.

A total of six surface water and sediment samples (including one duplicate sample and one field and trip blank sample, when appropriate) will be collected from the Kiskiminetas River. The locations of the samples were chosen upstream of the Site (background location), downstream of the Site, and at two PPEs.

All sample points will be located using a GPS device during sample collection. In addition, each sample location will be marked with a survey flag and numbered appropriately. The proposed locations for collection of all of these samples, with the exclusion of those groundwater samples that are sought in the Kiskimere area, as depicted in Figure 2, Proposed Sample Location Map. Samples will be collected to help characterize the Site and study area.

6.3 SAMPLING METHODS

Groundwater Sampling

Collection of groundwater from residential homes will be done in a tiered approach. The preferred sample collection method will be conducted first, if possible. If the primary approach is not possible, the secondary sample collection will be used as follows:

- Primary Sample Collection Method: The residential groundwater will be collected from a spigot located in closest proximity to the well. This could include a spigot directly on the well head, or a spigot located at the exterior of the home (hose faucet, etc.). This method will exclude collection of water that has been passed through potential water softeners, chlorinators, etc.
- Secondary Sample Collection Method: The residential groundwater will be collected from a spigot inside the home. If there are treatment systems located between the well and the spigot, they will be investigated and documented appropriately to determine any contaminants that could potentially enter the water supply.

Prior to collecting the water sample, the outlet will be opened to allow purging of the well water. Water quality parameter measurements will be recorded in the field logbook at approximate 3-5 minute intervals using a water quality meter to determine when parameters stabilize. Stabilization is achieved after all parameters have stabilized for three consecutive readings using the following criteria:

pH $\pm$ 0.1 unit
Conductivity $\pm$ 3%
Redox $\pm$ 10 mv
Temperature $\pm$ 3%

Following parameter stabilization, the water sample will be collected directly into laboratory certified pre-cleaned sample bottles as specified in Table 2. In the event that the water parameters do not stabilize, the sample will be collected following 15 minutes of purging. TechLaw will utilize pH paper to ensure that the pH requirements are met for all samples that require preservation. The analyses to be conducted on the ground water samples are summarized in Table 1. All samples will be placed in a cooler at 4+/-2°C.

During collection of well water samples, every attempt will be made to identify the formation that the drinking water is obtained from. If the residents' wells are open or are able to be opened, water tape will be utilized to identify depths of the groundwater in

each well. Water quality parameters will be recorded. In addition, global positioning system (GPS) equipment will be used to record the exact locations of the wells. All groundwater sample locations will be photographed and documented.

Surface Water Sampling

Four surface water samples will be collected from locations in the waterway of the Kiskiminetas River. One of the samples will be collected from a location upstream of the Site, which will be designated as a background samples. One of the samples will be collected from a location downstream of the Site. Two of the samples will be collected at locations adjacent to the Kiskimere area, where surface runoff pathways were visually observed to originate from the Site area and flow into the Kiskiminetas River. A duplicate sample will be collected from one of these four locations. A field blank sample will be collected using laboratory certified deionized water for all analyses. Both a field and trip blank will be collected using laboratory certified deionized water for VOC analysis.

The surface water samples will be collected directly into laboratory certified pre-cleaned sample bottles as specified in Table 2. TechLaw will utilize pH paper to ensure that the pH requirements are met for all samples that require preservation. The analyses to be conducted on the surface water samples are summarized in Table 1. All samples will be placed in a cooler at 4+/-2°C.

Sampling will be conducted from the farthest downstream location to the farthest upstream location to minimize the potential for cross contamination. All surface water sample locations will be photographed and documented during sampling activities. GPS equipment will be used to document the locations of the surface water samples. If wetlands are observed in the field, they will be assessed to determine if they meet the 40 CFR 230.3 Definition of a Wetland; this information will be entered into the log book.

Sediment Sampling

As many as seven sediment samples will be collected from the site and study area. Five of the sediment sampling locations will correspond to the five surface water sampling locations. An additional two sediment samples will be collected during the sampling event; one from Carnahan

Run and one from Lee Lake. Sediment sampling will be conducted using factory-sealed plastic spoons. Sediment sampling will be conducted with surface water sampling and will occur after the surface water sample has been collected, proceeding from the most downstream location to the most upstream location. All sediment sample locations will be photographed and documented during sample activities. GPS equipment will be used to document the locations of the sediment samples. In addition, survey flags will be placed at the sediment sample locations and labeled appropriately.

6.4 CONTROL OF CONTAMINATED MATERIALS

Sample collection of residential well water may require collection of purge water into 5-gallon buckets. Collection of purge water will be required if collection of well water is conducted at a tap on or near the well head(s). Collection of purge water will not be required if collection of well water is conducted at a spigot inside the home. The purge water generated from the sampling event will be held until analytical data is received to determine appropriate disposal methods.

Disposable personal protective clothing and sampling equipment generated during field activities will be cleaned by physical removal of potentially contaminated soil, rendered unusable by tearing (when appropriate), bagged in plastic garbage bags, and disposed of as dry industrial waste.

6.5 ANALYTICAL PARAMETERS AND REQUIREMENTS

Sample Parameters and Quantities

The following table lists the analytical parameters, matrices, and QC sample summary for this project:

Table 4

Sample Parameters and Quantities

Parameter (Method)	Detection Limit	Matrix	Field Samples	Bkgd	QC Sample Summary					Total Field and QA/QC Analyses (not including MS/MSD)
					Dup	Trip[1] Blanks	Rinsate[1,2] Blanks	Field[1] Blanks	MS/MSD	
TAL Metals + Hg + U (CLP ISM01.2 ICP-AES/ M.A. for U)	CRQLs/ 1 pCi/g for U	Sediment	5	1	1	0	0	0	1	7
TCL VOA (SOM01.2)	CRQLs	Sediment	5	1	1	1	0	0	0	8
Radium-226 (903.1)	1 pCi/g	Sediment	5	1	1	0	0	0	1	7
Radium-228 (904.0)	1 pCi/g	Sediment	5	1	1	0	0	0	1	7
Gamma Spec (901.1)	1 pCi/g	Sediment	5	1	1	0	0	0	1	7
Gross Alpha/Beta (900.0)	1 pCi/g/ 1 pCi/g	Sediment	5	1	1	0	0	0	1	7
TAL Metals + Hg + U (CLP ISM01.2 ICP-MS/ M.A. for U)	CRQLs/ 1 pCi/L	Surface Water	3	1	1	0	0	1	1	6
TCL Trace VOA (SOM01.2)	CRQLs	Surface Water	3	1	1	1	0	1	0	7

Parameter (Method)	Detection Limit	Matrix	Field Samples	Bkgd	QC Sample Summary					Total Field and QA/QC Analyses (not including MS/MSD)
					Dup	Trip[1] Blanks	Rinsate[1,2] Blanks	Field[1] Blanks	MS/MSD	
Radium-226 (903.1)	1 pCi/L	Surface Water	3	1	1	0	0	1	1	6
Radium-228 (904.0)	1 pCi/L	Surface Water	3	1	1	0	0	1	1	6
Gamma Spec (901.1)	1 pCi/L	Surface Water	3	1	1	0	0	1	1	6
Gross Alpha/Beta (900.0)	3 pCi/L/ 4 pCi/L	Surface Water	3	1	1	0	0	1	1	6
TAL Metals + Hg + U (CLP ISM01.2 ICP-MS/ M.A. for U)	CRQLs/ 1 pCi/L for U	Groundwater	31	2	4	0	0	2	2	39
TCL Trace VOA (SOM01.2)	CRQLs	Groundwater	31	2	4	2	0	2	2	41
Radium-226 (903.1)	1 pCi/L	Groundwater	31	2	4	0	0	2	2	39
Radium-228 (904.0)	1 pCi/L	Groundwater	31	2	4	0	0	2	2	39
Gamma Spec (901.1)	1 pCi/L	Groundwater	31	2	4	0	0	2	2	39
Gross Alpha/Beta (900.0)	3 pCi/L/ 4 pCi/L	Groundwater	31	2	4	0	0	2	2	39

Notes: 1. This QA sample will be an aqueous matrix.
2. Sample to be collected only if non-dedicated sampling equipment is used.

KEY:

CLP = Contract Laboratory Program.
Dup = Duplicate
EPA = Environmental Protection Agency
GC = Gas Chromatograph
Hg = mercury
ICP AES = Inductively Coupled Plasma Atomic Emission Spectrometry
ICP MS = Inductively Coupled Plasma Mass Spectrometry
ILM = CLP statement of work (SOW) for Inorganics, Low to Medium concentration
MS = Mass Spectrometer
MS/MSD = Matrix spike/matrix spike duplicate.
QA/QC = Quality assurance/quality control.
SOW = Statement of Work
TAL = Target Analyte List
TCL = Target Compound List
U = uranium

Sample Preservation and Holding Times

Sample parameters and methods, holding times, sample containers, and preservation requirements are summarized in the following table:

Table 5

Sample Preservation and Holding Times

Analytical parameter and Method	Matrix	Sample Preservation	Holding Time	Sample Container (s)
TAL Metals+Hg+U (CLP ISM01.2 ICP-AES/ M.A. for U)	Sediment	Ice, 4°C	180 days; 28 days Hg;	One 8-oz cwm jar
TCL VOA (SOM01.2)	Sediment	Ice, 4°C	14 days 4-oz cwm jars.	Four 4-oz jar with septa cap
Radium-226 (903.1))	Sediment	Ice, 4°C	180 days	One 8-oz cwm jar*
Radium-228 (904.0)	Sediment	Ice, 4°C	180 days	One 8-oz cwm jar*
Gamma Spec (901.1)	Sediment	Ice, 4°C	180 days	One 8-oz cwm jar*
Gross Alpha/Beta (900.0)	Sediment	Ice, 4°C	180 days	One 8-oz cwm jar*
TAL Metals+Hg+U (CLP ISM01.2 ICP-MS/ M.A. for U)	Surface Water	HNO_3 pH$\leq$ 2, Ice, 4°C	180 days; 28 days Hg	One 1-Liter HDPE*
TCL VOA (SOM01.2)	Surface Water	HCl, pH$\leq$ 2, Ice, 4°C	14 days	Three 40-ml vials
Radium-226 (903.1))	Surface Water	HNO_3 pH$\leq$ 2, Ice, 4°C	180 days	One 1-Liter HDPE*

Analytical parameter and Method	Matrix	Sample Preservation	Holding Time	Sample Container (s)
Radium-228 (904.0)	Surface Water	HNO_3 pH≤ 2, Ice, 4°C	180 days	One 1-Liter HDPE*
Gamma Spec (901.1)	Surface Water	HNO_3 pH≤ 2, Ice, 4°C	180 days	One 1-Liter HDPE*
Gross Alpha/Beta (900.0)	Surface Water	HNO_3 pH≤ 2, Ice, 4°C	180 days	One 1-Liter HDPE*
TAL Metals+Hg+U (CLP ISM01.2 ICP-MS/ M.A. for U)	Groundwater	HNO_3 pH≤ 2, Ice, 4°C	180 days;	One 1-Liter HDPE*
TCL Trace VOA (SOM01.2)	Groundwater	HCl, pH≤ 2, Ice, 4°C	14 days	Three 40-ml vials
Radium-226 (903.1))	Groundwater	HNO3 pH< 2, Ice, 4°C	180 days	One 1-Liter HDPE*
Radium-228 (904.0)	Groundwater	HNO3 pH< 2, Ice, 4°C	180 days	One 1-Liter HDPE*
Gamma Spec (901.1)	Groundwater	HNO3 pH< 2, Ice, 4°C	180 days	One 1-Liter HDPE*
Gross Alpha/Beta (900.0)	Groundwater	HNO3 pH< 2, Ice, 4°C	180 days	One 1-Liter HDPE*

*One sample bottle may be used for multiple analyses dependent on laboratory requirements.

Key:

≤ = less than or equal to
°C = Degrees Celsius
CLP = Contract Laboratory Program
CWM = Clear wide mouth
EPA = Environmental Protection Agency
HCl = Hydrochloric Acid
HNO_3 = Nitric Acid
HDPE = High Density Polyethylene
ICP-AES = Inductively Coupled Plasma Atomic Emission Spectroscopy
ICP-MS = Inductively Coupled Plasma Mass Spectroscopy
N/A = Not Applicable
oz = ounce
pH = - Log $[H^+]$
TAL = Target Analyte List
TCL = Target Compound List
VOA = Volatile Organic Analysis

.

SECTION 7
QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

7.1 Quality Control of Field Activities

The START Site Leader is responsible for ensuring that sample quality and integrity are maintained in accordance with the QA/QC Procedures and that the sample labeling and documentation is performed as described in Section 8.2 of this sampling plan.

7.2 Sample Documentation

All sample documentation will be completed legibly using indelible black or blue ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing and dating the error.

Field Logbook

The use of field logbooks by START for site documentation will be consistent with TechLaw SOP 03-01-03 (2007), Maintaining a Field Logbook. The field logbook is a descriptive notebook detailing Site activities and observations so that an accurate account of field procedures can be reconstructed. All entries will be dated and signed by the individual making the entries, and include (at a minimum) the following:

1. Site name and project number.
2. Name(s) of personnel on site.
3. Dates and times of all entries (military time preferred).
4. Descriptions of all site activities, including site entry and exit times.
5. Noteworthy events and discussions.
6. Weather conditions.
7. Site observations.
8. Identification and description of samples and locations.

9. Subcontractor information and names of on-site personnel.
10. Date and time of sample collections, along with chain of custody information.
11. Record of photographs.
12. Site sketches.

Sample Labels/Tags

Sample labels and tags must clearly identify the particular sample. Required information for sample labels and tags is presented in *Contract Laboratory Program Guidance for Field Samplers*, EPA Publication 540-R-09-03, Final (January 2011) and is provided below.

Sample bottle labels must include the following information:

1. Sample number, as applicable;
2. Case No.;
3. Preservative(s);
4. Analysis/fraction.

Additional information may be included on the label, such as the Station Location (Sampler-assigned sample No.), date and time collected, etc.

Sample tags must include the following information:

1. Sample number, as applicable;
2. Case No.;
3. Station No. and/or Station Location No. (assigned by sampler);
4. Date sample was collected (month, day, and year);
5. Time sample was collected (in military time);
6. Preservative, if any (specify "None" if sample is not preserved);
7. Type of sample (grab or composite);
8. Analysis/fraction requested;
9. Sampler's names/signature(s);

Sample labels will be securely affixed to the sample container. Tie-on sample tags will be properly secured around the neck of the container.

Chain of Custody Record

Proper chain of custody will be maintained from the time the sample is collected to its final deposition. Every transfer of custody will be noted and signed. When samples (or groups of samples) are not under direct control of the individual responsible for them, they will be stored in a locked container sealed with a Custody Seal.

The Chain of Custody record/EPA Traffic Report (COC/TR) will include (at minimum) the following information:

1. Sample number, as applicable;
2. Case No.;
3. Sample matrices;
4. Specify sample type (grab or composite);
5. Analyses requested;
6. Laboratory turnaround time (TAT) [*Note: This does not include the TAT for data validation. If preliminary results (PR) are required, this must be specified on the COC*.)
7. Preservative(s);
8. Station location identifier (sampler assigned sample No.);
9. Date and time sample collected;
10. Field QC information (identify trip/field/blanks only as "Field QC");
11. Specify samples to be used for laboratory QC (MS/MSD);
12. Name(s) and signature(s) of sampler(s);
13. Signature(s) of any individual(s) with control over samples;
14. Carrier, air bill No., and date of the shipment.

Custody seals

Custody seals will be used on all shipping containers used to ship samples. Custody Seals demonstrate that a container has not been tampered with or opened. The individual shipping the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, will be noted in the field logbook. EPA Region III does not require custody seals on individual sample containers and has specifically directed samplers not to use custody seals on individual sample containers containing samples for volatile organics analysis (VOA).

7.3 Sample Packaging, Storage, and Shipping

In accordance with TechLaw SOP 04-02-01, Packaging and Shipping Procedures - Environmental Samples (2007), and *Contract Laboratory Program Guidance for Field Samplers*, sample containers will be labeled and shipped with a label and sample tag affixed to each container. Samples will be placed in plastic zipping bags. Bagged containers will be placed in appropriate transport containers and the containers will be packed with appropriate absorbent material and bubble wrap. All sample/traffic reports/COC documents will be affixed to the underside of each transport container lid. The lid will be sealed with shipping tape and custody seals affixed to the transport container. Transport containers will be labeled with the origin and destination locations.

Regulations for packaging, marking, labeling, and shipping of hazardous materials and wastes are promulgated by the U.S. Department of Transportation (DOT). Air carriers which transport hazardous materials, in particular, Federal Express, require compliance with the current International Air Transport Association (IATA) Regulations, which apply to the shipment and transport of hazardous materials by air carrier. TechLaw will follow IATA regulations to ensure compliance.

SECTION 8
MEASUREMENT OF QUALITY OBJECTIVES

8.1 FIELD QUALITY CONTROL PROCEDURES

Calibration of the pH, temperature, and conductivity meters will follow instrument manufacturers' instruction manuals. Sample collection will progress from downstream to upstream to prevent cross contamination.

All appropriate sampling equipment will be decontaminated prior to initial use. Basic decontamination will consist of washing or brushing gross particulate off sampling equipment with tap water and a scrub brush, followed by washing equipment with a solution of Liquinox® and distilled water, rinsing with distilled water, rinsing with methanol and/or nitric acid, and finally rinsing with distilled water.

The following samples will be collected to evaluate quality assurance at the site in accordance with the "Guidance for Performing Site Inspections under CERCLA," Interim Final September 1992, (EPA 1992):

- One duplicate aqueous sample per set of 20 aqueous samples collected. One will be required for this site; and

- Additional double and triple volumes of one sediment sample, one soil sample, and one aqueous sample will be collected and used for MS/MSDs (the MS/MSD samples will not be labeled as separate samples).

8.2 DATA QUALITY INDICATORS

Data quality assessment to determine data quality and usability will include:

- A QA/QC review of field generated data and observations;

- Individual data validation reports for all sample delivery groups;

- Review of the procedures used by the validator to qualify data for reasons related to dilution, reanalysis, and duplicate analysis of samples;

- Evaluation of QC samples such as, field blanks, trip blanks, equipment rinsates, field replicates, and matrix spike laboratory control samples to assess the quality of the field activities and laboratory procedures;

- Assessment of the quality of data measured and generated in terms of accuracy, precision, and representativeness; and

- Summary of the usability of the data, based upon the assessment of data conducted during the previous steps.

Quality attributes are qualitative and quantitative characteristics of the collected data. The principle quality attributes to environmental studies are precision, bias, representativeness, comparability, completeness, and sensitivity. Data quality indicators (DQIs) are specific indicators of quality attributes. Performance criteria for each DQI are documented below:

Bias

Bias is systematic or persistent distortion of a measurement process that causes errors in one direction. The extent of bias can be determined by an evaluation of laboratory initial calibration/continuing calibration verification, laboratory control spike/laboratory control spike duplicates, blank spike, MS/MSD, and method blank.

Sensitivity

Sensitivity generally refers to the capability of a method or instrument to discriminate between small differences in analyte concentration. Detection limits and project requirements will be compared in order to select a method with the necessary detection limits to meet the project goals. Data validation will include a review of final reporting limits to determine if matrix issues such as dilution and interferences have affected the end use of the data.

Precision

Precision is the measure of agreement among repeated measurements of the same property under identical, or substantially similar, conditions and is expressed as the relative percent difference (RPD) between the sample pairs. Overall sample precision will be monitored using a duplicate or replicate for each matrix. Acceptance criteria in RPD are: water ±20%, soil ±30%, and sediment ±35%.

Representativeness

Representativeness is the measure of the degree to which data accurately and precisely represent a characteristic of a population parameter, variations at a sampling point, a process condition, or an environmental condition. Representativeness will be achieved by adherence to TSOPs for sampling procedures, field and laboratory QA/QC procedures, appropriateness of sample location, and achieving the acceptance criteria laid out in the FSP.

Completeness

Percent completeness is calculated using the following formula: Percent Completeness = Number of Valid Measurements/ Number of Measurements Planned X 100. The actual percentage of completeness is less important than the effect of completeness on the data set. The effect of any non-valid data points on the end use of the data will be evaluated in the analytical results report.

Comparability

Comparability is used to describe how well samples within a data set, as well as two independent data sets, are interchangeable. Comparability will be controlled by collecting all samples in one sampling event adherence to the FSP. The impact to the end use of the data caused by deviations from the FSP or relevant weather events will be discussed in the analytical results report.

SECTION 9
DATA REPORTING

Analytical data for organic analyses generated under this Sampling QA/QC Work Plan will be evaluated in accordance with EPA *Region III Modifications to National Functional Guidelines for Organic Data Review Multi-Media, Multi-Concentration (OLMO1.0-OLMO1.9)* (September 1994) to Data Validation Level M2, and in accordance with *EPA Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (April 1993) at the IM2 Level. Validation for the analytical services subcontract arranged through TechLaw will be accomplished by an experienced TechLaw data validator.

SECTION 10
REFERENCES

U.S. Environmental Protection Agency (EPA). 1992. "Guidance for Performing Site Inspections Under CERCLA," Interim Final September 1992.

US Army Corps of Engineers (USACE). 2002. "Preliminary Assessment. Shallow Land Disposal Area, Parks Township, Armstrong County, Pennsylvania." March 11, 2002

US Army Corps of Engineers (USACE). 2005. "Remedial Investigation: Shallow Land Disposal Area" October, 2005

Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
Projection: Lambert Conformal Conic

TechLaw

TDD No. TL03-11-03-003
START Contract No. EP-S3-10-04

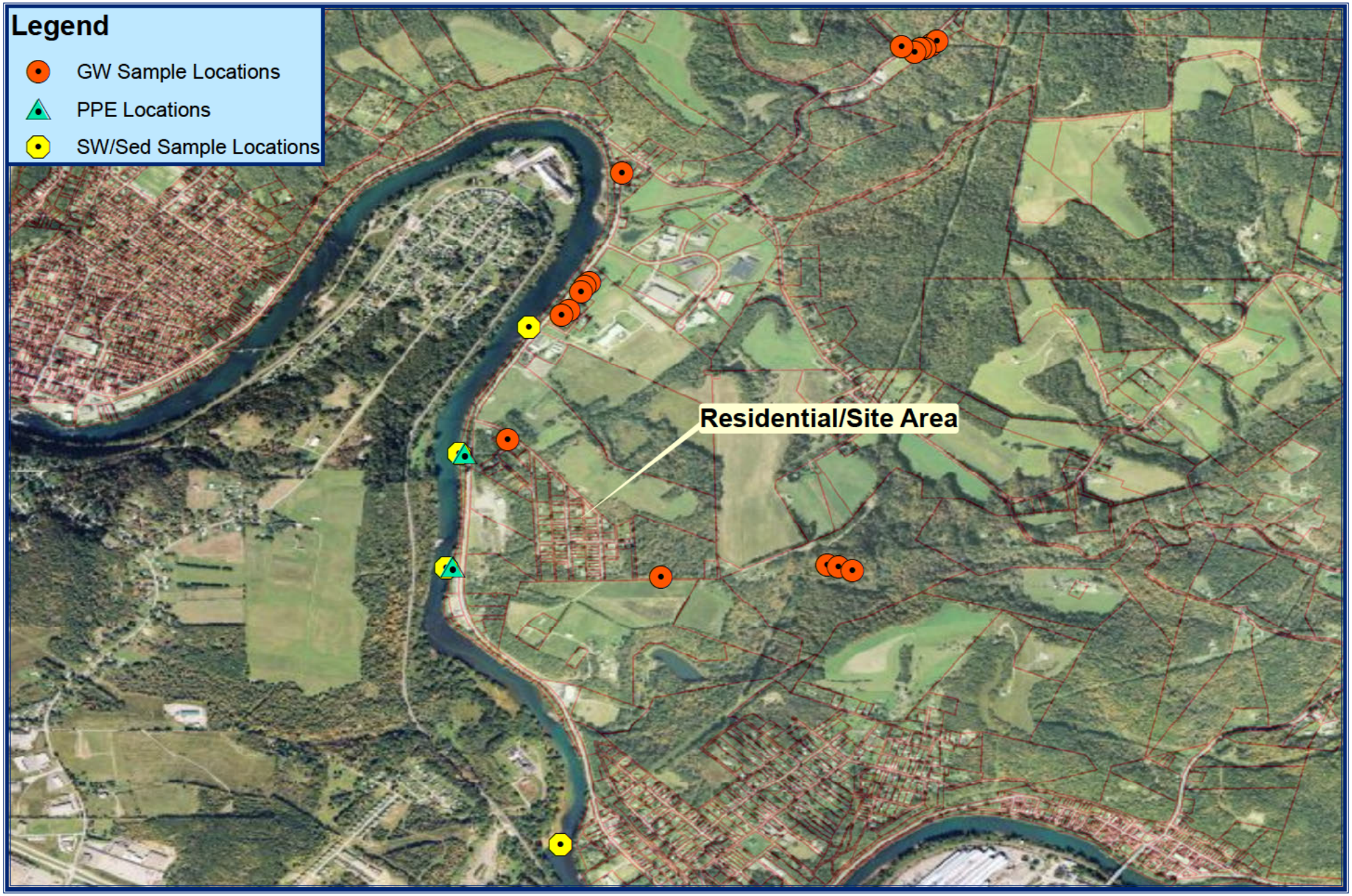
Figure 1: Site Location Map
Kiskimere Groundwater Well Investigation Site
Kiskimere, Armstrong County, Pennsylvania

0 650 1,300 2,600 Feet

Map By: WFH
Date Modified: 6/12/2011
Scale: 1:11,907

Source:
Bing Maps Online Services for ESRI - Bing Maps Aerial Layer

Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
Projection: Lambert Conformal Conic



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TDD No. TL03-11-03-003
START Contract No. EP-S3-10-04

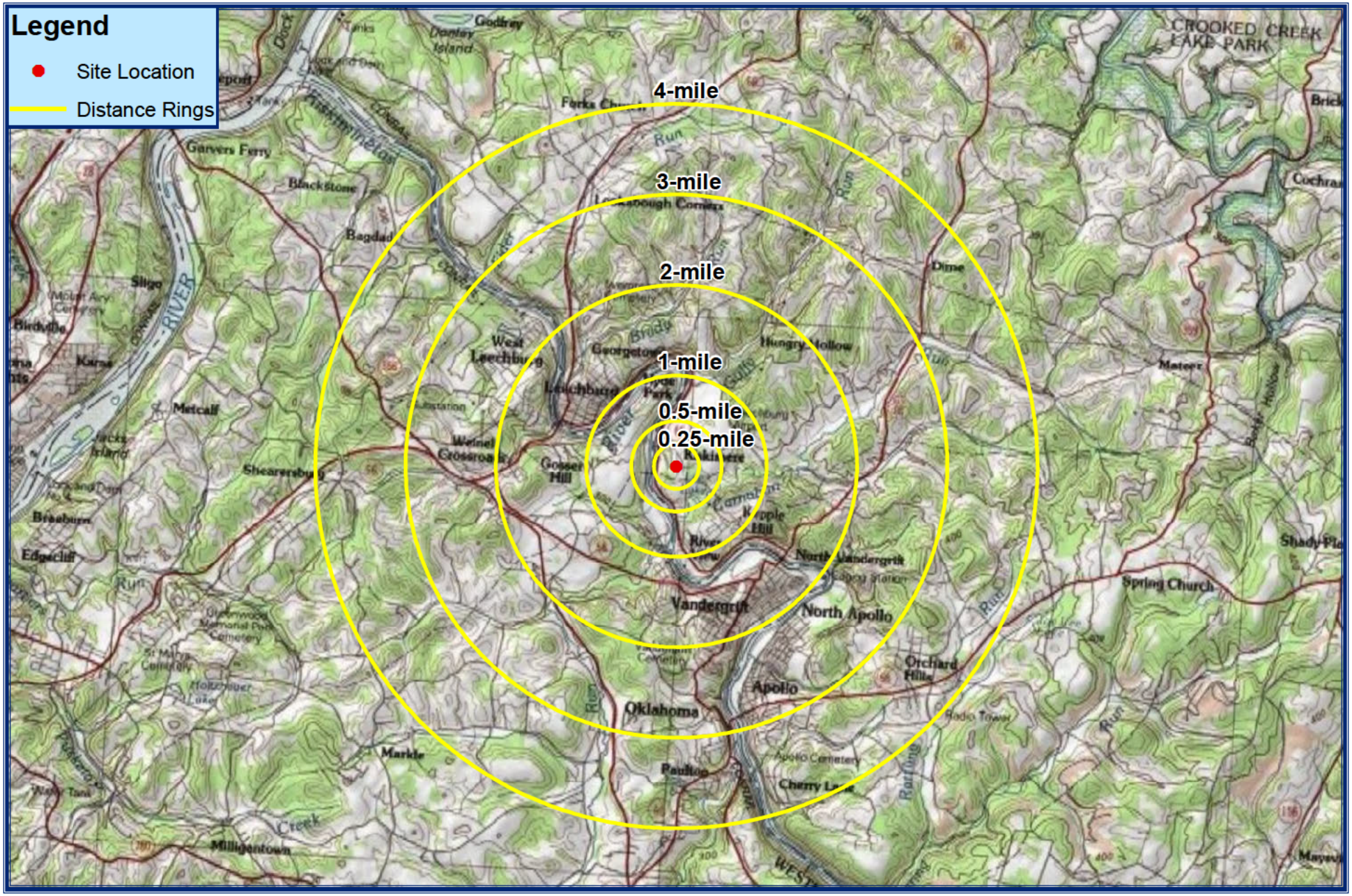
Figure 2: Proposed Sample Location Map
Kiskimere Groundwater Well Investigation Site
Kiskimere, Armstrong County, Pennsylvania

0 1,350 2,700 5,400 Feet

Map By: WFH
Date Modified: 7/15/2011
Scale: 1:24,251

Source:
Bing Maps Online Services for ESRI - Bing Maps Aerial Layer

Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
Projection: Lambert Conformal Conic



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TDD No. TL03-11-03-003
START Contract No. EP-S3-10-04

Figure 3: 4-mile Distance Ring Map
Kiskimere Groundwater Well Investigation Site
Kiskimere, Armstrong County, Pennsylvania

0 5,000 10,000 20,000 Feet

Map By: WFH
Date Modified: 7/15/2011
Scale: 1:93,739

Source:
Bing Maps Online Services for ESRI - USGS 100K Topographic Map Layer NGS_Topo_US_2D