SAMPLING PLAN FOR SELECTED PILES AT THE FORMER SATRALLOY SITE

Sampling Plan

Prepared for: Cyprus Amax Minerals Company
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June 11, 2013 **053-1695.410**

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1.0 INTRODUCTION

This sampling plan describes the approach to sampling selected piles at the Former Satralloy Site (Site) in Jefferson County, Ohio.

1.1 Background

The site consists of approximately 333 acres of land that includes an abandoned ferrochromium-alloy plant. The site is located in Cross Creek Township, Jefferson County, Ohio, approximately four miles south of Steubenville, as shown in Figure 1. The site is accessed via County Road 74 (Gould Road), and is bordered on the north, west, and south by Cross Creek, a perennial stream that discharges into the Ohio River.

Certain piles at the Site have been identified by the Ohio Environmental Protection Agency (OEPA) as being “actively managed piles” by a former Site operator, as shown in Figure 2. While Cyprus Amax Minerals Company (Cyprus Amax) does not necessarily agree with this identification, it has agreed to manage these piles as hazardous waste where they exhibit the Toxicity Characteristic as determined by the Toxicity Characteristic Leaching Procedure (TCLP) per Subtitle C of the Resource Conservation and Recovery Act (RCRA). Table 1 lists the selected piles and their estimated volumes. The piles consist of heterogeneous materials with widely varying particles sizes (see photographs in Attachment A).

Due to the history and sources of the materials in the piles, it is expected that inorganic chemicals are present in the piles, and that semi-volatile organic compounds (SVOCs) and volatile organic compounds (VOCs) are likely not present in the piles.

1.2 Scope and Objectives

The scope of this sampling plan is limited to the eight “selected piles” (SPs) identified in Figure 2.

The primary objective of sampling the piles is to determine whether the materials in the piles exhibit the Toxicity Characteristic as defined in 40 CFR §261.24. In summary, chemical concentrations in leachate from samples tested using the TCLP Environmental Protection Agency (EPA) Method 1311 are compared to regulatory levels (Table 2). If the TCLP concentrations for the chemicals specified in the regulation exceed their regulatory limits, then the material is considered to exhibit the Toxicity Characteristic. Because the piles are expected to only contain inorganic chemicals, due to the history and sources of these piles, the TCLP analyses will be conducted for inorganic chemicals only. To verify that SVOCs and PCBs are not present in significant concentrations, SVOC and PCB analyses will also be performed on solid samples.

1.3 Regulatory Context

Cyprus Amax will obtain an exemption from the Director of OEPA pursuant to Ohio Revised Code Section 3734.02(G) (”02(G) Exemption”) prior to managing any materials at the Site that could exhibit the Toxicity Characteristic. The 02(G) Exemption will allow Cyprus Amax to perform the activities described in this plan for the SPs without subjecting these activities to regulation under RCRA and the regulations promulgated thereunder. The 02(G) Exemption will not apply to off-Site disposal of any of the SPs.

1.4 Approach

Sample collection and analytical procedures for this project will comply with the Quality Assurance Project Plan (QAPP) for the Former Satralloy Site (Golder 2012a), except as otherwise specified in this plan.

The pile samples will be collected in a manner that obtains a representative composite sample from the heterogeneous bulk materials within the piles. An appropriate method for obtaining such a sample is the Incremental Sampling Methodology (ISM) (ITRC 2012). The ISM is a structured composite sampling and laboratory processing protocol that is designed to reduce sampling and analytical error, reduce data variability, and provide an unbiased estimate of mean constituent concentrations in a volume of material. ISM protocols are designed to ensure that the samples and aliquots drawn from the collection of incremental samples are representative through a sampling and processing methodology where every particle within each “decision unit” has an equal probability of being collected into a sample. A decision unit is the unit of area where each discrete decision will be made. One ISM sample will be collected from each decision unit. Consistent with ITRC 2012 guidance, a total of 30 increments will be collected along a randomly-started systematic grid for each decision unit, and those increments will be composited into one large sample, as described in Section 2.2. Each sample is then subjected to ISM preparatory methods at the laboratory to derive representative aliquots from each sample for analysis (Section 3).

The ISM samples will be analyzed for TCLP (inorganics only), SVOCs, and PCBs.

2.0 SAMPLING PLAN

2.1 ACM Management During Sampling

Some debris observed in certain piles (bricks, tiles, etc.) were identified as suspect asbestos-containing materials (ACM). Golder completed a survey of suspect ACM visible near the surfaces of the piles and soils in the piles on January 31, 2013. A technical memorandum describing the ACM sampling and analytical results is presented in Attachment B. None of the suspect ACM samples contained asbestos. A trace (less than 1%) of asbestos was detected in soils collected from one pile (SP-SMB), but was not detected in soils collected from the remaining piles. Small pieces of cement board assumed to contain asbestos were identified in several of the piles.

Materials known or assumed to be ACM will be excluded from ISM samples. Transite at the Site is known to contain asbestos. Cement board at the Site is assumed to contain asbestos. Known or assumed ACM will be removed and placed aside in compliance with applicable ACM regulations during the sampling described in this plan. These ACM will be disposed off-Site during subsequent interim actions.

Due to the potential presence of ACM in some piles (e.g., transite), and the possibility that previously unidentified materials may be found during ISM sampling, additional precautions will be implemented. The precautions include oversight of sampling activities by a licensed Asbestos Hazard Evaluation Specialist, application of amended water as necessary to prevent any visible airborne emissions, and appropriate personal protective equipment.

2.2 ISM Sample Collection

The sampling units for ISM sampling of the piles are the seven decision units specified in Table 1. Materials in SP-1 and SP-3 will be treated as one decision unit. For the ISM samples, a total of 30 increments will be collected and combined into one sample per decision unit in a manner where every particle has an equal probability of being collected. A systematic transect or grid system with random starting points will allow the equal probability of every particle within a decision unit to be included as a part of the increment.

Each decision unit will first be regraded to approximately rectangular shapes (to facilitate measurement and sample planning) and a 4-foot maximum height (for safer trenching). The piles will be sampled by excavating trenches or faces from the piles, and collecting increments from the trench walls or faces of the piles. Figure 3 provides an illustration of the procedures for regrading, trenching, and sampling within the piles. Table 3 provides a summary of the number of samples to be collected and the analyses for each sample. Figure 2 illustrates the anticipated boundary of the SP materials after they have been regraded into an appropriate shape for ISM sampling.

Several of the piles contain reinforced concrete, reverts, and other discrete manufactured materials such as bricks, tiles, and piping. Discrete manufactured materials with known composition where waste characterization can be characterized based on “generator knowledge” do not require sampling. However, samples will be obtained and held until the TCLP results for the ISM samples are known. If the TCLP results “fail” for a pile, then discrete manufactured materials from that pile will also be analyzed for TCLP unless the material is to be recycled. Discrete manufactured materials that cannot be characterized based on “generator knowledge” will be sampled and analyzed as described in Sections 2.3 through 2.5.

Triplicate ISM samples will be collected from at least 10% of the decision units, which in this case is one set of triplicates. Pile SP-5 was selected at random for triplicate sampling. The triplicate sample analytical results will be used to evaluate the replicability of the ISM methodology. The relative percent difference (RPD) will be calculated for each pair of replicates (for example, replicates 1 and 2, replicates 2 and 3, and replicates 1 and 3). The control limit for evaluation of replicate results from the triplicate samples will be the EPA Functional Guidelines (USEPA 2010) control limit of 20% of the RPD between duplicate samples. The decisions to be made from the RPD analyses are as follows:

- If the RPD results for the replicate sets are within the control limit, then the replicability of the ISM results is adequate for the purposes of this sampling event.
- If the RPD results are outside of the control limit, but the variability between replicates does not change the TCLP decision (i.e., the material is hazardous or it is not hazardous), then the ISM results are adequate for the purposes of this sampling event.
- If RPD results are outside of control limits, and the variability between the replicates has a potential effect on the TCLP result, then further evaluation may be required.

The approach to systematically selecting a random starting location and randomly selecting the increment locations is described below. These procedures ensure that all particles within the decision unit have an equal probability of being collected, resulting in a representative composite sample from each decision unit.

1. Each decision unit pile will be regraded as necessary so that the maximum height of material is less than 4 feet above ground surface. The purpose of the regrading is to allow safe trenching of the piles. Material placed outside the original pile footprint will be placed on geotextile to distinguish the moved material from the underlying undisturbed soil.
2. The shortest dimension for the pile footprint (width) will be no longer than the reach of the excavator operating at that pile (16 linear feet) to allow a trench to be excavated across the entire width of the pile (two-sided access is allowed).

3. Field personnel will measure the longest dimension (length) of the pile or series of piles after regrading. The length will be divided into evenly spaced pile intervals with a random start (Length Transects). The number of transects may vary based on pile dimensions. The random start will be selected using a random number generator and the bounds of zero and the length of the pile in feet. The 1-foot random number generation ensures that every part of the line will have an equal a priori chance of being selected for a transect starting point, as the gap between potential sampling locations is less than the width of the trenching device (excavator bucket). For example, given a 60-foot length, a random number between 0 and 50 feet will be generated, and five Length Transects will be spaced 10 feet apart (one-tenth of 50 feet). If the randomly generated number is 28, then the Length Transects will be located at 8, 18, 28, 38, 48, and 58 feet on the tape (Figure 3). Piles with dimensions less than 10 feet will require a random number generated to three significant figures (0 feet to 10.0 feet).
4. The sampler will measure the trenched out area or cutaway face. Width Transects will be selected by random number generator with the bounds of zero and the width of the trench or cutaway face. The number of Width Transects will be based on the number of Length Transects, selected to give a total of 30 incremental samples (for 6 Length Transects, there will be 5 Width Transects). For example, given a cutaway face that is 15 feet long, a random number between 0 and 15 will be generated. If the randomly generated number is 4, then the Width Transects will be located at 4, 9, 14, 19, and 24 feet on the tape (Figure 3).
5. The height of the pile at each Width Transect will be measured, and a random number will be selected from 0 feet to the height at that location. The randomly selected height at each Width Transect will be the location where each increment will be collected.
6. A trench will be excavated into the pile at each Length Transect location to the extent needed to reach the sample location. In some cases, hand coring may be used to obtain the increment sample if deemed safer or simpler and able to obtain the sample.
7. The incremental samples will be of similar mass. A field scale will be available to use as a guide to assess the approximate mass of the increments, however, it will not be necessary to weigh each increment. If a large rock or boulder is encountered at the increment location, then it will be chipped or drilled to obtain the necessary sample quantity. All of the incremental samples are placed into one sample container or series of sample containers with the same sample identification number.
8. In the event that a discrete manufactured material is encountered at the increment location, it will not be included in the sample. Another increment location will be randomly selected in place of that location.
9. Triplicate samples will be collected from one of the decision units. The three replicate samples will be collected concurrently with the primary sample collection, as the trenching will disturb the pile. The measurements will be made at one time for all sets of transects. Then, a trench or cutaway face will be excavated sequentially across all Length Transect locations, and incremental samples will be placed into the appropriate sample container for each replicate.
10. Samples will not be sieved in the field, as they will likely not be dry. Rather, they will be dried and processed using the ISM protocol at the selected laboratory.

The SP-4 pile is comprised of several discrete manufactured materials placed on the ground, and is not actually a pile. The discrete manufactured items will be removed, and the underlying granular material will be sampled in the same manner as the other SPs.

2.3 Reinforced Concrete Relocation and Sampling

Several of the piles contain large pieces of reinforced concrete and rebar. The reinforced concrete and rebar are construction debris from demolished building walls, which have been previously characterized (Appendix E of Golder 2012b). Due to size, the reinforced concrete will be an impediment to regrading and trenching for ISM sampling. Therefore, the concrete pieces will be removed from the SPs prior to regrading of the SP, and the concrete will be placed in one pile.

The concrete pile will consist of homogenous materials (discrete pieces of demolished concrete and rebar). Because the concrete is a homogenous material, ISM is not needed to collect a representative sample. One grab sample will be collected from the concrete from a series of five randomly located locations in the concrete pile. At each location, the concrete will be drilled to a depth of one-half the width of the concrete piece to obtain the grab sample. The five grab samples will be composited, and analyzed for the same parameters as the SPs.

2.4 Revert Materials

Revert is a material removed from smelters during furnace relining. Large pieces of revert are present in several piles (particularly SP-6). These large pieces of revert may be impediments to regrading the piles. Large pieces of revert material will be removed, as needed to facilitate regrading, and placed near the SP whence they came. Because the revert material is relatively homogenous, ISM sampling is not necessary.

Attempts have been made to collect field samples of the revert material that have not succeeded due to the extreme hardness of the material. Five representative samples of the revert will be collected and analyzed to determine if the revert can be recycled. If the material is not to be recycled, the samples will be reduced in size off-Site as necessary to meet TCLP requirements. An equal volume from each of the five grab samples will be composited into a single sample for TCLP analysis. The composite revert sample will be analyzed only for TCLP inorganics.

2.5 Discrete Manufactured Materials

Several of the piles contain discrete pieces of manufactured materials such as plastic pipes, various types of tiles, and bricks. If waste characterization can be performed for a manufactured material based on “generator knowledge”, then that material will not be sampled. Manufactured materials where waste characterization cannot be performed based on “generator knowledge” (e.g., unknown composition) will be sampled in the same manner as the concrete (one composited sample from five grab subsamples). Samples of discrete manufactured materials will be analyzed for TCLP inorganics and PCBs.

2.6 Sample Collection Procedures

2.6.1 Sample Collection Equipment

Multiple devices may be required to collect pile samples in a rapid, efficient and consistent manner. In some instances a coring tool may be insufficient to retain the matrix in the selected sampling unit. Therefore, a hand trowel will be used to aid or substitute when needed to retain the increment. A rock hammer, hammer drill, or equivalent may also be used to break down materials. Equipment in contact with the media being sampled will be subject to decontamination procedures when moving from one decision unit to another.

2.6.2 Sample Identification

Sample labels will be attached to each sample container with a sample identification number (ID) assigned to each sample collected during field activities. For ISM samples, the sample ID number will be applied to the container that contains the incremental samples taken to represent one replicate for a given sampling unit. Since quality control (QC) samples for one decision unit will have three replicates, a suffix number (1, 2, and 3) will identify those replicates to ensure a unique ID number.

Samples will be assigned a unique alphanumeric identification code as follows:

SP--XX-YYY where:

- SP – Special Piles
- XX – The sequential number of the sample. The field notes will indicate the decision unit from which the sample was collected. Triplicate samples will be numbered in the sequence in which they are collected, which will render them to be blind triplicates for the laboratory.
- YYY – Sample type: samples types will be designated as either ISM or ACM according to their collection techniques and analytical requirements.
- Z – Replicate # (1 for primary field sample, 2 for field duplicate, 3 for field triplicate, 4 for equipment blank).

For example, a sample ID of DU-3-ISM is an ISM sample from decision unit 3.

2.6.3 Sampling Equipment Decontamination

There will be no decontamination steps between increment locations, except to visually confirm that the material from the previous increment has been adequately extricated from the tool, and will not add a significant amount to the following increment. Decontamination of sampling equipment will only be performed between sampling units.

The sampling equipment that was in contact with the sample material will be thoroughly cleaned prior to beginning the next decision unit. Personnel performing decontamination will wear rubber gloves, and such other safety equipment as directed by the Site Health and Safety Plan (Golder 2012c). The backhoe bucket will be decontaminated by brushing off adhered material until visually clean. Other sampling equipment will be decontaminated as follows:

- The parts of the sampling tools that contact sampled material will be placed in clean, dedicated buckets during and after decontamination procedures to collect wash and rinse fluids.
- Non-dedicated equipment will be cleaned with a brush and non-phosphate detergent/water mixture such that visible solid matter is removed.
- A tap water or better rinse will be applied after the first detergent wash until the evidence of soap/ suds are eliminated.
- A second wash will be performed on non-dedicated equipment after the first detergent/water wash, using a fresh batch of non-phosphate detergent - water mixture.
- A second and final rinse of distilled/deionized water will then be applied and the equipment is ready for use.
- Triplicate samples will be collected using a dedicated sampling tool for each replicate.

2.7 Quality Control/Quality Assurance

For this project, QA/QC samples will include field replicates in the form of an original ISM, a duplicate ISM, and a triplicate ISM at selected locations for at least one of the decision units. The field replicate sample results will be used to evaluate laboratory precision, homogeneity gained from the sample preparation procedures, and variability of the ISM field sampling techniques.

QA/QC will also include equipment blanks consistent with the QAPP (Golder 2012a). Equipment blank samples are used to evaluate the potential for cross-contamination between samples due to inadequate decontamination of non-dedicated equipment.

2.8 Investigation-Derived Waste

Decontamination water will be placed in appropriate containers. One grab water sample will be collected from the containers. The water sample will be analyzed for total and dissolved metals, total dissolved solids (TDS), and total suspended solids (TSS), as shown in Table 3. The decontamination water will be stored in above-ground containers on the Site and treated during the interim action in accordance with the approved Interim Action Workplan.

3.0 LABORATORY PREPARATION AND ANALYSIS

3.1 Sample Analysis

The ISM samples will be shipped to a specified laboratory for sample preparation using ISM protocols, and the specified analyses as specified in the protocol in Attachment C.

3.2 ISM Sample Preparation

The sample ISM preparation will be done to ensure that a representative analytical aliquot is taken from the composited samples for analysis.

The ISM samples will be dried and pulverized, and then sieved at the laboratory with a number 10 mesh (0.2 centimeter particle size). The pulverizing can be done with a puck mill or similar, however the equipment must not have stainless steel that contacts the sample, as chromium can be released from stainless steel equipment during pulverization.

Once processed, the material will be laid out in a slab of uniform depth, and a grid of regularly spaced cells will be placed over the slab of material. Grid nodes will be selected systematically with a random start for a total of 30 laboratory incremental samples. The material will be collected out of the slab at each laboratory increment location with a square-bottomed scoop (a square-bottomed scoop collects material from the entire sampling interval, whereas a round-bottomed scoop preferentially collects the larger materials at the top, which discriminates from the smaller particles at the bottom of the sampling interval). The scoop must retrieve the material from the entire depth of material contained in the selected cell. All of the laboratory incremental samples will be placed into a sample container for the appropriate analyses.

One duplicate laboratory sample will be collected, selected randomly by the laboratory. The duplicate sample will be collected from the surplus of material remaining after the initial sample is collected. The surplus material will be laid out and subsampled in the same manner as the initial sample.

The laboratory incremental sampling routine will be applied for dividing materials to generate the required volume for the given analytical test.

3.3 Laboratory Analysis

The samples obtained under this plan will be analyzed as specified in Table 3. The analytical procedures to be used on these samples will be those listed in the QAPP (Golder 2012a), unless otherwise specified.

4.0 REFERENCES

Golder Associates Inc. (Golder). 2012a. Quality Assurance Project Plan for the Former Satralloy Site. August 3.

Golder. 2012b. Final Draft Interim Action Workplan for the Former Satralloy Site. November 15.

Golder. 2012c. Health and Safety Plan for the Former Satralloy Site, Jefferson County, Ohio. August 3.

Interstate Technology & Regulatory Council (ITRC). 2012. Incremental Sampling Methodology. ISM-1. Washington, D.C.: Interstate Technology & Regulatory Council, Incremental Sampling Methodology Team. www.itrcweb.org (accessed April 23, 2013).

US Environmental Protection Agency (USEPA). 2010. Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, OSWER 9240.1-51, EPA 540-R-10-011, January 2010.

TABLES

TABLE 1
Pile Summary
Former Satralloy Site

Pile ID	Decision Unit Number	Estimated Quantity (cubic yards)	Length or Radius (feet)	Width (feet)	Height (feet)	Pile Shape	Material Notes	Location Notes
SP-1	1	64	60	24	3	irregular	Slag, soil, concrete, bricks, rebar	Group of piles on service road southeast of SMB
SP-3		92	44	25	5	irregular	Slag, soil, concrete, bricks, rebar	
SP-2	2	209	25	-	9	conical	Slag, soil, rocks, concrete	
SP-4	3	8	6	-	2.0	cylinder	Pile with debris on surface	Pile on service road southeast of SMB
SP-5	4	54	13	-	9	conical	Slag, soil, bricks, concrete, other debris	Pile on service road southeast of SMB
SP-6	5	361	65	30	5	rectangle	Large furnace reverts, bricks, rebar, other debris, some slag & soil	Concrete pad in front of NMB
SP-7	6	295	43	37	10	rectangle	Slag, soil, and debris. Grass and trees growing on pile.	Concrete pad in front of NMB
SP-SMB	7	417	50	30	10	irregular	Slag and soil with bricks and large debris	Inside SMB

Notes:

Abbreviations:

NMB North mill building
SMB South mill building

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TABLE 2
Toxicity Characteristic Concentrations for Chemicals
Former Satralloy Site

EPA Hazardous Waste Code	Contaminant	Regulatory Concentration (mg/L)
D004	Arsenic (As)	5
D005	Barium (Ba)	100
D006	Cadmium (Cd)	1
D007	Chromium (Cr)	5
D008	Lead (Pb)	5
D009	Mercury (Hg)	0.2
D010	Selenium (Se)	1
D011	Silver (Ag)	5

TABLE 3
Sample Collection Summary
Former Satralloy Site

Samples	Number of Samples	Replicates for QC [a]	Total Number of Samples	Analyses
Pile Composites	8	2	10	TCLP (inorganics only), PCBs, SVOCs
Reinforced Concrete	1	0	1	TCLP (inorganics only), PCBs, SVOCs
Discrete Manufactured Materials	1 each [b]	0	1 [b]	TCLP (inorganics only), PCBs, SVOCs
Revert Material	1	0	1	TCLP (inorganics only), PCBs, SVOCs
Wastewater Characterization	1	0	1	Total and Dissolved COPC Metals, TDS, TSS
Equipment Blank	2	0	2	Inorganics, PCBs, SVOCs
TOTALS	**14**	**2**	**16**	

Notes:

[a] One set of triplicate samples = Two replicates.

[b] The number of samples will be determined in the field based on the number of types of materials encountered.

COPC	Constituents of potential concern (see below) total and dissolved metals. plus mercury, TSS, TDS
PCBs	Polychlorinated Biphenyls
SVOCs	Semi-Volatile Organic Compounds
TCLP	Toxic Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

COPC metals:

Aluminum
Antimony
Arsenic
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Mercury (elemental)
Nickel (soluble salts)
Selenium
Silver
Thallium (soluble salts)
Titanium (tetrachloride)
Vanadium (and compounds)
Zinc (and compounds)

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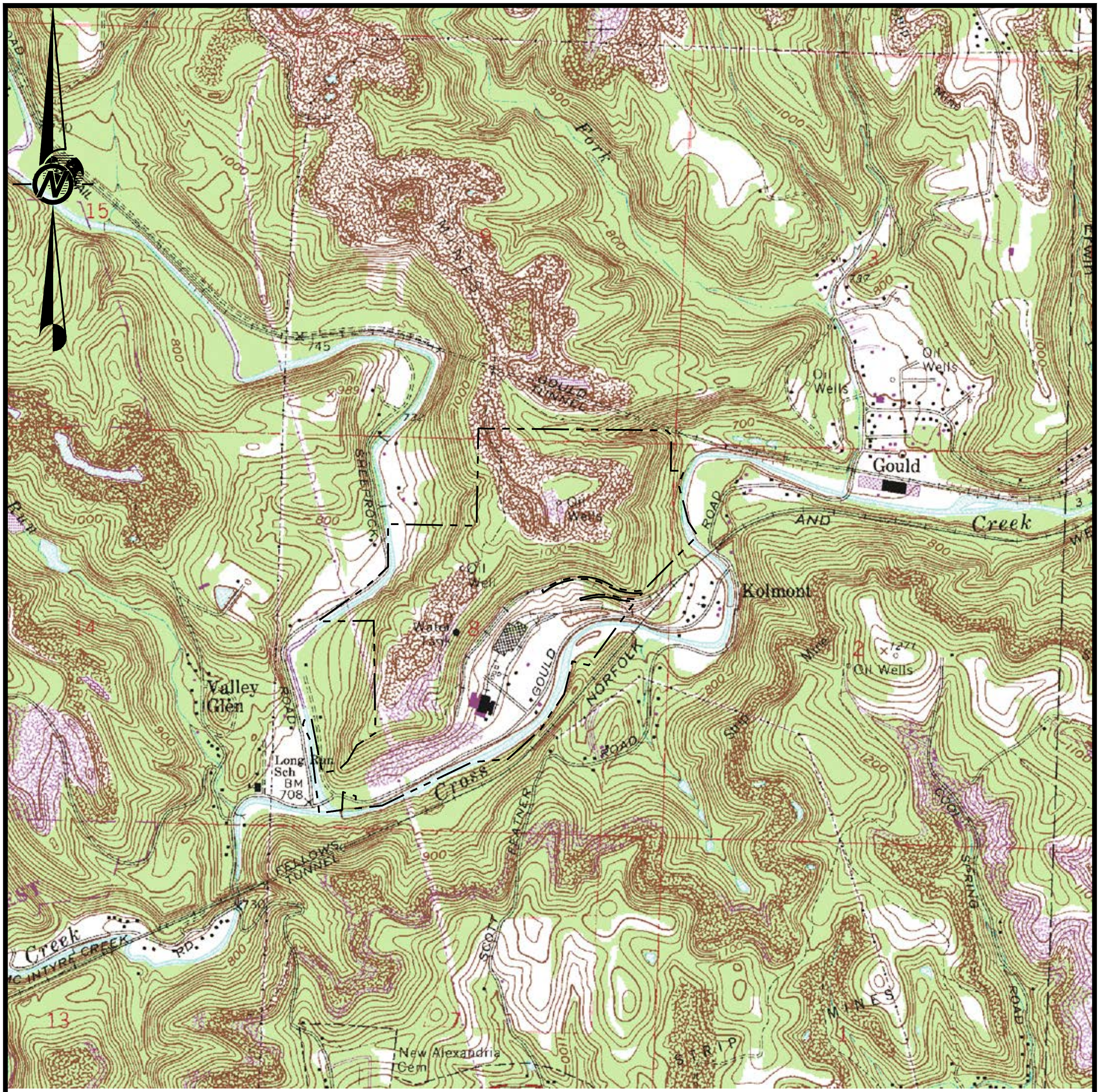
FIGURES



REFERENCES

1.) MAP TAKEN FROM U.S.G.S. 7.5 MINUTE QUADRANGLE OF STEUBENVILLE WEST, OHIO, DATED

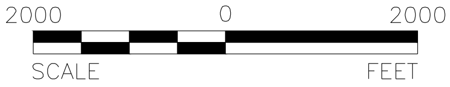
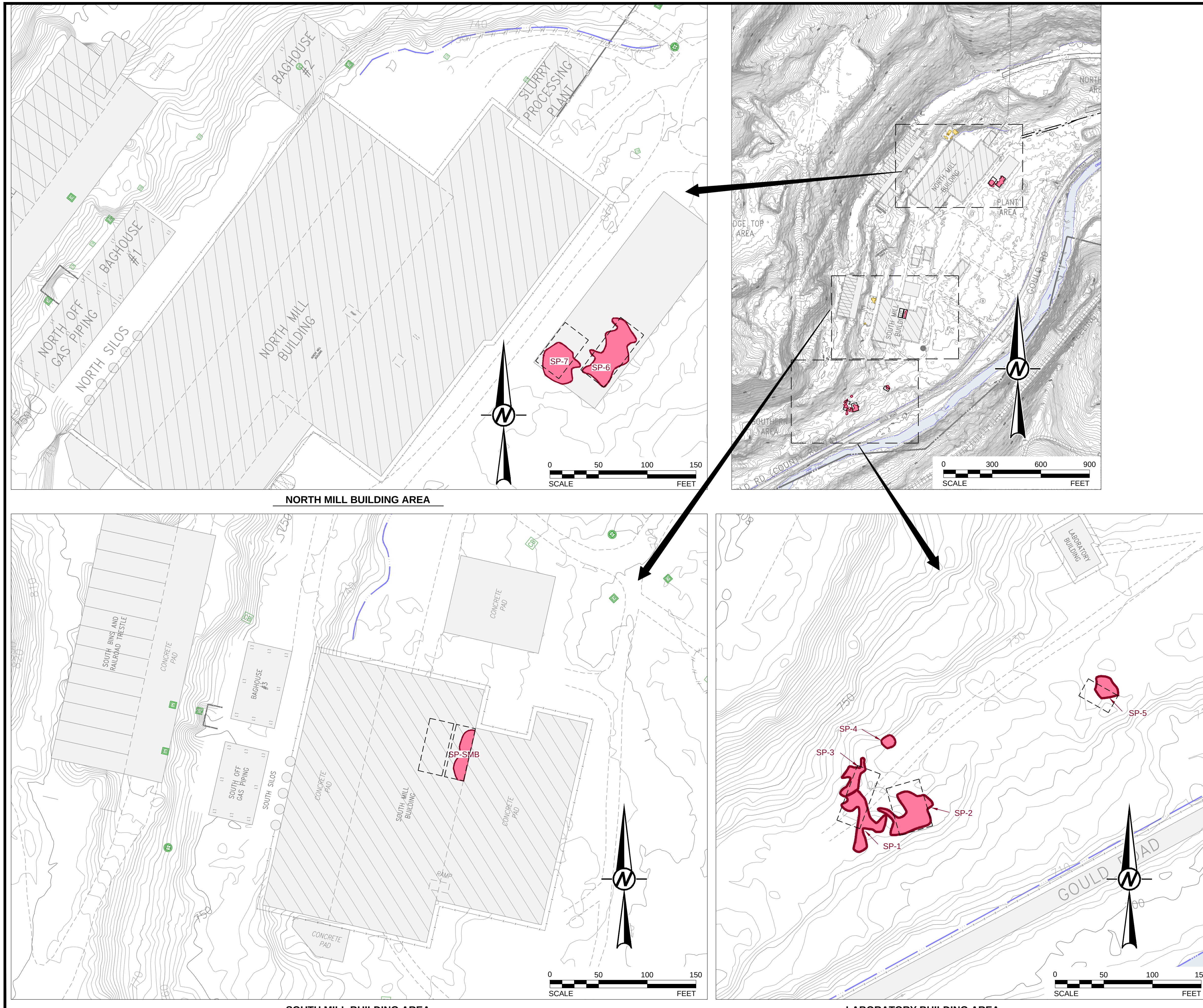


FIGURE 1

FORMER SATRALLOY SITE LOCATION

K:\CAD\Projects\2005\0531695\410\053-1695_410_F01.dwg | 1 FIGURE | Mod: 03/20/2013, 13:05 | Plotted: 03/20/2013, 13:12 | SSimmons

Golder Associates



NOTES:

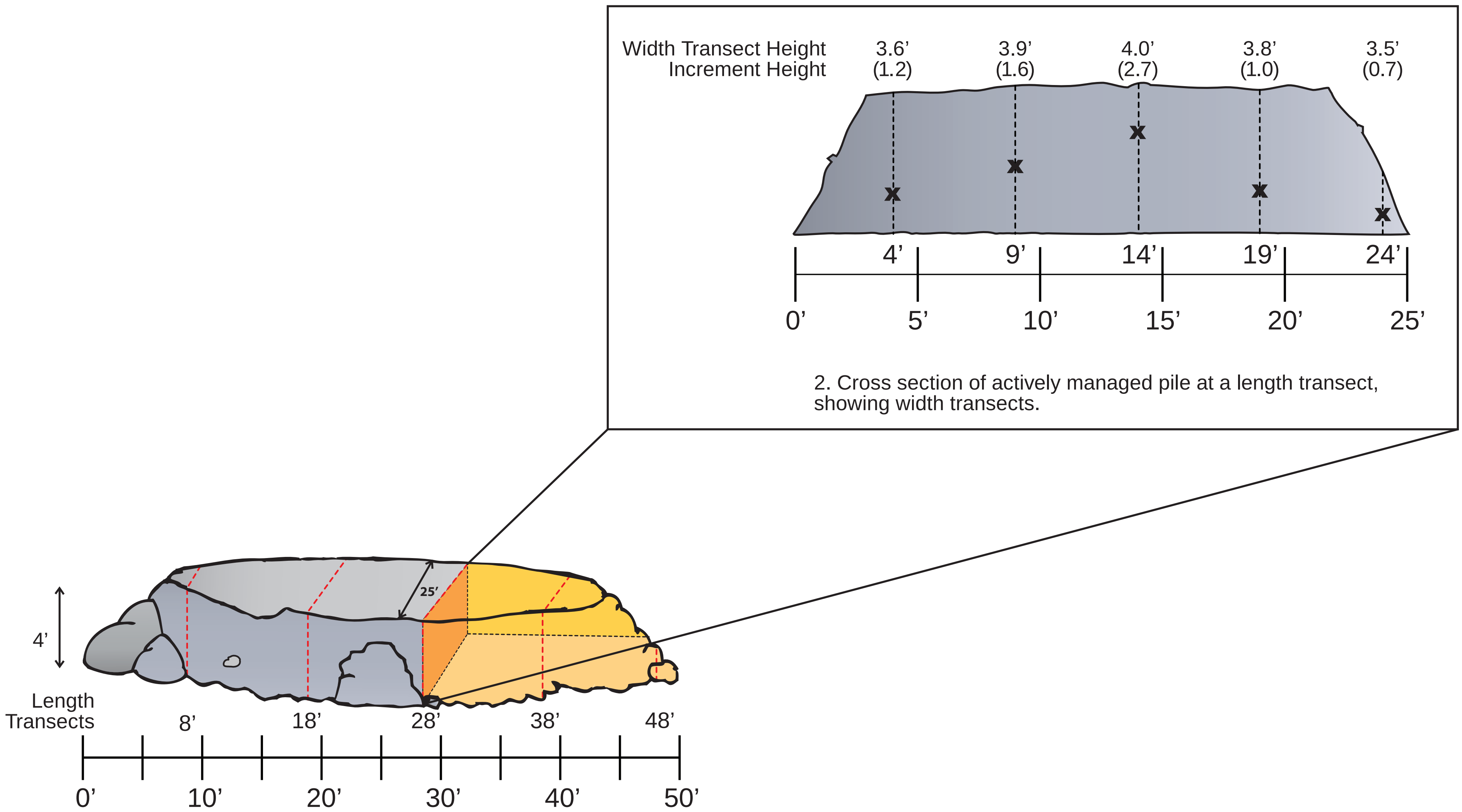
1. BASE TOPOGRAPHY DATED 2003 PROVIDED BY JEFFERSON COUNTY, OHIO, ENGINEER'S OFFICE.
   HORIZONTAL DATUM: OHIO NORTH ZONE NAD 83 - STATE PLANE U.S. SURVEY FEET.
   VERTICAL DATUM: NAVD 88 (EST. 1991).
   CONTOUR INTERVAL: 2 FT.
   ADDITIONAL TOPOGRAPHY BASED ON FIELD OBSERVATIONS AND MEASUREMENTS.
2. PROPERTY BOUNDARY BY BONAR SURVEYING, BERGHOLZ, OHIO, DATED OCTOBER 17, 2006.
3. WETLANDS DELINEATION PROVIDED BY WESTLAND RESOURCES, INC., ON DRAWING DATED MAY 30, 2007.
4. THE RIVER MILE MARKERS SHOWN FOR CROSS CREEK HEREON WERE VIA A GEODATABASE AVAILABLE ON THE OHIO STATE DNR WEBSITE, JUNE 2012.
5. SITE ADDRESS:
   4243 COUNTY ROAD 74
   MINGO JUNCTION, OH 43938

LEGEND:

- EXISTING PROPERTY BOUNDARY (SEE NOTE 2)
- EXISTING ON-SITE ACCESS ROAD
- EXISTING COUNTY ROAD (PAVED)
- EXISTING RAILROAD
- EXISTING SLURRY PIPELINE
- CROSS CREEK
- EXISTING WATER FEATURE
- EXISTING FACILITY (TO BE DEMOLISHED)
- FUTURE RAILROAD SPUR CENTERLINE (TO BE RECONSTRUCTED)
- SELECTED PILES (SP)
- APPROXIMATE FOOTPRINT OF PILE RE-GRADED FOR SAMPLING

FIGURE 2

FORMER SATRALLOY SITE SELECTED PILE LOCATIONS



1. Actively managed pile regraded to 4’ height, showing length transects

NOT TO SCALE

x Increment sampling location

FIGURE **3**

ACTIVELY MANAGED PILE ILLUSTRATION

G&K/SATRALLOY RI/FS/OH

ATTACHMENT A
SATRALLOY SELECTED PILE (SP) PHOTOGRAPHS

Satralloy Selected Pile (SP) Photographs	
SP-1	
SP-2	

Satralloy Selected Pile (SP) Photographs	
SP-3	
SP-4	

Satralloy Selected Pile (SP) Photographs	
SP-5	
SP-6	

Satralloy Selected Pile (SP) Photographs	
SP-7	
SP-SMB (South Mill Building)	

ATTACHMENT B
REPORT ON SELECTED PILE ASBESTOS SAMPLING

TECHNICAL MEMORANDUM

Date:	March 25, 2013	**Project No.:**	053-1695
To:	Barbara K. Nielsen	**Company:**	Cyprus Amax Minerals Company
From:	Lee Holder		
		Email:	Barbara_Nielsen@FMI.com

RE: REPORT ON SELECTED PILE ASBESTOS SAMPLING

1.0 INTRODUCTION

On behalf of Cyprus Amax Minerals Company (Cyprus), Golder Associates Inc. (Golder) performed an asbestos survey of materials contained in eight selected piles (SPs) identified at the Former Satralloy Site (the Site) on January 31, 2013. The purpose of this survey was to identify and sample asbestos-containing materials (ACMs) located within the AMPs at the Site, including soils comprising these piles. A brief discussion of sampling methodology, analysis, and results are provided below.

2.0 SUSPECT ASBESTOS CONTAINING MATERIALS

Ms. Jamie E. Bailey, Project Geologist with Golder and State of Ohio Licensed Asbestos Hazard Evaluation Specialist (Certification #ES34596) performed the survey with assistance from Mr. Bob Ireson, Senior Project Manager, and Mr. Eric Hoying, Staff Scientist, with Golder.

2.1 Sampling and Analysis

Each AMP was visually examined noting suspect-ACM on the surfaces. Three bulk samples were collected from each homogenous, miscellaneous, suspect ACM in accordance with the Asbestos Hazard Emergency Response Act (AHERA) sampling guidelines as outlined in 40 CFR Part 763. Cement board was visually identified and noted when present, but not sampled as a part of this assessment.

A total of 36 bulk samples and 8 soil samples were collected and analyzed by Polarized Light Microscopy (PLM) in accordance with the United States Environmental protection Agency (EPA) "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R93/116, July 1993). Analysis was performed by ALS Environmental (ALS), located in Cincinnati, Ohio. ALS is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP #101917) and the Ohio Voluntary Action Program, Certified Laboratory (VAP #CL0022) for PLM analysis.

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Soil samples were collected using a five-point composite method to ensure adequate coverage of soils located within the piles. A summary of the laboratory analytical results is included in the tables below. Bulk sample logs, chain of custody documentation, laboratory analytical results, and inspector certifications are included as Attachments.

2.2 Findings

Table 1 below provides a summary of suspect materials identified and sampled during this survey. All bulk samples collected were identified as non-detect for asbestos content. Note that quantity estimates are based on minimal disturbance of pile materials and observations are generally limited to pile surfaces.

Table 1 – Asbestos Bulk Sample Results

Sample No.	Homogeneous Material	Location of Material	Asbestos Content	Condition	Quantity Observed
AMP01-A AMP01-B AMP01-C	Tan Smooth Tile, 14”x14”; 1” Hole in Center	AMP-4 AMP-1 AMP-6	ND	Good	17 EA
AMP02-A AMP02-B AMP02-C	Tan Smooth Tile, 5 ½”x14”x1/2”; 3, 2” Holes Down Centerline	AMP-4 AMP-1 AMP-6	ND	Good	25 EA
AMP03-A AMP03-B AMP03-C	Red Smooth Tile, 14”x13½”x15”x8½” w/ Some Having 1” Hole in Center, 1” Routed Edge on Two Sides	AMP-4 AMP-1 AMP-6	ND	Good	50 EA
AMP04-A AMP04-B AMP04-C	Red Smooth Tile, 14”x5½”x¾“ w/ 3-2” Holes Down Centerline	AMP-4 AMP-1 AMP-6	ND	Good	13 EA
AMP05-A AMP05-B AMP05-C	Tan Smooth Tile, 14”x5½”x½”	AMP-4 AMP-1 AMP-6	ND	Good	18 EA
AMP06-A AMP06-B AMP06-C	Brown Smooth Conduit, 19”x1$^{1}/_{8}$”	AMP-4 AMP-1 AMP-6	ND	Good	28 EA
AMP07-A AMP07-B AMP07-C	Red/Tan Rough Brick, 9”x4$^{1}/_{2}$”x2$^{1}/_{2}$”, “Empire Sim” Written on Material	AMP-4	ND	Good	25 EA
AMP08-A AMP08-B AMP08-C	Tan Rough Brick, 9”x4$^{1}/_{2}$”x2$^{1}/_{2}$”, “OKILO” Written on Material	AMP-4 AMP-1	ND	Good	96 EA
AMP09-A AMP09-B AMP09-C	Red Smooth Tile, 14”x5½”x¾“	AMP-4 AMP-1 AMP-6	ND	Good	18 EA
AMP10-A AMP10-B AMP10-C	Red Smooth Tile, 14”x5½”1”	AMP-4 AMP-1 AMP-6	ND	Good	24 EA
AMP11-A AMP11-B AMP11-C	Gray/Black Exterior, Purple Interior Rough Brick, 9”x4$^{1}/_{2}$”x2$^{1}/_{2}$”, “GREEN CLIPPER SM” Written on Material	AMP-4 AMP-SMB	ND	Good	120 EA
AMP12-A AMP12-B AMP12-C	Tan Rough Cone Shaped Brick w/ 1” Hole in Top	AMP-SMB	ND	Good	100 EA

AMPXX-X = Bulk Sample
ND = Non-detect

Table 2 below provides a summary of the soils sampled and results with a general description of the contents observed on the surfaces of each AMP. All soil samples collected were identified as non-detect for asbestos content with exception of soil sample SAMP-SMB. Soil sample SAMP-SMB was identified as containing a trace (<1%) amount of chrysotile asbestos.

Table 2 – Asbestos Soil Sample Results and Observations

Sample No.	Soil Material Description	Asbestos Content in Soil	Pile Contents	Cement Board Observed	Suspect ACM Material
SAMP-1	Fine to coarse gravelly slag and silt	ND	Very Heterogeneous with very large reinforced concrete and construction debris and small boulder slag	Yes	AMP01, AMP02,AMP03, AMP04, AMP05, AMP06, AMP08, AMP09, AMP10
SAMP-2	Medium to large gravelly bedded slag, some silt	ND	Moderately homogeneous gravelly slag	No	NA
SAMP-3	Fine to coarse gravelly slag and silt	ND	Heterogeneous with some reinforced concrete and construction debris and small boulder slag	Yes	NA
SAMP-4	Coarse to small gravelly silt with some clay beneath debris	ND	Construction debris on surface. Soils beneath debris difficult to observe	Yes	AMP01, AMP02,AMP03, AMP04, AMP05, AMP06, AMP07, AMP08, AMP09, AMP10
SAMP-5	Fine to large gravelly slag, some silt	ND	Moderately homogenous gravelly slag and pale yellow brick (non-suspect ACM). Few boulder slag	No	NA
SAMP-6	Fine to coarse revert with silt and gravel	ND	Heterogeneous small to boulder slag and revert and fine to coarse revert with bricks and construction debris	Yes	AMP01, AMP02,AMP03, AMP04, AMP05, AMP06, AMP09, AMP10, AMP11, AMP12
SAMP-7	Coarse to small gravelly silt with some clay	ND	Moderately homogeneous silt with gravelly slag and vegetation/trees	No	NA
SAMP-SMB	Fine to coarse revert	Trace (<1%)	Heterogeneous small to very large boulder slag and revert and fine to coarse revert, some bricks, concrete and debris	Yes	AMP11, AMP12

SAMP-X = Soil Sample
NA = Not Applicable
ND = Non-detect
Trace = Identified as containing <1% asbestos

Attachments: Figure 1 – AMP Location Map

Attachment A: Photographs
Attachment B: Bulk Sampling Logs
Attachment C: Laboratory Analytical Reports
Attachment D: Inspector Certification

ATTACHMENT C
GOLDER REQUIREMENTS FOR STANDARD LABORATORY PROCEDURE/INCREMENTAL SAMPLING METHODOLOGY HANDLING AND SUBSAMPLING

June 2013

GOLDER REQUIREMENTS FOR STANDARD LABORATORY PROCEDURE / INCREMENTAL SAMPLING METHODOLOGY HANDLING AND SUBSAMPLING

The following laboratory procedure was prepared to support the Incremental Sampling Methodology (ISM) approach, which can be found in ITRC (2012) relating to sampling of particulate solids. The ISM approach provides a means for the reduction of sampling error in a systematic fashion in order to obtain a sample that is representative of the material being sampled.

The ISM approach provides methods used to obtain proper field samples and, from such samples, to obtain proper laboratory aliquots. Some of the aspects of the approach include:

- Taking measures to ensure that every portion of a given sampling unit has an equal opportunity of being selected during sampling in the field, and that every portion of a sample has an equal opportunity of being selected during aliquot preparation in the laboratory.
- Reducing the size of the largest particle size in a sample to substantially reduce the largest component of particulate material sampling error.
- Use of systematic incrementing (i.e., compositing) with a random start in the field and in the laboratory to ensure representativeness of the sample and the aliquot, respectively.
- Use of field sampling tools and laboratory subsampling tools that avoid bias in terms of particle size.

Laboratory preparation procedures detailed below incorporate ISM techniques to minimize sampling error at the laboratory.

- Laboratory receipt of ISM sample.
- Dry the sample at a temperature between 80 to 105 degrees C, until free flowing.
- The sample material will be pulverized with a puck mill or alternate size reduction instrument. The material should be reduced to at least a 0.2 centimeter fraction (number 10 mesh). The purpose of the grinding is to reduce the particle size of the sample.

Surplus material will be prepared by the laboratory as necessary to meet the QC standards for duplicates and matrix spikes, as required by the applicable method and laboratory SOP. There are very distinct and necessary steps in ISM incremental sampling, which constitutes a modification to the detailed SOP received from the laboratory. The ISM incremental sampling methods described below are required to ensure proper sampling.

The steps required for laboratory incremental sampling should be performed using a ‘pan & grid’ method to collect 30 laboratory increments, as follows:

1. The pan will accept the dried, desegregated and sieved sample material, to be spread into an approximate uniform depth (for example, 1 to 2 cm).
2. Place a grid with regularly spaced cells of uniform dimension over the spread of the material.

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3. Select the grid nodes to be collected into an aliquot for analysis in a systematic collection sequence, with a random start. That is, the first laboratory increment will be collected from one of the grid nodes selected randomly from all of the available grid nodes.
4. Systematically collect laboratory increments to be composited into the analytical aliquot.
5. Collect one duplicate sample from one of the ISM samples, to be randomly selected by the laboratory. The duplicate sample will be collected after the initial set of subsamples are collected, as described above, in the same manner as the initial sample and from the leftover material. The laboratory will designate the duplicate sample with a "D" suffix on the sample identification number, and analyze the duplicate samples in the same manner as the other samples.
6. A square-bottomed scoop device will be used to collect the increment from each selected grid node (a square-bottomed scoop collects material from the entire sampling interval, whereas a round-bottomed scoop preferentially collects the larger materials at the top, which discriminates from the smaller particles at the bottom of the sampling interval). The scoop must retrieve the material from the entire depth of material contained in the selected cell.

The laboratory incremental sampling routine will be applied for dividing materials to generate the required volume for the given analytical test. The sample volumes are summarized below.

Sample Media	Analysis	Aliquot Mass	Total Number of Field Samples
Debris pile ISM Samples	Metals, SVOCs		7
Debris pile grab samples	VOCs		7
Equipment Blanks	Metals, SVOCs, VOCs		1

REFERENCES

Interstate Technology & Regulatory Council (ITRC). 2012. Incremental Sampling Methodology. ISM-1. Washington, D.C.: Interstate Technology & Regulatory Council, Incremental Sampling Methodology Team. www.itrcweb.org.

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