FINAL REPORT – EASTERN HILLSIDE, SOUTH SPRING, & SOUTH YARD
FORMER CERRO METAL PRODUCTS BELLEFONTE FACILITY
SPRING TOWNSHIP, CENTRE COUNTY, PENNSYLVANIA
PADEP FACILITY ID #14-17981
PF# 722142 AND REM# 39040

June 2011

Prepared for:

The Marmon Group, LLC
Chicago, Illinois

Prepared by:

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Steven James Treschow, Professional Geologist

CHAMBERS
ENVIRONMENTAL GROUP, INC

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June 8, 2011

Ms. Cheryl Sinclair, P.G.
Pennsylvania Department of Environmental Protection
Environmental Cleanup Program
208 West Third Street, Suite 101
Williamsport, PA 17701

RE: Final Report – Eastern Hillside, South Spring, & South Yard
Former Cerro Metal Products Bellefonte Facility
Spring Township, Centre County, Pennsylvania
PADEP Facility ID #14-17981
Permitted Facility # 722142 and Remedial ID # 39040

Dear Ms. Sinclair:

Chambers Environmental Group, Inc. (Chambers) is pleased to provide this Final Report for the Eastern Hillside, South Spring, and South Yard areas of the former Cerro Metal Products facility located in Bellefonte, Pennsylvania (PA) for your review and comment. This Final Report contains a brief summary of the project, a brief description of the regulatory structure, a conceptual site model, a summary of site characterization/remedial activities completed, and a demonstration of attainment for the selected remedial standards.

Sincerely,

Steven J. Treschow, P.G., CPG
Professional Geologist

Matthew C. Whitman
Project Manager

Enclosure

cc: Mr. Ray Avendt, Ph.D., P.E., The Marmon Group
Ms. Marcy Eckley, Bolton Metal Products
P:\2000 PROJECTS\2008\08-061709 - Marmon Eastern Hillside Task 19\Final Report\Final Report 06.08.11.doc

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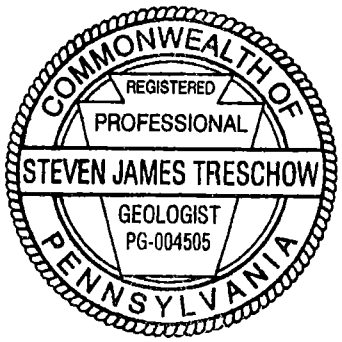
PROFESSIONAL GEOLOGIST CERTIFICATION

I, Steven James Treschow, a Registered Professional Geologist licensed in the Commonwealth of Pennsylvania (PG004505), have participated in the preparation of the document titled, *"Final Report – Eastern Hillside, South Spring, & South Yard, Former Cerro Metal Products Bellefonte Facility, Spring Township, Centre County, Pennsylvania, PADEP Facility ID#14-17981, PF# 722142 and Rem# 39040"* I certify that the geologic and hydrogeologic content of this document, as prepared by the signing licensed Professional Geologist, are consistent with the applicable geologic and hydrogeologic standards of the Technical Guidance Manual for Pennsylvania's Land Recycling Program and Act 2.



6/8/2011

Steven James Treschow, Professional Geologist

(Original Document bears Crimp Seal, Stamp, and Signature

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1.0 SUMMARY AND REGULATORY STRUCTURE

The Marmon Group, a Berkshire Hathaway Company (Marmon), previously owned the stock of Cerro, before selling the stock to Bolton MKM Corporation (Bolton). As part of the sale's agreement, Marmon retained the environmental liability for the site. Marmon contracted Chambers Environmental Group, Inc. (Chambers) to assist in the process of obtaining an Act 2 Relief of Liability for the site using Pennsylvania Department of Environmental Protection's (PADEP) Statewide Health Standard (SHS).

The Cerro site consists of approximately 150 acres, 19 of which the plant occupies. The Cerro property is depicted on **Figure 1** of **Appendix A**. The site characterization was conducted in multiple phases in order to define specific areas for remediation. As part of the characterization process, Marmon submitted revised Notice Of Intent to Remediate (NIR) documents in July of 2009 to address specific sites as defined in PA Code, Title 25, Chapter §250.1. The characterization resulted in the identification of six distinct areas: the North Yard, Plant 1, South Spring, Plant 4, South Yard, and the Eastern Hillside (**Figure 2** of **Appendix A**). Each of the six areas was characterized and the results of the investigation are summarized in Volume I of II of the March 31, 2010 Remedial Investigation Report (RIR) (Chambers, 2010). The site characterization revealed that soils from the Eastern Hillside were not impacted with volatile organic compounds (VOCs) or other site-related constituents-of-interest (COI), no impacts were identified in groundwater within the South Yard, and no COI were identified in the South Spring Area. The PADEP approved the RIR in correspondence dated July 2, 2010. The PADEP assigned the Eastern Hillside, South Spring, and South Yard areas Permitted Facility PF# 722142 and Remedial ID # 39040. The three areas were combined based upon historic usage, the lack of impacts to subsurface media, and the type and degree of interim remedial actions completed.

The site characterization has been conducted in phases over the past 17 years. Historically, a Consent Order and Agreement (COA) was issued by the Pennsylvania Department of Environmental Resources (PADER, now PADEP) on November 21, 1994 to address various issues regarding the characterization and remediation of certain areas of the Cerro plant. The PADER required Cerro to address environmental and health and safety issues within and around the plant. These issues are summarized below along with the date that the issue was addressed by either Cerro or their consultant.

Table 1
COA Requirements

COA Issue	Obligation	Date Completed	Notes
Immediate Response Measures	Sediments and sludge removed at outfall samples SED 40 and 44	July 29, 1994	
	Address baghouse dust	June 21, 2005	Air permit was modified
	Remediate metals and PCBs in existing soils, slag, sediment, dust and metal fines	February 14, 1994	Letter detailing analytical results of Plant 4 baghouse; Currently ongoing through Act 2 process
	Plug Unused Drains and prevent drains' discharge to Logan Branch	2007 through 2008	Drains are identified and subsequently abandoned
	Pave previously unpaved areas	1994	All areas of plant have been paved by this date
	Stabilize stream banks	March 29, 1995	
Current Health Screening Documents	Submit all documentation for past five years	December 2, 1994	
Remediation Reporting	Submit report detailing remediation for past seven years	October 1, 1994	
Fish Tissue & Stream Sediment Monitoring	Submit biennial fish tissue samples for total PCBs, Pb, Cu, and Zn	October 31, 1994	December 2000, PADEP concluded not necessary to analyze fish tissue from Logan Branch
	Sample Logan Branch sediment for PCBs, Pb, Cu, Zn	October 10, 1995	
Response Work Qualifications	Retain qualified consultants	Multiple consultants have been hired to complete work at the plant	Geraghty & Miller and Mountain Research were retained
Work Plan Submittal to PADEP	Work plan must be Approved by PADEP to address COA	October 1, 1995	
Additional Assessment Activities	Surface water seeps to be tested	March 31, 1996	
	Sediment Study and Spring Creek Assessment	March 31, 1996	
	Streambank assessment	March 1, 1995 and March 31, 1996	
	Airborne Particles – Assess air dispersion and Pb, Cu, Zn contamination	June 2, 1997	Summary of soil quality conditions of hillsides
Detailed Site Plan	Site Characterization Work Plan	October 19, 1994	Volumes I, II, III submitted by Geraghty & Miller
Site Remediation Plan	Site Remediation Plan	February 2, 1995	Habitat improvement has been completed under supervision of Mark Hartle, PA Fish & Boat Commission
	Groundwater contamination	Currently under Act 2 process	
	Soil contamination	Currently under Act 2 process	
	Logan Branch fine stream sediments remediation	February 17, 1995	Great Lakes Environmental Services completed this work
	Stormwater permits	Currently in place	
Water Supply	Cerro shall report on all public and private supply wells within 2,500 feet of the site	January 17, 1995	Completed by Geraghty & Miller

There are other requirements within the COA. However, these issues largely pertain to permit requirements, reporting requirements, civil penalties, stipulated penalties, oversite costs, and transfer of the site. These issues are not pertinent to this report. Therefore, there are no outstanding issues regarding the COA and due to the initiation of the Act 2 Land Recycling Program, the COA has been superseded. Groundwater and soil contamination is being addressed through the characterization and remediation currently taking place.

In accordance with PA Code, Title 25, Chapter § 250.312, a Final Report must be submitted when the SHS has been attained. Chapter 250.312 specifies that a Final Report shall include a summary of the site characterization which includes, but is not limited to, the following: historic use of the property, historic usage of regulated substances, source characterization, development of a conceptual site model, delineation of the horizontal and vertical extent of contamination, fate and transport analysis of COI, descriptions of sampling and decontamination methodologies and analytical quality assurance/quality control procedures, soil boring/monitoring well logs, laboratory analytical data, determination of the physical and geochemical properties of the media of concern (including sampling data, descriptions, and methodology), evaluation of ecological/sensitive receptors, and a formal demonstration of attainment for the selected standard.

2.0 SITE CHARACTERIZATION

2.1 Historic Property & Regulated Substance Use Summary

Historic operations at Cerro have included forging, machining, melting, casting, pickling, drawing, and the finishing of metals, specifically copper and brass. The manufacturing operations flowed in a southern to northern direction through the site buildings. Raw and scrap metals, which have included copper, zinc, lead, brass, and other alloying metals, were delivered to the South Yard before being deposited into Plant 4 where they were housed in the southern most section of Plant 4 to prevent contact with precipitation. Cerro previously handled and stored various lubricants, oils, degreasers, sulfuric acid and hydrogen peroxide for operations conducted on site. The Eastern Hillside historically was undeveloped land and not utilized as part of the manufacturing operations. The South Spring Area historically contained administration buildings, parking, and a pond used for an emergency fire suppression system. The South Yard historically contained a bag house, scales, and parking and was utilized for receiving of raw materials.

2.2 Historic Investigation Summary

Historic investigation activities in the Eastern Hillside, South Spring, and South Yard were based upon the limited previous use of each portion of the property. There were no earlier environmental investigations conducted in the South Spring or South Yard areas. However, an area of the Eastern Hillside was potentially affected by the airborne deposition of particulate matter from former melting furnace operations. The contaminants consisted of particulate matter containing metals (copper, lead, and zinc). The early air emission modeling studies conducted by Geraghty & Miller indicated an area potentially affected by metals from the former melting furnace operations. This model was updated and rerun in 2008 by Environmental Resource Management, Inc. (ERM) to determine the potential Area-of-Concern (AOC) from both the historical melting furnace operations with no pollution controls and the relocated melting furnace stack emission point with the installed baghouse for particulate control (please note that all melting furnace operations ceased in 2008).

The area of the Eastern Hillside potentially affected by the airborne deposition of particulate matter containing metals (both before and after installation of the baghouse) is extremely steep with exposed limestone bedrock terrain and a thin soil profile. The existing vegetative cover is limited to sparse ground cover, and tree growth is limited. Soil samples were collected on the Eastern Hillside by previous consultants to determine if metals were above the applicable PADEP Soil-to-Groundwater Used-Aquifer (total dissolved solids $\leq$2,500 milligram per liter (mg/L)) Non-Residential Statewide Health Standard (UANRSHS) Medium Specific Concentrations (MSCs). The metal (copper,

lead and zinc) concentrations were found to be elevated, but none found to be over the PADEP UANRSHS MSCs.

2.3 Methods and Procedures

The following subsections detail the methods and procedures utilized by Chambers to complete the site characterization investigative activities at the site. The results of the investigative activities are presented following the discussion of the methods and procedures utilized throughout the investigation. The site characterization activities were performed in accordance with the general site characterization requirements outlined in Act 2 (25 PA Code Chapter 250, Subchapter C) and the Pennsylvania Land Recycling Program Technical Guidance Manual (TGM) (PADEP, 2002). The methodologies presented in the following subsections reflect standard operating procedures for Chambers and are consistent with general and accepted industry practices. Chambers could not verify if the methods and procedures described in the following section were utilized by other entities that completed historic site characterization activities.

All work performed by Chambers was in compliance with the *Chambers' Health and Safety Plan* (HASP). Addendums to the Chambers HASP were prepared in order to address site-specific health and safety issues, including identification of COI, emergency contact information, emergency response services, and location and directions to the nearest medical facility.

2.3.1 Soil Boring, Logging, and Field Screening

Soil borings were advanced onsite by direct-push (Geoprobe®) boring and a hollow-stem auger drill rig using split spoon sampling by Bassett Environmental Associates Inc. (BEA), who is a licensed PA drilling firm. The direct-push method utilizes a 2-inch outside diameter (OD) and 1.5-inch inside diameter (ID) by 4 or 5-foot long hollow sample barrel (depending upon the exact model Geoprobe). Each barrel (with disposable acetate interior liner) was driven into the subsurface by means of a hydraulic ram/hammer. After driving the sampler to the desired interval, the sample barrel was retrieved from the borehole and the acetate liner removed. The soil-filled liner was then cut open and logged by the supervising field personnel. Samples designated for analyses or field screening were collected from the liner and placed in appropriate sample/screening containers. Borings and/or split spoons were advanced to refusal within the overburden materials. Hollow-stem auger drilling and split spoon soil sampling was completed in accordance with American Society of Testing & Materials (ASTM) D-1586 (Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils).

Logging of each soil boring was performed by the supervising field personnel and included descriptions of the physical characteristics of the soil (e.g., color and texture), classification according to the United States Department of Agriculture (USDA) or the Unified Soil Classification System (USCS), visual and olfactory observations of the presence/absence of petroleum related compounds, field screening results, and observations of the occurrence of saturated conditions/groundwater. Logging results are included on the soil boring logs included as **Appendix B**.

Field screening of soil samples was completed for soil borings to provide qualitative data for vertical delineation, and to facilitate selection of the subsurface soil intervals exhibiting potential impacts from site-related constituents. The field screening method utilized a photo ionization detector (PID) equipped with an 11.7 electron-volt (eV) lamp. Soil samples for field screening were prepared by crushing a representative sample from each 2-foot depth interval into a re-sealable, plastic freezer bag (Ziploc®) or similar container. The bag was then closed and sealed while maintaining an air void within the bag. The filled and sealed bag was then set aside to equilibrate and permit volatilization of constituents into the bag's headspace. At the end of the equilibration period, the tip of the PID probe was inserted into the plastic bag and the total volatile organic head-space concentration was measured and recorded. The results of the field screening are presented on the soil boring logs included as **Appendix B**.

Collection of soil samples for laboratory analyses was performed at various locations across the site. In general, samples were collected at 0-6 inches below ground surface (in-bgs) below the asphalt/concrete/soil surface, at 120-126 in-bgs, at the groundwater interface, and just above auger or Geoprobe® refusal/bedrock. Soil samples were also collected based upon visual observations, olfactory observations, and/or PID measurements.

Soil samples were collected from the disposable sampling device (acetate liner from the direct-push sample barrel or split spoon) and placed directly into the laboratory-supplied sample containers. A sample aliquot was collected from the sampling device by means of a dedicated and disposable syringe; approximately three, 5-gram samples were collected from the soil interval and then dispensed into one methanol-preserved 40-ml vial and two sodium bisulfate preserved 40-ml vials. Additional soils representative of the sample interval were removed from the sampling device and packed into an unpreserved 40-ml vial or 4-ounce jar for analysis of percent moisture to enable a dry-weight conversion of the analytical results.

All soil samples were submitted to American Westech (Westech), of Harrisburg, PA for analysis. The soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and polychlorinated biphenyls (PCBs), and metals or some combination if the soil sample was

biased, via USEPA Methods SW846 8260B, SW846 8270C, SW846 8015 DRO, SW846 8082, and SW846 6010B or 7471A, respectively, and were accompanied by Chain-of-Custody documentation. Quality assurance/quality control (QA/QC) measures utilized during soil sample collection are discussed in Section 2.3.5 of this report.

Sealing and abandonment of all exploratory borings was completed following soil sample collection. Boreholes were sealed with bentonite chips/pellets placed within the open borehole to the approximate ground level. The bentonite chips/pellets were hydrated with potable water to ensure a proper seal. Each boring was subsequently surveyed to provide a record of its location and elevation.

2.3.2 Groundwater Monitoring Well Installation

Drilling and installation of monitoring wells SB-90U-S and SB-90U-D was completed by BEA using nominal 8 ¼ -inch hollow stem auger drilling and 6-inch air rotary drilling and standard well construction methods. Shallow boreholes were advanced to auger refusal and completed based upon the depth of the weathered/competent bedrock interface observed at the time of drilling. Bedrock boreholes were advanced into saturated conditions and completed based upon observations made in regards to the presence of groundwater in bedrock at the time of drilling.

Soil and bedrock cuttings were examined for visual and olfactory observations of the presence/absence of VOCs. Observations of the occurrence of groundwater were made as drilling progressed. The cuttings were stockpiled on site for characterization and disposal at a later time.

Monitoring well construction was completed in accordance with PADEP's "Ground Water Monitoring Guidance Manual" (Guidance Manual). A 2-inch inside-diameter (I.D.) polyvinyl chloride (PVC) monitoring well, consisting of a slotted screen interval and a solid riser, was constructed within the borehole for each well. A clean quartz sand pack was placed in the annular space surrounding the well screen to a level approximately 2 feet above the top of the screened interval. A minimum 2-foot thick bentonite seal consisting of 3/8-inch bentonite pellets was placed over the sand-pack and hydrated with potable water to ensure an adequate seal. Surface finishing of each new well included a bolt-down, flush-mount manhole set within a concrete pad. Bedrock groundwater monitoring wells were sealed at or below the overburden/bedrock interface to prevent vertical communication between the two aquifers.

Logs detailing the installation and construction of each groundwater monitoring well are provided in **Appendix B**. Groundwater monitoring well logs were prepared under the supervision of a Professional Geologist licensed in the Commonwealth of Pennsylvania.

Development of each monitoring well was completed using a combination of pumping and surging. The pumping and surging method utilized a decontaminated submersible electric pump with disposable high-density polyethylene (HDPE) tubing. The wells were surged by rapidly raising and lowering the pump across the saturated screened interval of the well during pumping.

Water level and total depth measurements were recorded in each well prior to development to determine the volume of water present within the well (well volume). Personnel performing the activity periodically evaluated the progress of development through a qualitative assessment of the apparent groundwater quality (i.e., quantity and nature of removed sediments and water clarity). Development activities were deemed to be complete based on the following: a minimum of five well volumes were removed; turbidity and suspended solids decreased; and sediments from the bottom of the well casing were removed.

Each groundwater monitoring well was subsequently surveyed to provide a record of its horizontal location, adjacent ground surface elevation (top of flush mount well cover and natural ground surface), and to establish a reference elevation (e.g., top of PVC well casing) from which to collect depth-to-groundwater measurements (to be converted to groundwater elevations). The survey of the site was completed by a professional land surveyor licensed in the Commonwealth of Pennsylvania. Surveying activities are described in detail in Section 2.3.4.

2.3.3 Groundwater Monitoring and Sampling

Groundwater monitoring activities completed during the site characterization included fluid-level monitoring and groundwater sampling. Fluid-level monitoring included the identification, determination, and measurement of the water level and separate phase liquid (SPL) (if present) within groundwater monitoring wells. Fluid-level monitoring was performed during groundwater sampling events in site monitoring wells with an electronic-level indicator capable of detecting and discriminating between water and non-aqueous phase liquids (NAPLs). The device provided both an audible and visual indication of the presence of liquids and depths-to-liquids were determined from the graduated markings on the line connecting the probe in the well with the device at the surface.

Fluid-level measurements were performed by slowly lowering the interface probe into the monitoring well until the alarm (visual and/or audible) indicated the presence of the uppermost fluid level (either water or SPL). The precise measurement of the depth to the top of the fluid was then determined by repeatedly raising and lowering the tape to converge on the exact measurement (to hundredths of a foot) then reading the depth of the probe (from the graduated markings on the line) as feet below the well's surveyed

reference point. The reference point is marked on the top of each well's PVC casing. The probe indicated what type of fluid the probe was contacting by emitting differing audible tones. Once the upper fluid level was measured, the probe was lowered to the bottom of the well to determine the total depth of the well. Fluid-level measurements were recorded in the field notebook.

The monitoring and sampling activities also included the collection and analysis of groundwater samples. Sampling of the site monitoring well network was performed in accordance with the PADEP's Groundwater Monitoring Guidance Manual and generally accepted industry practices.

The general methods employed during the groundwater sampling/monitoring events included the following:

- Completion of fluid-level measurements by the methods previously described. The depth-to-groundwater was measured using an electronic water level indicator after each well top was opened and the water table was allowed to stabilize. The instrument was thoroughly decontaminated between wells to prevent cross-contamination.
- Subsequent to gauging the groundwater level, at least three well volumes of water were purged from each well via the use of a submersible pump. A new piece of poly-tubing was used for each well to avoid possible cross-contamination.

The purpose for purging the wells prior to sampling is to assure collection of a representative sample from the aquifer being monitored. Stagnant water in the well casing may have undergone changes in temperature, pH, or volatile organics concentration. The purge water from each monitoring well was pumped from the submersible pump through a granular activated carbon (GAC) mobile filtering system and then discharged onto the ground surface. During purging activities, the groundwater was monitored for pH, temperature, oxidation-reduction potential (ORP), and turbidity. Upon completion of purging activities, the tubing was raised to the top of the water column, the pumping rate was reduced to approximately 100 milliliters per minute (ml/min), and a groundwater sample was collected.

The groundwater samples were sealed in laboratory supplied glassware, labeled, placed in an iced-filled cooler, and either shipped to the analytical laboratory or returned to Chambers' office. The samples returned to Chambers' office were stored in a refrigerator (at 4 °C) until they were picked up by the laboratory. The samples were submitted to Westech of Harrisburg, PA for analysis. The samples were analyzed for VOCs, SVOCs, PCBs, TPH, and metals via USEPA Methods SW846 8260B, SW846 8270C, SW846 8015 DRO, SW846 8082, and SW846 6010B or 7471A, respectively, and were accompanied by Chain-of-Custody documentation. QA/QC measures utilized during groundwater sample collection are discussed in Section 2.3.5 of this report.

2.3.4 Surveying

A boundary and site survey of the property and area of investigation was completed by Land & Mapping Services, Inc. of Clearfield, PA, ELA Group, Inc., and Kerry Uhler & Associates, Inc. of Bellefonte, PA. The survey included a full boundary retracement survey to establish property boundaries, as well as the location of buildings, structures, edges of pavement/cartway, underground utility lines (those marked out by PA One Call), overhead utility lines, monitoring well locations (ground surface, top of manhole cover, and top of PVC riser at each location), adjacent stream location (Logan Branch), and the Pennsylvania Department of Transportation (PADOT) right-of-way location. Horizontal locations are in the PA State Plane coordinate system and elevations are in feet above mean sea level (ft-amsl) and referenced to the North American Datum of 1983 (NAD 83). The survey was completed by a registered Professional Land Surveyor licensed in the Commonwealth of Pennsylvania.

2.3.5 Quality Assurance/Quality Control

QA/QC samples collected during the field investigation activities performed by Chambers included trip blanks and duplicate samples.

Trip blank samples were obtained from the laboratory and were submitted with groundwater and soil samples for analyses of site COI. The trip blank samples were used to determine potential exposure of the samples to ambient contamination that could compromise the integrity and validity of the samples. The trip blank samples are maintained with the primary samples from bottle preparation at the laboratory, to the field for use, and returned to the laboratory for analysis. The trip blank sample may also be used to determine the presence of laboratory contaminants at the time of analysis.

Duplicate soil and groundwater samples were collected throughout the site characterization. Duplicate groundwater samples are collected by simultaneously filling two sets of sample bottles from one sample location. Duplicate soil samples were taken by filling two sets of sample bottles from one sampling location/depth. Duplicate samples were given fictitious identifications and submitted to the laboratory as "blind" samples. These duplicate samples provide a quantifiable measurement as to the degree of the laboratory's ability to reproduce a given result, and the reproducibility of the sampler and sampling method.

2.3.6 Sample Management

Samples collected for laboratory analysis were handled and managed in accordance with standard chain-of-custody (COC) procedures and generally-accepted industry practices. COC forms were completed for samples submitted for laboratory analysis. The COC form included, at a minimum, the following information:

- Site identification (site name).
- Site contact person and phone number.
- Sampler(s) name.
- Sample location, identification, time, and date.
- Analyses requested.
- Number of samples.
- Special instructions to the laboratory.

The completed COC form accompanied soil and groundwater samples from collection to receipt at the laboratory and documents all handling of the samples. Copies of the COCs for the soil and groundwater investigation are included with the corresponding analytical reports in **Appendix C**.

Immediately following their collection, samples were placed in a durable cooler with ice pending pick-up by laboratory, or overnight shipment to the lab. Each sample container was labeled with the following minimum information:

- Site identification.
- Sample identification, time, and date.
- Preservative (if any).
- Sampler's initials.
- Analyses to be performed.

Samples were sealed within a water-tight plastic bag (e.g., Ziploc®) and ice was placed in the coolers to maintain acceptable sample temperatures during transport to the laboratory.

2.3.7 Decontamination

Dedicated equipment and materials were used where applicable and appropriate throughout the investigation. Non-dedicated and/or non-disposable equipment used for soil boring and sampling, groundwater monitoring well installation, and development and sampling were decontaminated prior to and/or after use and exposure to site soils and groundwater. The procedures of equipment decontamination varied according to the type of equipment, equipment use, and data objectives of the particular phase of the investigation. All procedures maintained the same overall objective of minimizing the potential for cross-contaminating samples and media during the implementation of investigative activities. The following section describes the typical decontamination procedures for the various investigative tasks.

Soil boring and sampling equipment that came into contact with subsurface soils and groundwater were decontaminated to varying degrees depending on the type of

equipment, the data objectives, and the location of the soil boring. The general decontamination procedure for excavation and sampling equipment, general heavy equipment (drill rigs, etc.), and miscellaneous hand tools (shovels, wrenches, etc.) included the following:

- Initial pressurized water wash.
- Follow-up detergent wash (if necessary).
- Multiple water rinses (to remove detergent).
- Additional pressurized water wash (if necessary).

Decontamination of the submersible pumps used for well development and sampling included a wash with detergent (e.g., Liquinox™ or Alconox™) and water solution, followed by multiple water rinses. Internal workings of the pumps were decontaminated by running the pump in the detergent/water cleaning and water rinse solutions. Pumps were then inverted to allow excess liquid to drain from the pump. Decontamination of fluid-level monitoring probes included a wipe with a clean rag/paper towel to remove adhered substance or debris, followed by a detergent or solvent rinse, and multiple rinses with deionized water.

2.3.8 Project Documentation

Field activities and observations were recorded on one or more of the following:

- Project Field Notebook.
- Photographs.
- Sampling COCs.

The project field notebook was used to record a chronological history of site activities, including: site identification, Chambers project number, field dates, weather conditions, personnel and equipment used, measurements, and notes of any observations made while on-site.

Photographs of various activities were taken to provide a visual archive of site investigative and monitoring activities. These photos supplement field notes and are maintained in the project files for future reference.

2.3.9 Investigation-Derived Wastes

Investigation-Derived Waste (IDW) material generated through the completion of the site characterization and monitoring activities included the following:

- Decontamination fluids.
- Fluids from monitoring well development, purging and sampling.

- Soil and rock cuttings from drilling activities.
- Personal protective equipment (PPE).
- Acetate liners utilized for soil sampling.
- Plastic tubing.
- Packing materials.

PPE, acetate liners, plastic sheeting, tubing, and packing materials were disposed through the local residual waste management system. Decontamination fluids and groundwater generated by groundwater well development, purging, and sampling were discharged to the ground surface on-site following treatment through a portable, 10-gallon GAC unit. Drill cuttings were screened with a PID, segregated based upon the PID screening, and stockpiled on plastic (if impacts were observed) pending disposal.

2.3.10 Quality Assurance Plan

Chambers and Marmon completed a Quality Assurance Project Plan (QAPP) as part of the Remedial Investigation which outlined the areas and constituents to be sampled for and at what locations. The QAPP is included in **Appendix D**. The QAPP provides additional information concerning the QA/QC procedures utilized throughout the completion of the site characterization.

2.4 Overall Site Characterization Approach

Each of the six areas of the site was investigated by using a multitude of resources available to Chambers. Historical drawings, employee interviews, soil sampling, groundwater sampling, surveying, and groundwater modeling were used to characterize the study areas. Chambers advanced 94 unbiased soil borings and 26 biased soil borings in the investigated areas. Unbiased soil borings were placed within a 100-foot by 100-foot grid over the plant, while the biased soil borings were placed in specific locations due to known historical activities. The unbiased soil boring soil samples were analyzed for VOCs, SVOCs, TPH, PCBs, and metals in at least three different subsurface elevations; below surface in the unsaturated zone, at or above the water table (at the time of sample collection), and directly above the bedrock. Biased soil samples were analyzed specifically for the known constituents thought to have been present at one time or historically utilized as part of site operations in the specific area of the sample.

Soil sample locations that reportedly contained constituent concentrations above their respective PADEP UANRSHS MSC were also selected for groundwater monitoring well locations in order to determine if groundwater had been impacted by the constituent of interest (COI). Groundwater characterization began by installing bedrock wells, screened entirely within the bedrock with a seal between the bedrock and overburden to prevent communication between aquifers. Next, overburden wells were installed within a ten foot

radius of each bedrock well. These wells were then sampled to determine if the groundwater within the specific area needed further characterization. A working total of 70 monitoring wells were installed across the areas investigated.

As part of the overall site characterization, a hydrologic model was developed to understand drainage patters and stormwater runoff across the entire Cerro property. The model developed catchment areas for each particular portion of the site. The purpose of evaluating stormwater flow was to determine if runoff and sedimentation were contributing VOCs and/or metals to Logan Branch. The hydrologic model and stormwater runoff are discussed in more detail in the following sections of this report.

In summary, site characterization activities included soil borings, soil sampling and analysis, groundwater monitoring well installation, groundwater monitoring, sampling, and analysis, stormwater/drainage evaluations, sediment sampling/analysis, and surface water monitoring.

2.5 Eastern Hillside Characterization

The Eastern Hillside consists of 73 acres of extremely steep forested lands with two power transformer stations. The Eastern Hillside, as it currently exists, is depicted on **Figure 3** of **Appendix A**.

The potential AOC is limited to the portion of the Eastern Hillside potentially affected by the airborne deposition of particulate matter from the historical melting furnace operations. The contaminants are particulate matter containing metals (copper, lead, and zinc). The historic air emission modeling studies conducted by Geraghty & Miller indicated an area affected by metals from the former melting furnace operations. This model was updated and rerun in 2008 by ERM to determine the potential AOC from both the historical melting furnace operations with no pollution controls and the relocated melting furnace stack emission point with the installed baghouse for particulate control. It should be noted that the melting furnace operations ceased in 2008.

The portion of the Eastern Hillside potentially affected by the airborne deposition of particulate matter containing metals (both before and after installation of the baghouse) is extremely steep with exposed limestone bedrock terrain and little soil cover. The existing vegetative cover is limited to sparse ground cover and tree growth is limited. Soil samples were collected on the Eastern Hillside by previous consultants to determine if metals were above the applicable PADEP UANRSHS MSCs. The metal (copper, lead and zinc) concentrations were found to be elevated, but none were found to be over the PADEP UANRSHS MSCs.

As a result of historic investigations, Chambers focused the additional characterization activities on the environmental fate and transport of sediment and particulate matter in the

Eastern Hillside runoff. Specifically, the additional characterization of the Eastern Hillside soils focused on an evaluation of stormwater runoff/drainage patterns and sediment quality.

A hydrologic model was developed by AMEC Earth & Environmental, Inc., (AMEC) to understand stormwater runoff drainage patterns from storm events for the Eastern Hillside. The AMEC report was previously submitted to the PADEP in the RIR. The model indicated the entire Eastern Hillside has nine drainage areas that contribute runoff into or onto Cerro property before discharging into Logan Branch. The drainage patterns along with historic soil analytical data were utilized to determine the most representative locations for sediment samples and evaluate potential alterations to the on-site stormwater conveyance system. The goal of the sediment sampling and stormwater routing evaluation was to minimize sediment and potential contaminant (metals) loading to Logan Branch.

The ultimate fate of sediment from the Eastern Hillside was the stormwater catch basins along SR 144. Samples of the sediment in the catch basins along SR 144 (SR 144-A, B, C, and D) were collected on May 26, 2009 and analyzed for metals, diesel range organics (DRO), and PCBs. The locations of the catch basins are depicted on **Figure 4** of **Appendix A**. **Appendix D** includes the results of these analyses for the stormwater catch basins along PA SR 144. SR 144 Catch Basin A is the storm basin near the southern most section of Plant 4 (South Yard) and SR 144 Catch Basin D is just north of the administration building. The other two catch basins are located between A and D. Catch basins B and C receive storm water runoff from the previously discussed area of the Eastern Hillside potentially affected by the airborne deposition of particulate matter from the melting furnace operations.

Table 2 presents the concentrations of metals in the catch basin sediment samples where the respective PADEP UANRSHS MSC was exceeded. It should be noted that metals exceedances were limited only to lead. No other exceedances were identified. The locations of these sediment catch basins are identified in **Figure 4**.

Table 2
Lead Results for Catch Basin Sediment Samples
(Unsaturated UANRSHS – 450 mg/kg)

Sediment Sample ID	Concentration
Storm Drain Samples	Lead
144C	730
144D	698

Note: Metals – all units in mg/kg.

Because catch basin C contributed drainage to the South Spring Pond, the sediment in the South Spring Pond was initially characterized by the collection of four sediment samples (Spring Pond #1 through Spring Pond #4), one in each quadrant of the pond. It was

further characterized with an additional eight sediment samples (SP-5 through SP-12). The laboratory analyses of the sediment in the South Spring Pond sediment samples reported no exceedances for metals or DRO as compared to the respective PADEP UANRSHS MSCs. The lack of exceedances in the pond sediment indicates the SR 144 catch basins are effectively preventing impacted sediment from discharging to the South Spring Pond and eventually to Logan Branch. The complete analytical results for the South Spring Pond sediment samples are included in the **Appendix D**.

The South Spring Pond is fed by a natural spring and previously by the stormwater from catch basin C. In order to protect of the pond and subsequently Logan Branch, the stormwater in the south spring area was rerouted. **Figure 5A** of **Appendix A** depicts the rerouting of the stormwater conveyance system. The goal of the stormwater rerouting was to separate the spring discharge from the stormwater and to enhance the sediment removal capability of the stormwater collection system. **Figure 5B** of **Appendix A** depicts the stormwater conveyance system as it currently exists. The additions and/or alterations to the stormwater system are depicted in blue and include the following:

- The installation of a new sedimentation basin with a snout to treat stormwater coming from catch basin C. A snout is an in-line structure which reduces and/or prevents floatables and trash, free oils, and sediment from passing through.
- The installation of two new sedimentation basins with snouts to collect and treat stormwater runoff from the paved areas around the pond.
- Installation of a new stormwater line around the South Spring Pond along with an in-line baffled chamber to remove/collect sediment from the water.
- The installation of a new sedimentation basin to treat stormwater coming from catch basin D.

The alterations to the stormwater collection system successfully separated the spring flow from the stormwater runoff. The pond is now entirely fed by the spring and no stormwater and/or sediment is discharged to the pond. The additions of the catch basins and snouts have successfully removed additional sediment and other debris and prevented their discharge to Logan Branch.

In summary, the historic soil sampling/analysis, hydrologic model, sediment sampling and analysis, and stormwater reconfiguration have effectively demonstrated attainment of the SHS and have improved the stormwater quality being discharged to Logan Branch.

Potential contamination of the Eastern Hillside groundwater may also be associated with airborne deposition of particulate metals from the former melting furnace operations. This airborne deposition of particulate metals (copper, lead, and zinc) could potentially contaminate the hillside stormwater runoff via particle detachment and sedimentation and subsequently be detected in the catch basin sediment along SR 144, adsorb to the soil

particles and stay within the soil profile (dependent on soil physical and chemical properties), and/or contaminate the underlying bedrock aquifer. Soil samples collected by previous consultants identified elevated concentrations of metals. However, metals were not present at concentrations above their respective PADEP UANRSHS MSCs. Based on the typical physical and chemical characteristics associated with the Opequon and Hagerstown soil series mapped on the Eastern Hillside, heavy metal contaminants would most likely be held in the soil profile via adsorption and/or runoff when adsorbed to sediment particles.

Given the change in relief between the Plant and Eastern Hillside and the limited overburden on the Eastern Hillside, the first aquifer beneath the Eastern Hillside occurs within bedrock. No groundwater monitoring wells were installed within the limits of the Eastern Hillside due to the inaccessibility of extremely steep slopes and immediate proximity of SR 144, which is located at the base of the Eastern Hillside. Although no wells were installed on the Eastern Hillside, numerous bedrock and overburden groundwater monitoring wells have been constructed along the entire plant property downgradient of the Eastern Hillside. Site observations along the entire operating facility (Plant 1, South Spring, Plant 4, and South Yard) support a regional bedrock groundwater flow from southeast to northwest approximately parallel with Logan Branch.

The topography of the Eastern Hillside slopes across SR 144 toward the plant site. Along the northernmost portions of the Plant site; the top of the bedrock aquifer is represented by the surface water elevation in Logan Branch. There is also a major spring (North Spring) with a recorded flow in excess of 6 million gallons per day (gpd) located at the base of the Eastern Hillside across from the North Yard that discharges into Logan Branch.

Based upon the direction of local and regional groundwater flow, bedrock groundwater from the middle sections of the Eastern Hillside flows under SR 144 and then beneath the Plant 1 and South Spring areas. The quality and flow of bedrock groundwater originating from beneath the Eastern Hillside can be assessed by groundwater elevations in the bedrock groundwater monitoring wells installed in the Plant 1 area. There is also another major spring (South Spring) with a recorded discharge of 1 million gpd discharging through the fire pond into Logan Branch. Metals have not been detected in groundwater samples collected from Plant 1 bedrock wells or the discharge of the South Spring to Logan Branch. The lack of metals in bedrock groundwater indicates metals from the Eastern Hillside are not migrating into solution and being transported downgradient.

Bedrock groundwater from the southernmost portion of the Eastern Hillside flows under SR 144 and then beneath Plant 4 and South Yard. Only one bedrock well in Plant 4 (SB-79U-D) reportedly contained zinc at a concentration above its applicable PADEP UANRSHS MSC. This exceedance is believed to be related to the DNAPL present in the

well and is not considered to be representative of natural bedrock groundwater geochemistry. Therefore, the bedrock groundwater monitoring wells in Plant 4 can likely be relied upon for an adequate determination of potential metal contamination coming from the Eastern Hillside.

Eastern Hillside bedrock groundwater flow under the South Yard area can be evaluated by the bedrock groundwater monitoring well installed in this area. There is also a major spring (South Yard Spring) with a recorded flow in excess of 1.2 million gpd located at the base of the Eastern Hillside across from the South Yard that discharges into Logan Branch. No elevated metals concentrations were reported in groundwater samples from the South Yard bedrock well or the South Spring discharge. South Yard groundwater and analytical data will be discussed in the following section of this report.

2.6 South Spring Characterization

Eight unbiased soil borings, SB-49U through SB-56U, were logged and sampled in at least four depth intervals. No biased soil samples were taken in the South Spring area because of its past use as administrative offices with no recorded manufacturing or chemical storage operations. In all, 26 VOC, 26 metals, and 26 PCB soil samples were collected and analyzed in the South Spring area. Soil Boring locations are identified in **Figure 6** of **Appendix A**. Table 3 identifies soil samples where the respective PADEP UANRSHS MSC was exceeded. Depending on the saturated or unsaturated status of the sample, samples were compared to the respective saturated or unsaturated PADEP UANRSHS MSC.

Table 3
Summary of Exceedances in South Spring Soil Samples

Arsenic
(Unsaturated UANRSHS – 53 mg/kg – 0-2'/ 150 mg/kg – 2-15';
Saturated UANRSHS – 15 mg/kg)

Soil Sample ID	Concentration
Unbiased Samples	
SB-49U-B-12-13'	15.7
SB-49U-C-20-20.8'	15.8
SB-53U-B-5-6'	15.0

Note: Metals – all units in mg/kg.

Chromium
(Unsaturated UANRSHS – 420 mg/kg – 0-2'/190 mg/kg-2-15';
Saturated UANRSHS – 19 mg/kg) – Chromium VI standard used for comparison

Soil Sample ID	Concentration
Unbiased Samples	
SB-53U-B-5-6'	20.8

Note: Metals – all units in mg/kg.

Arsenic and chromium were the only constituents identified above their respective PADEP UANRSHS MSC. Arsenic is not associated with past or present operations at the facility. Given the low levels present and the homogeneous distribution across the site, the detected arsenic concentrations were within typical range of local soils. Chromium was only analyzed for total chromium, not trivalent or hexavalent chromium. Chambers conservatively used the hexavalent chromium standard in comparison with the total chromium results. Based on the comparison, there was potentially one soil sample that exceeded the hexavalent chromium standard; however, this sample concentration was below the trivalent chromium PADEP UANRSHS MSC.

Soil samples in this area were analyzed for PCBs, VOCs, TPH (DRO), and metals. There were only two minor exceedances of metals in the soil. Based upon the soil analytical data, no groundwater monitoring wells were installed in this area.

In summary, the following tasks have been completed: soil and groundwater have been characterized, sedimentation issues evaluated, sediment characterized and removed, and stormwater conveyance in the South Spring area has been modified. The characterization identified exceedances of the PADEP UANRSHS for arsenic and chromium in soil. In order to more accurately evaluate these exceedances, a Synthetic Precipitation Leaching Procedure (SPLP) analysis was completed. A summary of the SPLP procedure and the result of the SPLP analysis are detailed in Section 4.0 of this report.

2.7 South Yard Characterization

The South Yard, as it existed prior to the additional site characterization, is depicted on **Figure 7A** of **Appendix A**. The South Yard, as it currently exists, is depicted on **Figure 7B** of **Appendix A**.

The soil characterization of the South Yard was completed on August 27 and August 28, 2008. There were six unbiased soil borings advanced within the South Yard area (SB-90 through SB-95). The six unbiased soil borings, SB-90U through SB-95U, were logged and sampled in at least three depth intervals. Samples were collected below asphalt/concrete/soil surface material, at groundwater occurrence (60-120 in-bgs), and just above auger/Geoprobe® refusal/bedrock. There were no biased soil borings in the South Yard due to the lack of recorded use of the area for manufacturing operations or chemical and/or fuel storage. The unbiased soil samples were analyzed for VOCs, SVOCs, PCBs, TPH (DRO), and metals by USEPA methods SW846 8260B, SW846 8270C, SW846 8082, SW846 8015, and SW846 6010B/7471A, respectively.

In all, 16 soil samples were collected and analyzed in the South Yard area. Table 4 identifies soil samples where the respective PADEP UANRSHS MSC was exceeded. The soil boring locations are identified on **Figure 8** of **Appendix A**. Depending on the

saturated or unsaturated status of the sample (identified in the Soil Boring Logs and Soil Analytical Tables in **Appendices B** and **C**, respectively), samples were compared to the respective saturated or unsaturated PADEP UANRSHS MSC.

Table 4
Summary of Exceedances in South Yard Soil Samples

Trichloroethene
(Unsaturated UANRSHS – 0.5 mg/kg; Saturated UANRSHS – 0.5 mg/kg)

Soil Sample ID	Concentration
Unbiased Samples	
SB-90U-18-30"	6.12
SB-90U-42-48"	3.70
SB-92U-6-18"	1.38

Note: VOCs – all units in mg/kg.

Chromium (total)
(Unsaturated UANRSHS – 420 mg/kg – 0-2'/190 mg/kg-2-15';
Saturated UANRSHS – 19 mg/kg) – Chromium VI standard used for comparison

Soil Sample ID	Concentration
SB-93U-42-54"	29.4

Note: Metals – all units in mg/kg.

Lead
(Unsaturated UANRSHS – 450 mg/kg; Saturated UANRSHS – 45 mg/kg)

Soil Sample ID	Concentration
Unbiased Samples	
SB-92U-54-66"	83.6
SB-93U-6-18"	499
SB-93U-42-54"	231

Note: Metals – all units in mg/kg.

Zinc
(Unsaturated UANRSHS – 12,000 mg/kg; Saturated UANRSHS – 1,200 mg/kg)

Soil Sample ID	Concentration
Unbiased Samples	
SB-93U-42-45"	3,220

Note: Metals – all units in mg/kg.

Trichloroethylene (TCE) soil contamination was identified in soil samples collected from borings SB-90U and SB-92U. Three soil samples (two soil boring locations) reportedly contained TCE at concentrations above the PADEP UANRSHS MSC. Concentrations of TCE appear to be elevated just below the surface and decrease vertically through the soil profile.

Chromium (total), lead, and zinc were also identified above their respective PADEP UANRSHS MSCs. Lead was identified above its PADEP UANRSHS MSC in three soil samples (from borings SB-92U and SB-93U) and zinc was identified above its PADEP UANRSHS MSC in one soil sample (SB-93U). Chromium was only analyzed for total chromium, not trivalent or hexavalent chromium. Again, the conservative hexavalent

chromium standard was used in comparison with the total chromium results. Based on the comparison, there was one soil sample that exceeded the hexavalent chromium standard; however, the reported chromium concentration in SB-93U was below the trivalent chromium PADEP UANRSHS MSC. There were no exceedances of SVOCs or PCBs in the soil samples collected from the South Yard soil borings.

The COI identified in the characterization of South Yard are TCE, lead, chromium, and zinc. Chromium is not being retained as a COI because the chromium observed in the South Yard soil sample was trivalent (not hexavalent) and therefore below the applicable UANRSHS MSC. Lead and zinc do not readily enter into solution or volatilize to indoor air and typically resorb to soil within short distances. Therefore, lead and zinc are not considered to have the potential for migration. TCE is the only COI with potential for migration into groundwater. In summary, with the exception of TCE, the other COI identified in soil are not considered a potential threat to human health or the environment because they are relatively immobile, exist only in unsaturated conditions, and/or are spatially limited (i.e., not laterally extensive).

In response to the exceedances of TCE in soil in SB-90U, groundwater monitoring wells were installed in order to determine if groundwater had been impacted by TCE observed in soil. The groundwater monitoring wells received nomenclature similar to the boring location, for example, two wells were installed in the immediate area around soil boring SB-90U; these two wells received the nomenclature SB-90U-S ("S" indicates a shallow overburden well) and SB-90U-D ("D" indicates a deep bedrock well). Once installation of the wells in the South Yard was complete, the groundwater within the monitoring wells was sampled and analyzed for VOCs, SVOCs, PCBs, and metals. Again, the data from the groundwater samples was analyzed to determine if constituent concentrations were above the PADEP UANRSHS MSCs and to determine if the groundwater in the subject area was contaminated and required further characterization.

The groundwater analytical data from wells SB-90U-S and SB-90U-D completed the groundwater characterization of the COI for the South Yard. The location of the monitoring wells is depicted on **Figure 7A** of **Appendix A**. There were no exceedances of PADEP UANRSHS MSCs for VOCs, SVOCs, PCBs, and metals. The lack of exceedances of VOCs or metals in groundwater supports the assertion that the COI are immobile and not laterally extensive across the South Yard area.

As with the Eastern Hillside, understanding stormwater flow (in relation to sediment deposition from the Eastern Hillside) beneath the South Yard was necessary in order to minimize sediment and contaminant (metals) loading to Logan Branch. The hydrologic model developed to understand stormwater runoff drainage patterns from the Eastern Hillside also included evaluating stormwater flow in the South Yard. The model indicated a portion of the Eastern Hillside drainage contributed stormwater runoff to the

South Yard area of the Cerro property before discharging into Logan Branch. The model also evaluated stormwater across the South Yard and identified separate catchment areas. The catchment areas in the South Yard are depicted on **Figure 9** of **Appendix A**.

The ultimate fate of sediment from the Eastern Hillside was the stormwater catch basins along SR 144. Samples of the sediment in the catch basins along SR 144 (SR 144-A, B, C, and D) were collected on May 26, 2009 and analyzed for metals, DRO, and PCBs. The locations of the catch basins are depicted on **Figure 4** of **Appendix A**. **Appendix D** includes the results of these analyses for the stormwater catch basins along PA SR 144. SR 144 Catch Basin A is the storm basin adjacent to the South Yard. No exceedances of the PADEP UANRSHS MSC for metals were reported in the sediment sample collected from Catch Basin A.

Prior to any modification, the stormwater collection system in the South Yard consisted of the PADOT stormwater inlets and piping, on-site parking lot inlets/lines, and a natural spring discharge. However, there was no single point of treatment for sediment. In a good faith effort to be protective of Logan Branch, the stormwater conveyance system in the South Yard area was modified. The goal of the sediment sampling and stormwater routing evaluation was to minimize sediment and potential contaminant (metals) loading to Logan Branch. The modifications to the stormwater conveyance system in the South Yard area include:

- The installation of three, 8' x 8' in-line sedimentation basins to treat stormwater coming from Catch Basin A.
- The installation of a new sedimentation basin with a snout to treat stormwater from another PADOT (PADOT #1 on Figure 6B) catch basin. A snout is an in-line structure designed to reduce and/or prevent floatables and trash, free oils, and sediment from passing through.

In addition to the sediment sampling and stormwater modifications, sediment was removed from basins throughout the South Yard. In 2008, water and sediment was removed from the sediment traps located in catchment areas RB-1, Outfall 002 (sediment trap), the close grate in South Yard – Catchment 1, and inlet in the central area of Outfall I. The sediment was placed into a dewatering box, and the basins were washed down and the material vacuumed out. The sediment was placed within the North Yard secondary containment area, and water that appeared to be impacted by organic compounds was containerized and disposed of properly. The sediment was then characterized and disposed of properly.

In summary, soil and groundwater was characterized, sedimentation issues evaluated, sediment characterized and removed, and the stormwater conveyance in the South Yard was modified. The characterization identified exceedances of the PADEP UANRSHS for

TCE, lead, chromium, and zinc in soil. In order to more accurately evaluate these exceedances, a SPLP analysis was completed. A summary of the SPLP procedure and the result of the SPLP analysis are detailed in Section 4.0 of this report.

3.0 INTERIM REMEDIAL ACTIONS

In order to provide extra protection of Logan Branch from the stormwater flow, interim remedial actions within the South Spring, Plant 4 (in relation to the Eastern Hillside), and South Yard areas were completed. The Eastern Hillside did not have soil samples with COI at concentrations that exceeded the PADEP UANRSHS MSC, however, over years of sediment deposits in the stormwater drains, levels of lead had exceeded the PADEP UANRSHS MSC in two of stormwater drains. Since PENNDOT has not consistently cleaned out the stormdrains along SR 144, in order to protect Logan Branch stormdrains were rerouted and structures installed to aid in the removal of sediment. The following sections describe in greater detail the stormwater routing and cleaning of the South Spring Pond.

3.1 South Spring

The South Spring area previously had two stormwater drains along SR 144 that discharged into the South Spring Pond. Sediment, road oils, and floatable debris were transported from the road/stormwater drains and into the pond, which eventually discharged the spring water and stormwater to Logan Branch. Due to the potential for the presence of metals in the pond, the pond was sampled and characterized. Though metals were detected in the pond sediment, there were no sample results with copper, lead, and zinc above their respective PADEP UANRSHS MSCs. In a good faith effort to provide extra protection of the Branch, sediments in the pond were removed and disposed of and all inlet piping into the pond was sealed. During the cleaning of the South Spring Pond, the stormwater piping was replaced and rerouted through a series of new stormwater inlets and Snout structures to prevent floatable debris and sediment from reaching the Branch.

The pond cleaning began on December 7, 2009. The pond was dewatered through a series of pumps and filter bags to prevent sediment from being discharged into the Branch. Once the pond was dewatered, the hired contractor, G.M. McCrossin, Inc., (McCrossin) began removing plant life and sediment from the sides and bottom of the pond. This material was placed in lined dumpsters before being hauled to the North Yard secondary containment area for holding until the end of the project for disposal. During the pond dewatering, an oil seep was encountered in the Southeastern corner of the pond. The oil seep was believed to be from operations within Plant 4. The oil was contained and removed using absorbent pads, booms, and skimmer pumps. During the cleanup, oil did not migrate into the Branch as confirmed through a series of inspections by the PA Fish and Boat Commission. Due to the oil seep, further removal of the sediments in the pond ceased. McCrossin lined the bottom and sides of the pond with rip-rap material to prevent scouring of the sediments by the spring water which may have discharged metals

into Logan Branch. Once the water within the pond was allowed to return to static conditions, the oil seep stopped discharging into the pond water. Multiple wells were installed in the northern section of Plant 4 in characterize the oil seep. The seep was not encountered and all well samples had COIs that were non-detect or below laboratory reporting limits.

As detailed in Section 2.7, new piping and new Snout stormwater structures were installed within the South Spring Area to aid in the protection of the Branch. Three stormwater Snout structures were installed in various locations within the discharge line along the South and Southwest areas of the pond. The stormwater travels through the Snouts and a three compartment baffle before discharging to Logan Branch. A fourth Snout is located on the North side of the pond which aids in protecting the Branch from a stormwater drain (SR 144-A) that is located directly across from the administration building on the east side of SR 144. Once water travels through this Snout it is discharged to Logan Branch.

With the new stormwater system and rip-rap of the South Spring Pond, Logan Branch is protected from sediment from the Eastern Hillside, road oils, and floatable debris.

3.2 South Yard

There are three stormwater drains along SR 144 that discharge through the South Yard and into Logan Branch. Again, even though concentrations of COIs in sediment were not above their respective PADEP UANRSHS MSCs, extra protection was given to the Branch by installing one Snout structure and a three 8-foot by 8-foot baffle systems. Both of these systems were placed after the stormwater drains that are along SR 144, but before a natural spring that discharges through the in-place piping. The placement of both systems was designed to provide additional time for sediment to settle to the bottom of the Snout or baffle system prior to discharging to Logan Branch.

3.3 Plant 4

Stormwater drain SR 144 C is located along the eastern side of SR 144 outside of Plant 4. Due to its location, there is no room for a Snout or baffle system to be placed outside of the building; however, McCrossin was able to excavate the plant floor and locate the pipe under Plant 4 to install an in-line baffle system. The placement of the baffle is currently able to be accessed through the plant floor in order to monitor sediment levels.

4.0 DEMONSTRATION OF ATTAINMENT

The initial screening of the soil analytical data was completed using the PADEP Soil-to-Groundwater UANRSHS MSCs. Specifically, the higher of the 100x GW MSC and the Generic Value was utilized to identify each COI. This demonstration of attainment will compare the analytical results to the Residential SHS.

The Generic Value established by the PADEP for each COI is based upon a scientifically derived leaching equation and is intended to protect receptors where no groundwater investigations have been performed. However, the generic value may be replaced by an alternate soil-to-groundwater standard determined by a SPLP analysis of soil from the site. The result of the SPLP analysis can then be compared directly to the groundwater MSC for each COI.

Soil sampling and SPLP analysis were completed for arsenic, chromium, copper, lead, zinc, PCB-1248, and TCE. Ten samples were selected from across the entire property with the highest reported concentrations of each COI. Of those 10, the four samples with the highest concentrations of each COI (except TCE where only two samples were selected) were selected from SPLP sampling and analysis. Please note that only the SPLP results for the COI (TCE, arsenic, lead, chromium, and zinc) identified as part of the Eastern Hillside, South Spring, and South Yard characterizations are presented below.

Table 5
Summary of SPLP Sampling and Analysis

TCE

SPLP Soil Sample ID	Direct Contact Residential MSC	PADEP Residential Soil-to-Groundwater MSC	SPLP Concentration	Residential Groundwater MSC
SB-7U-SPLP-0-1'	260	0.5	<50.0	5
SB-42U-SPLP-2-4'	260	0.5	<50/0	5

Notes: Direct Contact and Soil-to-Groundwater MSCs in milligrams per kilogram (mg/kg).
SPLP Concentration and Groundwater MSC in micrograms per liter (ug/L).

Arsenic

SPLP Soil Sample ID	Direct Contact Residential MSC	PADEP Residential Soil-to-Groundwater MSC	SPLP Concentration	Residential Groundwater MSC
SB-12U-SPLP-24-25'	12	29	<0.02	10
SB-26U-SPLP-9-10'	12	29	<0.02	10
SB-39U-SPLP-4-5'	12	29	<0.02	10
SB-49U-SPLP-2-4'	12	29	<0.02	10

Notes: Direct Contact and Soil-to-Groundwater MSCs in mg/kg.
SPLP Concentration and Groundwater MSC in ug/L.

Lead

SPLP Soil Sample ID	Direct Contact Residential MSC	PADEP Residential Soil-to-Groundwater MSC	SPLP Concentration	Residential Groundwater MSC
SB-3U-SPLP-1-2'	500	450	<0.0100	5
SB-30U-SPLP-8-10'	500	450	<0.0100	5
SB-93U-SPLP-.5-1.5'	500	450	<0.0100	5
SB-21B-SPLP-4-5'	500	450	<0.319	5

Notes: Direct Contact and Soil-to-Groundwater MSCs in mg/kg.
SPLP Concentration and Groundwater MSC in ug/L.

Chromium

SPLP Soil Sample ID	Direct Contact Residential MSC	PADEP Residential Soil-to-Groundwater MSC	SPLP Concentration	Residential Groundwater MSC
SB-3U-SPLP-1-2'	190,000	190,000	0.0275	100
SB-4U-SPLP-5-6'	190,000	190,000	0.0201	100
SB-30U-SPLP-8-10'	190,000	190,000	<0.005	100
SB-33U-SPLP-1-2'	190,000	190,000	<0.00877	100

Notes: Direct Contact and Soil-to-Groundwater MSCs in mg/kg.
SPLP Concentration and Groundwater MSC in ug/L.

Zinc

SPLP Soil Sample ID	Direct Contact Residential MSC	PADEP Residential Soil-to-Groundwater MSC	SPLP Concentration	Residential Groundwater MSC
SB-3U-SPLP-1-2'	66,000	12,000	0.0275	2,000
SB-29U-SPLP-8-10'	66,000	12,000	0.0201	2,000
SB-61U-SPLP-5-7'	66,000	12,000	<0.005	2,000
SB-93U-SPLP-.5-1.5'	66,000	12,000	<0.00877	2,000

Notes: Direct Contact and Soil-to-Groundwater MSCs in mg/kg.
SPLP Concentration and Groundwater MSC in ug/L.

The SPLP analytical results for each COI were compared to the applicable PADEP Used-Aquifer (total dissolved solids ≤2,500 milligrams per liter (mg/L)) Residential Statewide Health Standard (UARSHS) Groundwater MSCs. The comparison indicates arsenic, lead, chromium, and zinc do not exceed the applicable Groundwater MSC and therefore meet the residential SHS. The SPLP results for TCE indicate less than 50 ug/L will leach into groundwater, but the Groundwater MSC is 5 ug/L. However, analytical results from groundwater samples collected from South Yard wells indicate TCE is not present in groundwater above 2.00 ug/L. The groundwater analytical data and the SPLP analysis both indicate TCE present in soil is not impacting groundwater to a degree which would cause an exceedance of the groundwater MSC.

4.1 Eastern Hillside

No COI were identified at concentrations above the PADEP UANRSHS MSCs in historic soil samples. Sediment sampling indicated elevated concentrations of lead which were addressed by installing sediment control structures (basins and snouts) to prevent the discharge of impacted sediment to Logan Branch. As demonstrated by the SPLP analysis,

lead present in soil and sediment is adsorbed to the particles and is not leaching into groundwater to a degree which would cause an exceedance of the groundwater MSC. In summary, the issues identified in relation to the Eastern Hillside have been adequately addressed and do not warrant further investigation.

4.2 South Spring

The COI identified during the characterization of the South Spring include arsenic and chromium. In order to evaluate the fate and transport of COI in soil, an SPLP analysis was completed. The SPLP analysis indicated COI reported in soil would not impact groundwater to a degree which would cause an exceedance of the groundwater MSC. In summary, the SPLP analysis in combination with groundwater analytical data indicates attainment of applicable PADEP UARSHS MSCs.

4.3 South Yard

The COI identified during the characterization of the South Yard include TCE, chromium, lead, and zinc. In order to evaluate the fate and transport of COI in soil, an SPLP analysis was completed. The SPLP analysis indicated COI reported in soil would not impact groundwater to a degree which would cause an exceedance of the groundwater MSC. In summary, the SPLP analysis in combination with groundwater analytical data indicates attainment of applicable PADEP UARSHS MSCs.

5.0 POST REMEDIAL CARE PLAN

In accordance with Section 250.312 of Act 2, a Post Remedial Care Plan (PRCP) is only required when attainment is demonstrated by Monitored Natural Attenuation (MNA). Though MNA is not being used as a remedial alternative, nor are there COIs that exceed their respective PADEP UARSHS MSCs, post remedial activities in relation to the Eastern Hillside, South Spring, and South Yard areas are needed to gauge sediment levels within the Snouts and baffle systems every six months for a two year period to determine the cleaning requirements for the Snouts and baffles. It is imperative that a cleaning schedule is developed and maintained to continue to provide the Branch protection from sediment loading, road oils, and floatable debris. During these events, spring discharge water samples will be taken to determine if the COIs within groundwater remain below the PADEP UARSHS MSCs. The results from each event will be summarized in a report and submitted to the PADEP for their review.

6.0 REFERNCES

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