January 24, 2019

Brian Jankauskas, P.E.
New York State Department of Environmental Conservation
Division of Environmental Remediation (DER), Remedial Bureau A
625 Broadway, 12th Floor
Albany, NY 12233-7015

Subject: **Revised Soil and Groundwater Sampling Work Plan for Pretreatment Plant Area**
Former Ciba-Geigy Facility, Glens Falls, New York
EPA ID NYD002069748 / NYSDEC Site No.: 557011

Dear Mr. Jankauskas:

This Revised Soil and Groundwater Sampling Work Plan (Work Plan) has been prepared for the collection of post-demolition confirmation soil and groundwater samples at the Pretreatment Plant (PTP) Area of the former Ciba-Geigy Corporation (CIBA) pigments manufacturing facility in Glens Falls, Queensbury Township, New York (the Site; **Figure 1**). EHS Support LLC ("EHS Support") is submitting this Work Plan to the New York State Department of Environmental Conservation (NYSDEC) on behalf of Hercules Incorporated (previously acquired by Ashland LLC) and CIBA (previously acquired by BASF Corporation). The Site is now in post-closure management under a NYSDEC Hazardous Waste Management (HWM) Post Closure Permit (NYSDEC Site No. 557011). A renewal of the Part 373 HWM Permit #5-5234-00008/00096 was issued by the NYSDEC on March 5, 2015. Hercules and CIBA (the Parties) are the permittees and share responsibility for on-going environmental activities at the Site.

Decommissioning and demolition activities were performed at the PTP Area in 2017 and 2018, including the removal of the 500,000-gallon aboveground storage tank (AST), tank T-110, and the demolition of the former Pretreatment Plant building. This Work Plan provides the Parties' proposed approach for the collection and analysis of soil samples from within the footprint of the former tank T-110 and near the former sumps within the footprint of the former PTP building, and the collection and analysis of a groundwater sample from within the footprint of the former tank T-110. This Work Plan has been prepared as requested by the NYSDEC in its October 4, 2017 approval letter for the *Revised AST & Pretreatment Plant Demolition Work Plan* (submitted by Antea Group in September 2017) and its November 8, 2018 comment letter on the *Soil Sampling Work Plan for the Pretreatment Plant Site* (submitted by EHS Support in October 2018). This Work Plan has been prepared in accordance with the NYSDEC Division of Environmental Remediation *Technical Guidance for Site Investigation and Remediation* (DER-10; May 2010). DER-10 Section 3.9(a)1 provides guidance for sampling beneath ASTs, and Section 3.9(d)1 provides guidance for sampling beneath floor drains and collection systems (e.g., sumps).

Historical Soil Investigations and Soil Remediation

Tank T-110 was constructed on unpaved ground (i.e., structural fill) at the PTP. Since the tank existed at the time of the historical Resource Conservation and Recovery Act Facility Investigation (RCRA RFI), soil samples were not collected from beneath the footprint of T-110. Soil sampling was completed in the

other areas of the PTP property, including locations adjacent to T-110. Samples were analyzed for metals, volatile and semi-volatile organic compounds (VOCs and SVOCs) and cyanide. The historical RFI investigations[1] identified select metals (barium, lead, cadmium, chromium and mercury), cyanide and certain SVOCs in soils above Target Cleanup Levels (TCLs) for unrestricted land use, as established in the 1996 Statement of Basis (SB) for the Site. Based on the RFI data, it was concluded that the detected SVOCs were sporadically distributed and dominated by polynuclear aromatic hydrocarbons (PAHs) that were not known to be associated with PTP operations; detected non-PAH organics were focused in the eastern area of the PTP Area.

The final corrective measures for the PTP Area were established in the 1996 SB and included the removal of shallow soils (0-2 feet below ground surface [ft bgs]) with metals concentrations above the TCLs, including the area around the former tank T-110 and the establishment of institutional controls via deed restrictions. The soil excavation was subsequently completed in accordance with the SB, and excavated soils were placed under the RCRA cap at the Main Plant Site area of the former Ciba-Geigy facility.

Historical Groundwater Investigations

As part of the RFI, groundwater assessments were conducted at the PTP Area, and groundwater monitoring has been conducted regularly since 1993. Based on the historical investigation and monitoring data, only cyanide has been detected above NYSDEC GA standards.[2] Cyanide concentrations in groundwater have declined significantly over time, and concentrations above the GA standard are limited to the eastern area of the Site, northwest of tank T-110.

Groundwater and surface water at locations downgradient from former tank T-110 have been sampled extensively since the 1990s. Groundwater flow and the hydrogeologic model were detailed in the 1994 RFI and in the 1996 SB. As described in the 1994 RFI, *"…the surface of the lacustrine clay unit dips to elevations below the base of the Feeder Canal east of the Pretreatment Plant beneath the marsh area. Thus, groundwater flowing toward the stream and marsh can either discharge to the surface water and eventually flow to the Feeder Canal, or flow under the canal."* As further described in the 1996 SB, "*…the results from the temporary well points along the south side of the canal support the hydrogeologic model of the site. Here groundwater above the clay was absent from the area around the pipe bridge over the canal and to the west. Concentrations of cyanide were detected in the temporary well points installed further to the east indicating that the groundwater was passing beneath the canal in this area*."

An off-site groundwater monitoring well located approximately 100 feet downgradient from former tank T-110 (well MW-OB21) has been sampled on a semi-annual to annual basis since 1997, with cyanide concentrations decreasing over time. Cyanide concentrations at well MW-OB21 were in the range of 0.4 to 0.9 milligrams per Liter (mg/L) between 1997 and 2005; in the range of 0.2 to 0.3 mg/L between 2006 and 2010; and have been below the GA standard of 0.2 mg/L since 2011. Surface water samples have historically been collected from multiple locations in the marsh area to the east and in the Feeder Canal

[1] RFA Sampling Visit, Pretreatment Plant (Eckenfelder Engineering, PC, July 1992); RFI Report for the Pretreatment Plant SWMU (Eckenfelder Inc., October 1994).
[2] Groundwater Addendum to RFA Report for Pretreatment Plant SWMU, Ciba-Geigy Site, Glens Falls, New York (Eckenfelder Engineering, PC, September 1993).

to the southeast. Annual sampling since 2015 has included surface water sample collection in the marsh (SG-7) and Feeder Canal (SG-11), and there have been no detections of free cyanide at these locations.

Demolition and Removal

Cleaning activities for tank T-110 were performed, as documented in the *AST Decommissioning Report* by Antea Group (February 2016). In March 2018, tank T-110 and the PTP building were demolished and removed, as documented in the *AST & Pretreatment Plant Decommissioning and Demolition Report* by Antea Group (August 2018).

As detailed in the reports, during cleaning and demolition of the tank, visual inspections were completed of both the tank bottom and the soil beneath. The bottom of the tank was observed to be in good condition, with no evidence of compromised integrity. When it was removed, there was no staining of the soil beneath, nor was there evidence of erosion or material disturbance. Based on the field observations, no evidence of a release from tank T-110 was documented, including the vicinity of the sump within the former tank.

As further detailed in the reports, the above-ground portions of the former PTP building have been removed. The concrete floor slab remains in-place. There were two sumps associated with the former PTP building, which were observed to be in good condition during the demolition activities, with no evidence of release. Sump 1 was a circular sump located in the western portion of the building and estimated to be approximately 3 feet deep (see **Figure 2**). Sump 2 was a square sump located in the eastern portion of the building and estimated to be approximately 1 foot deep (see **Figure 3**). The sumps were filled with concrete concurrent with the demolition activities.

As requested by the NYSDEC in its October 4, 2017 and November 8, 2018 letters, post-demolition confirmatory soil and groundwater sampling will be conducted at the PTP Area, as detailed in the following subsections.

Soil Sampling Objectives

The objectives of soil sampling activities are to:

- Determine the concentrations of Site-related constituents of potential concern (COPCs) in soils in the footprint of tank T-110 and in soils adjacent to the two former sumps in the PTP building. COPCs were selected based on historical investigations and include certain metals (barium, cadmium, chromium, lead and mercury) that were historically detected above screening levels in soils around tank T-110, as well as cyanide due to its presence in groundwater in other areas of the Site.
- Compare the soil sampling results to applicable 6 NYCRR Part 375 Soil Cleanup Objectives (SCOs)
- Follow recommendations in DER-10 Section 3.9, which provides guidance for sampling beneath ASTs located over unpaved soil (Section 3.9(a)1) and beneath subsurface collection systems (Section 3.9(d)1)

Groundwater Sampling Objectives

Given the close proximity of the former tank T-110 to the boundary of the PTP Area and the stable to declining cyanide concentrations off-site, a groundwater sample has not been collected in the immediate vicinity of the tank to-date. While no evidence of a release was documented upon demolition of the tank, as requested by the NYSDEC in its November 8, 2018, letter and in accordance with DER-10 Section 3.9(a)(1), a groundwater sample will be collected at this time.

The objectives of groundwater sample collection within the footprint of the former tank T-110 are to:

- Determine the concentration of cyanide, chromium and hexavalent chromium in groundwater within the former footprint of T-110. Cyanide was selected for analysis because it has been identified at concentrations above the GA standard at other locations in the PTP Area. Chromium and hexavalent chromium were selected for analysis because chromium was the primary Site-related COPC identified in the liquid waste removed from the tank in 2015.[3]
- Review the groundwater sample result to determine if the result is indicative of a potential historical release from tank T-110, which may warrant additional future sampling
- Follow the recommendation in DER-10 Section 3.9(a)1, which provides guidance for sampling beneath ASTs located over unpaved soil

Proposed Sampling Program and Methodology

Health and Safety

Field activities will be conducted in accordance with a Site-specific Health and Safety Plan (HASP) developed as a separate document. Field personnel will be required to implement the procedures presented in the HASP while conducting fieldwork, including the use of clean gloves during the collection of samples and any other personal protective equipment deemed necessary.

Borehole Clearance

Prior to installing the soil borings, a utility clearance survey will be completed. The survey will include calling 811 (New York Public Service Commission dig safely notification line) to report the work, and reviewing available Site utility drawings for the investigation area to identify potential utilities that may be present.

Sampling Locations and Depths

The soil and groundwater sampling program are summarized in **Table 1**. The locations of the borings will be field-located using Global Positioning System coordinates and measurements to nearby landmarks. Any modifications to the proposed locations, due to the location of utilities, boring refusal or other site conditions will be documented and the actual boring coordinates will be obtained and noted.

[3] AST Decommissioning Report, Ciba-Geigy/Hercules Site, Table 3 (Antea Group, February 2017).

Former Tank T-110

Four borings will be installed within the footprint of the former AST T-110, with each boring located within one quadrant of the former tank (**Figure 4**). One of the borings (PTP-SB01) will be located adjacent to the former sump, which was present in the southeastern quadrant of the tank.

Soil samples will be collected from all four boring locations. This sampling scope exceeds the recommendations in DER-10 Section 3.9(a)1, which states that a minimum of two surface soil samples shall be collected to detect contamination around the base of the tank, and that samples should be taken around larger tanks to ensure that there is at least one sample per 100 linear feet of the tank perimeter. The former AST T-110 had an approximately 60-foot diameter, with a perimeter of approximately 200 linear feet (minimum of 2 samples recommended per DER-10 Section 3.9).

At all locations, soil samples will be collected from 0-0.5 ft bgs and from 1.5-2 ft bgs. If crushed stone is present, the 0-0.5 ft bgs sample depth will be adjusted to the 6-inch layer beginning at the base of the crushed stone. If visual observations indicate soil staining, the 0-0.5 ft bgs sample depth will be adjusted to the 6-inch layer that is inclusive of the stained soil.

The 0-0.5 ft bgs (or adjusted depth based on visual observation) samples from each boring will be analyzed for the identified list of Site-specific COPCs. In addition, the 1.5-2 ft bgs sample collected from the boring adjacent to the sump (PTP-SB01) will be analyzed for Site-specific COPCs.

Additional samples will be collected at deeper intervals (as summarized in **Table 1**) but will be held pending the results of the initial soil sample analysis unless soil staining is observed. If soil staining is observed in a deeper interval, which may be indicative of historical release, the analysis of soil from that interval will be added to the analytical scope. If constituent concentrations in a 0-0.5 ft bgs sample exceed one or more applicable Part 375 SCOs, the deeper soil sample from that location will be analyzed for Site-specific COPCs to assess the depth of the exceedance(s). Hexavalent chromium will only be analyzed if, after receipt and review of the total chromium results, analysis is determined appropriate for comparison to applicable Part 375 SCOs.

At boring PTP-SB01, the boring will be extended to the depth of groundwater (approximately 10 ft bgs), a temporary well will be installed, and a groundwater sample will be collected using low-flow sampling methods. The temporary well will be left in-place pending receipt and review of the analytical data for the groundwater sample.

Former PTP Building

One boring will be installed adjacent to each of the two former sumps in the footprint of the PTP building (see **Figures 2 and 3**). A soil sample will be collected from the 6-inch interval below the estimated bottom of the former sumps – Sump 1 (3-3.5 ft bgs) and Sump 2 (1-1.5 ft bgs) – and analyzed for the identified list of Site-specific COPCs in soil. Hexavalent chromium will only be analyzed if, after receipt and review of the total chromium results, analysis is determined appropriate for comparison to the applicable Part 375 SCO.

Boring and Sampling Methodology

At PTP-SB01, where the boring will extend to approximately 10 ft bgs for the collection of a grab groundwater sample, soil and groundwater samples will be collected using direct-push equipment (Geoprobe or equivalent). At all other locations, soil sampling will be performed using hand augers, unless direct-push equipment becomes necessary in order to achieve the sample depth.

Soils extracted from each sample depth interval will be collected and visually inspected for physical characteristics (i.e., soil type, relative moisture content, color) and odors, and the field observations will be recorded in a field log book. Data regarding the sample recovery and sample penetration for each core will also be noted in the log book.

Samples will be sectioned from the augers by hand (utilizing clean gloves) or using a clean trowel, homogenized and transferred to clean sample containers provided by the laboratory. To the extent practical, the required sample volume will be collected from a contiguous interval of the core, and the sampled interval and ID will be recorded on the bore log. If additional sample is needed to achieve sufficient volume for sample analysis, a second adjacent core will be advanced to provide additional sample from the same interval.

Upon collection (filling of sample container for laboratory analysis), the container will be sealed (lid closed), labeled with the sample ID, date and time of collection, and placed in a cooler with ice for transport to the laboratory under chain-of-custody documentation.

Boring locations within the footprint of the former PTP building will require breaking through the concrete floor slab prior to sample collection.

Groundwater sampling will be performed using a peristaltic pump and the low-flow sampling procedures established for the Site.[4]

Quality Assurance/Quality Control Program

One blind duplicate soil sample and one duplicate groundwater sample will be collected and handled using the same methodology employed for original samples and will be analyzed for the same suite of analytes as the original samples. Category B data deliverables will be obtained, and Level IV data validation will be performed. Electronic data deliverables (EDDs) and data usability summary reports (DUSRs) will supplied to the NYSDEC concurrent with the project reporting.

Equipment Decontamination

Soil sampling equipment will be decontaminated after use in each borehole. Cleaning/decontamination will comprise a pre-rinse in potable water, followed by washing in non-phosphate detergent solution (e.g., Alconox wash), rinsing in clean (potable or laboratory grade) water, and air drying (or wiped dry using clean paper towels). Groundwater sampling will be performed using dedicated tubing.

[4] Remedy Optimization Plan, Appendix H – Field Sampling Methodology and Field Parameters (EHS Support, November 2016).

Investigation-Derived Waste

The excess soil that is not utilized for laboratory analysis will be placed back into the hole created during the auguring process. Excess cutting volumes are anticipated to be minimal. Solid waste (packaging material, spent gloves) will be disposed as municipal waste. Purge and decontamination water will be containerized and discharged to the Glens Falls publicly owned treatment works (POTW) via the treatment building at the Main Plant Site.

Analytical Methods

Soil and groundwater samples will be submitted for laboratory analysis as summarized in **Table 2**.

Schedule

The Parties are anticipating an overall project schedule of approximately 3-4 months, following receipt of NYSDEC approval of this Work Plan. The anticipated sample collection timeframe is early 2019; however, the timing will be weather-dependent. The project schedule milestones include the following:

- Prepare for Sampling – 2-4 weeks
- Collect Samples – 1 day
- Obtain Laboratory Results and Prepare Data Usability Report – 4-8 weeks
- Provide a Letter Report and EDDs to the NYSDEC – 4 weeks following completion of the data usability evaluation

Closing

We look forward to receiving approval of this Work Plan from the NYSDEC. Please contact me at (608) 558-6795 regarding any questions or comments.

Sincerely,

Cassie R. Reuter
Project Manager

cc: Eamonn O'Neill, New York State Department of Health
James Vondracek, Ashland LLC
Stephen Havlik, BASF Corporation
Laura McMahon, BASF Corporation
Christopher Meyer, Antea Group
Cody Hume, Antea Group
Bob O'Neill, Brown and Caldwell

List of Tables:

List of Figures:

TABLES

Table 1
Sampling Program
Revised Soil and Groundwater Sampling Work Plan for the Pretreatment Plant Area
Former Ciba-Geigy Facility, Glens Falls, NY

Sample Location	Depth (ft bgs)	Analysis	Notes
Soil Samples			
PTP-SB01 (Adjacent to Former Tank T-110 Sump)	0 - 0.5	Total Chromium; Cyanide; Additional Site-Specific Metals [(1)]	Analyze
	0 - 0.5	Hexavalent Chromium	Hold pending total chromium results [(2)]
	1.5 - 2	Total Chromium; Cyanide; Additional Site-Specific Metals	Analyze
	1.5 - 2	Hexavalent Chromium	Hold pending total chromium results
	5.5 - 6	Total Chromium; Cyanide; Additional Site-Specific Metals	Hold pending results from 0-0.5 and 1.5-2 ft bgs
	5.5 - 6	Hexavalent Chromium	Hold pending total chromium results
PTP-SB02	0 - 0.5	Total Chromium; Cyanide; Additional Site-Specific Metals	Analyze
	0 - 0.5	Hexavalent Chromium	Hold pending total chromium results
	1.5 - 2	Total Chromium; Cyanide; Additional Site-Specific Metals	Hold pending results from 0-0.5 ft bgs
	1.5 - 2	Hexavalent Chromium	Hold pending total chromium results
PTP-SB03	0 - 0.5	Total Chromium; Cyanide; Additional Site-Specific Metals	Analyze
	0 - 0.5	Hexavalent Chromium	Hold pending total chromium results
	1.5 - 2	Total Chromium; Cyanide; Additional Site-Specific Metals	Hold pending results from 0-0.5 ft bgs
	1.5 - 2	Hexavalent Chromium	Hold pending total chromium results
PTP-SB04	0 - 0.5	Total Chromium; Cyanide; Additional Site-Specific Metals	Analyze
	0 - 0.5	Hexavalent Chromium	Hold pending total chromium results
	1.5 - 2	Total Chromium; Cyanide; Additional Site-Specific Metals	Hold pending results from 0-0.5 ft bgs
	1.5 - 2	Hexavalent Chromium	Hold pending total chromium results
PTP-SB05	3 - 3.5	Total Chromium; Cyanide; Additional Site-Specific Metals	Analyze
	3 - 3.5	Hexavalent Chromium	Hold pending total chromium results
PTP-SB06	1 - 1.5	Total Chromium; Cyanide; Additional Site-Specific Metals	Analyze
	1 - 1.5	Hexavalent Chromium	Hold pending total chromium results
PTP-DUP01	0 - 0.5	Total Chromium; Cyanide; Additional Site-Specific Metals	Analyze blind duplicate sample for same parameters as 0-0.5 ft bgs sample
Groundwater Samples			
PTP-SB01	Est. 10 ft bgs [(3)]	Cyanide; Total Chromium; Hexavalent Chromium	Analyze
PTP-DUP01	Est. 10 ft bgs	Cyanide; Total Chromium; Hexavalent Chromium	Analyze

Notes:
(1) Additional metals for analysis will include barium, cadmium, lead and mercury.
(2) Samples will be held pending comparison of total chromium results to applicable NYSDEC DER Part 375 standards.
(3) Boring PTP-SB01 will be extended to the groundwater table (estimated 10 feet bgs), and a temporary well will be installed.

Table 2
Laboratory Analytical Method Summary
Revised Soil and Groundwater Sampling Work Plan for the Pretreatment Plant Area
Former Ciba-Geigy Facility, Glens Falls, NY

Analyte	Method Number	Anticipated Reporting Limit		Sample Container Type	Minimum Sample Volume	Preservation	Holding Time
Soil Sample Analysis							
Barium	SW846 6010C/ 6020A	1.0	mg/kg	4 oz glass	20 g	Cool, < 6 deg. C.	180 days
Chromium		1.0	mg/kg				
Cadmium		0.5	mg/kg				
Lead		2.0	mg/kg				
Mercury	SW846 7174B	0.033	mg/kg			Cool, < 6 deg. C.	28 Days
Hexavalent Chromium [(1)]	SW846 7199	0.4	mg/kg	4 oz glass	20 g	Cool, < 6 deg. C.	30 days
Cyanide	SW846 9012B	0.1	mg/kg	4 oz glass	20 g	Cool, < 6 deg. C.	14 Days
Groundwater Sample Analysis							
Dissolved Chromium	SW846 6020A	1.5	µg/L	250 mL plastic	250 mL	Filtration + HNO3 to pH<2	6 months
Hexavalent Chromium	SW846 7196A	10	µg/L	125 mL plastic	125 mL	Filtration, Cool, < 6 deg. C	24 hours
Cyanide	SW846 9012B	10	µg/L	250 mL plastic	250 mL	NaOH to pH>12, Cool, < 6 deg. C.	14 Days

Notes:

(1) Soil samples will be held pending comparison of total chromium results to applicable NYSDEC DER Part 375 standards.

mg/kg = milligrams per kilogram

µg/L = micrograms per liter

g = grams

oz = ounces

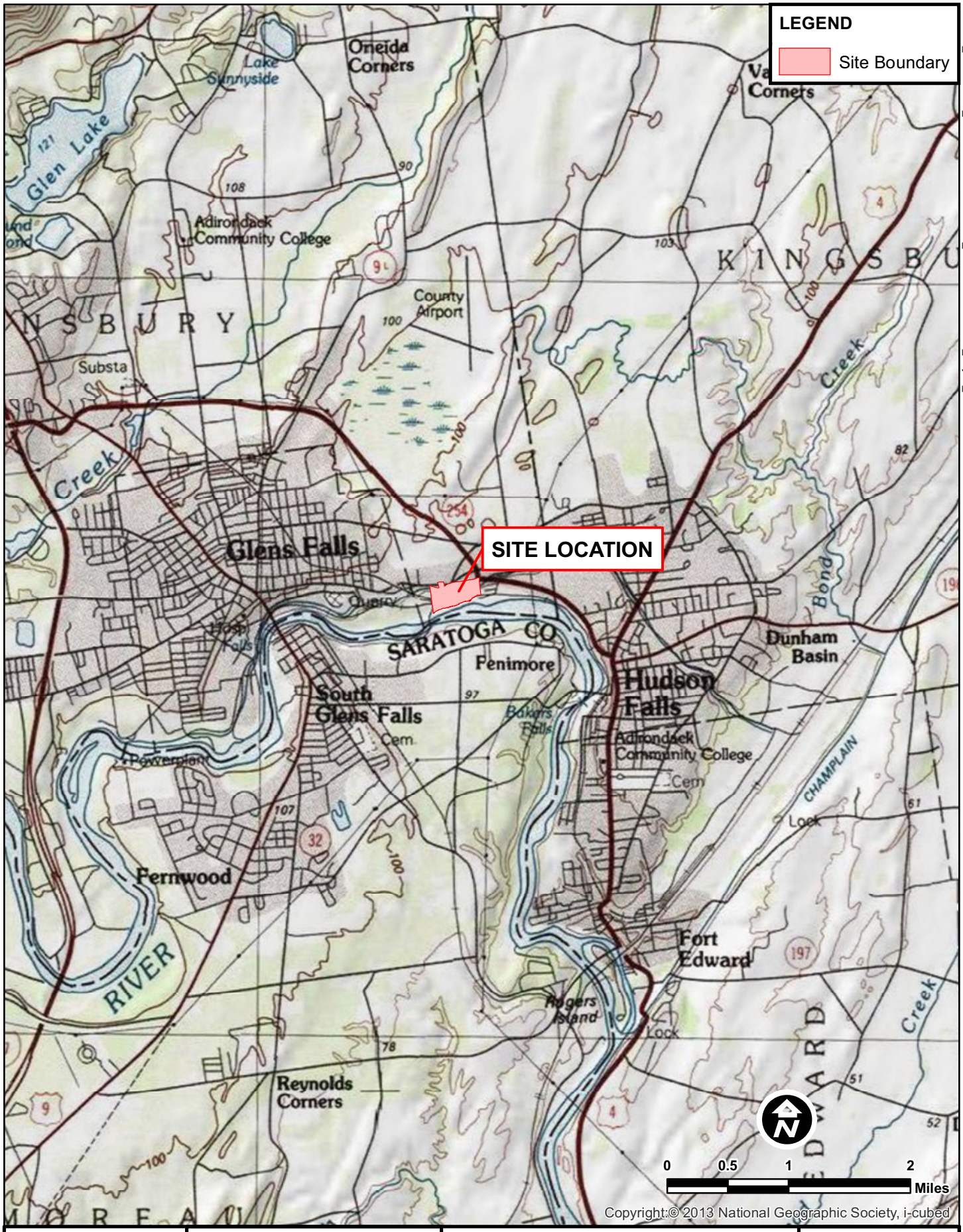
mL = milliliters

NaOH = sodium hydroxide

deg. C = degrees Celsius

EHS Support

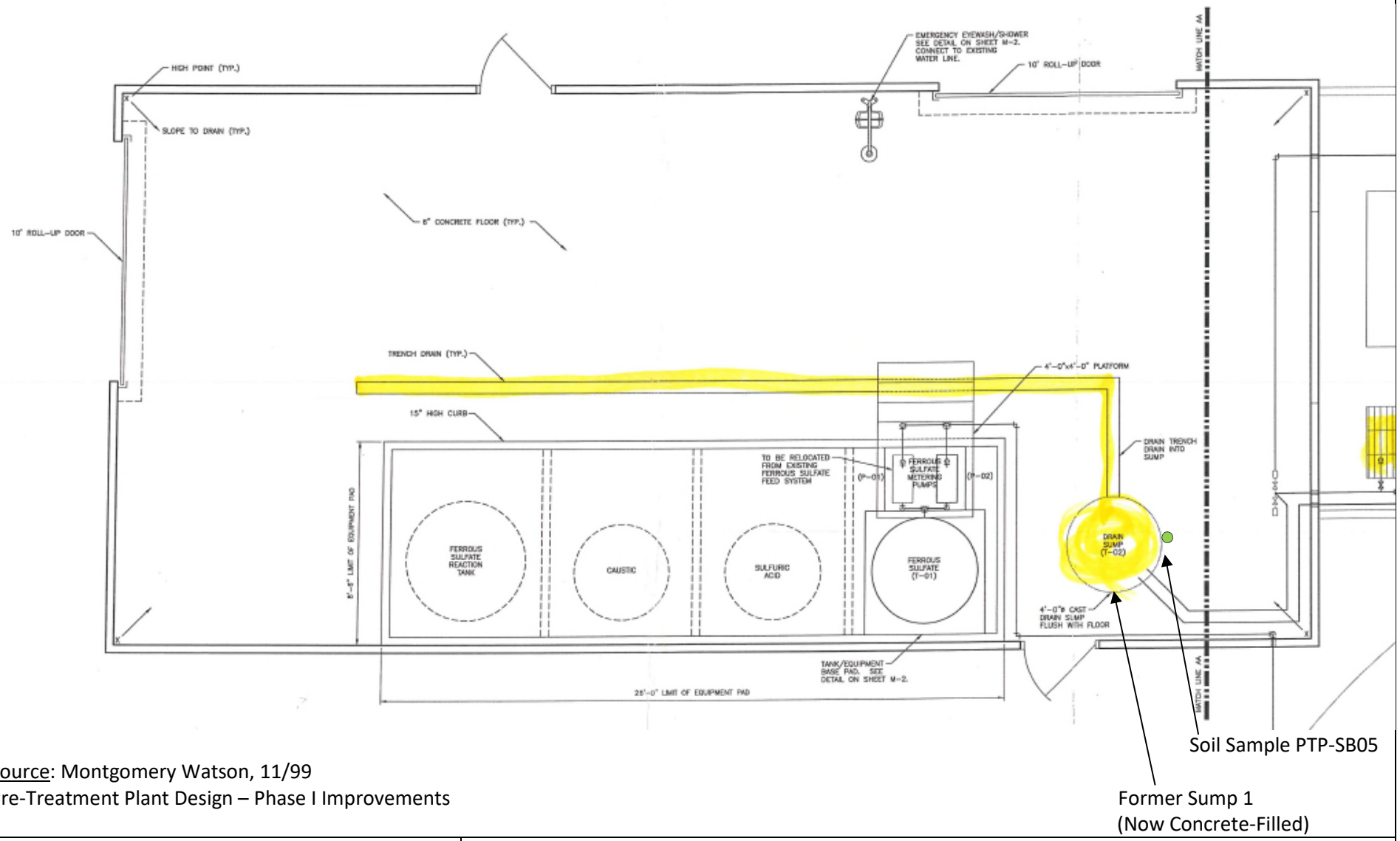
FIGURES



D:\EHSS_GIS\C16262_GlensFallsHudsonRiver\01_ANALYSIS\20160913_July16_GW\FIGURE 1 Site Location.mxd

Printed 2/13/2017 11:33:43 AM by ASmith

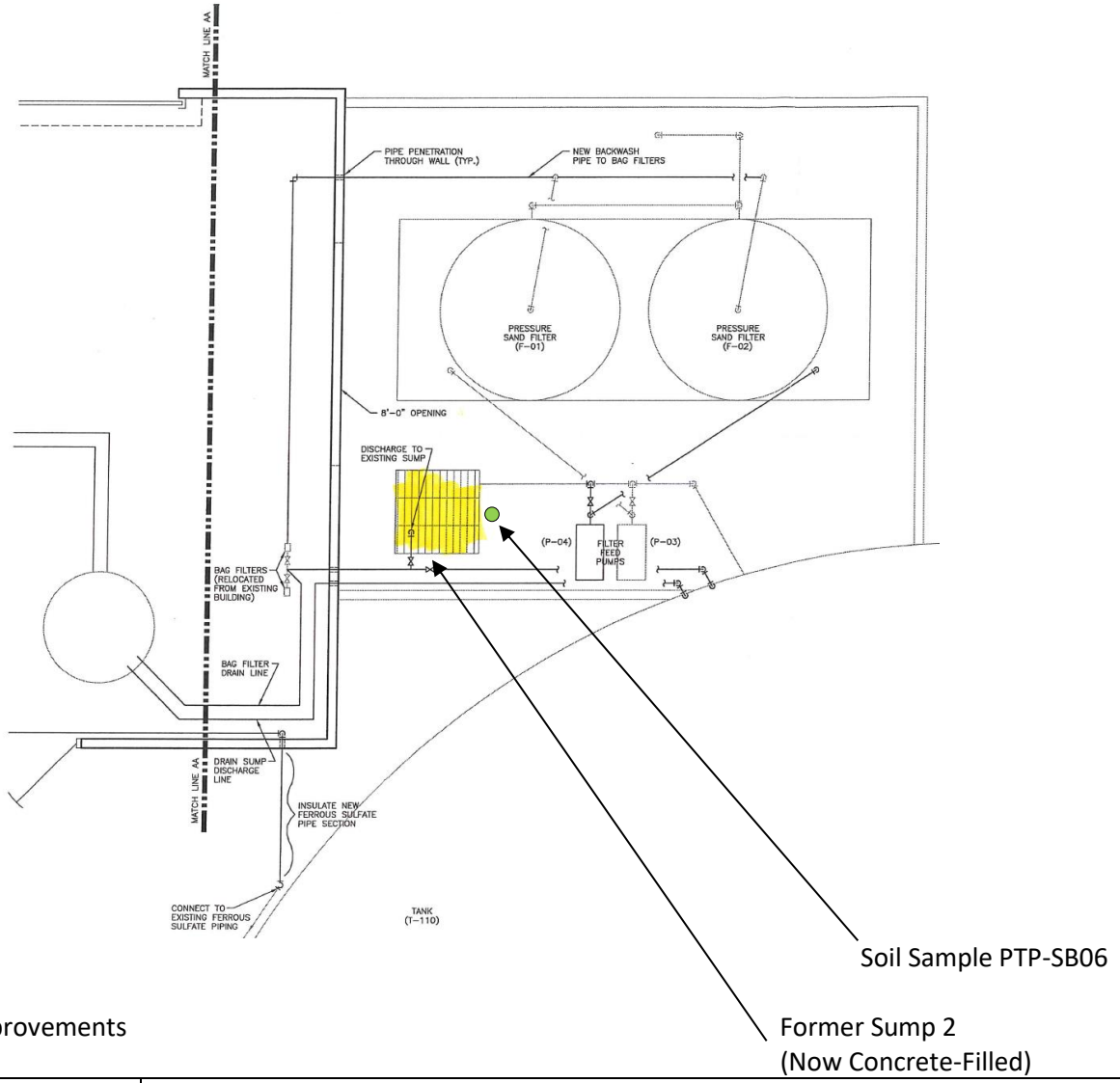
EHS Support	ASHLAND FORMER CIBA-GEIGY / HERCULES SITE GLENS FALLS, NY	SITE LOCATION	FIGURE 1



Source: Montgomery Watson, 11/99
Pre-Treatment Plant Design – Phase I Improvements

EHS Support

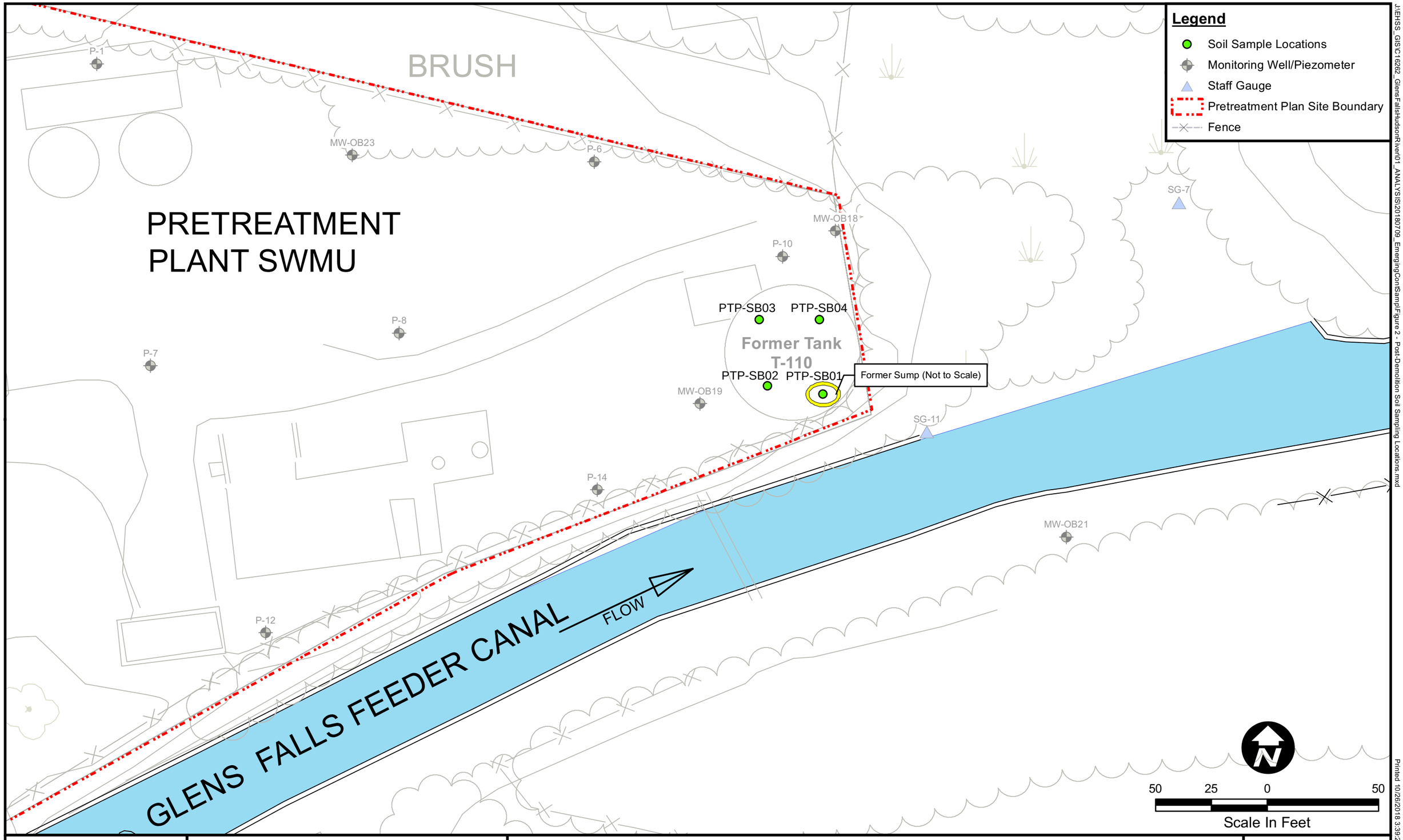
Figure 2
Sampling Location – Sump 1 in Former PTP Building



Source: Montgomery Watson, 11/99
Pre-Treatment Plant Design – Phase I Improvements

EHS Support℠

Figure 3
Sampling Location – Sump 2 in Former PTP Building



EHS Support

ASHLAND
FORMER CIBA-GEIGY / HERCULES SITE
GLENS FALLS, NY

SAMPLING LOCATIONS - FORMER TANK T-110 AREA

FIGURE 4