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20 March 2017

Mr. Nathan Freeman
Remedial Bureau B, Section D
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, 12th Floor
Albany, NY 12233-7012

RE: Pre-Design Investigation Activities
Contract/WA No: D007624-35
Site/Spill No./Pin: Former Adirondack Steel Site OU-2 (Site No. 401039)

Dear Mr. Freeman:

EA Engineering, P.C., and its affiliate EA Science and Technology (EA) were tasked by the New York State Department of Environmental Conservation (NYSDEC) under Work Assignment Number (No.) D007624-35 to perform pre-design investigation (PDI) activities and prepare a basis of design for Former Adirondack Steel Site OU-2 (Site No. 401039). This Letter Work Plan describes Task 3 – Environmental Sampling and Implementation activities proposed for the Former Adirondack Steel Site located in Colonie, New York, shown on **Figure 1**. This Work Plan is being prepared based on historical data collected from both OU-2 and OU-3 and recent data collected during a PDI investigation for OU-3. EA will conduct field activities for additional pre-design characterization to refine the extent of soil/sediment contamination and volume of impacted media.

The specific objectives for Task 3 include:

- Develop and implement a soil and sediment sampling program to fill data gaps and refine the extents of soil/sediment contamination in the OU-2 drainage ditch.
- Perform a high-resolution topographic survey before and after soil/sediment sampling, with survey efforts also directed to the area north west of OU-3.
- Characterize debris piles identified in OU-3 for off-site disposal.

Data collected from the soil/sediment sampling and survey will be incorporated into the remedial design (RD) for OU-2 and OU-3.

Field sampling activities will be conducted in accordance with EA's Generic Field Activities Plan[1], Quality Assurance Project Plan[2], and Health and Safety Plan[3]. Additionally, a site-

[1] EA. 2011. Generic Field Activities Plan for Work Assignments under NYSDEC Contract D007624. April.
[2] EA. 2011. Generic Quality Assurance Project Plan for Work Assignments under NYSDEC Contract D007624. October.
[3] EA. 2011. Generic Health and Safety Plan for Work Assignments under NYSDEC Contract D007624. October.

specific Health and Safety Plan Addendum is included in Attachment A. The following PDI activities will be completed as part of the field activities:

- Surface/subsurface soil sampling and laboratory analysis
- Sediment sampling and laboratory analysis
- Debris pile sampling and laboratory analysis
- Site surveying.

BACKGROUND AND RATIONALE

Site Description

The Former Adirondack Steel Site is currently a Class 2 site listed on the NYSDEC Registry of Inactive Hazardous Waste Sites (Site No. 401039). The site is located at 191 Watervliet-Shaker Road in the Town of Colonie, Albany County, New York, and is the location of an abandoned steel mill; the Adirondack Steel Casting Co. Inc. A site location map is provided in **Figure 1**.

Adirondack Steel Casting Co. Inc. produced steel casting for various industrial customers. The site contained transformers associated with the steel mill that were the source of the known polychlorinated biphenyl (PCB) contamination at the site. A variety of tenants also occupied the property while it was operated as the Adirondack Industrial Park. PCBs are understood to have reached soil at the site through routine maintenance of transformers, poor handling of used fluids, and/or unauthorized scavenging. The property contains eight dilapidated, unoccupied buildings (two of which are on the Class 2 Site), foundation slabs of the original production buildings, deteriorating access roads, and emerging tree growth. The northern end of the property also contains a 9-acre landfill that received spent foundry and core sands, furnace slag and refractories, and dust from collector furnace and slag.

The Former Adirondack Steel Site currently occupies 4.2 acres (onsite) of the 38.5 acre former industrial property and includes three OUs: OU-1 (0.4 acres onsite), OU-2 (2.1 acres offsite), and OU-3 (3.8 acres onsite).

- **OU-1:** The soil in the vicinity of the North Power Station and South Power Station where electrical equipment containing PCBs and volatile organic compounds (VOCs) was maintained or damaged resulting in releases of fluid to the ground surface. These releases resulted in the contamination of the soil in three locations over a portion of the Former Adirondack Steel Site property. OU-1 is the former excavation areas near the former power station buildings and foundation slabs, and is contained within the boundaries of OU-3. OU-1 remedial work has been completed and a No Further Action Record of Decision (ROD) was signed on 31 March 2010.

- **OU-2:** The offsite drainage ditch that runs along the eastern and northern boundary of the Adirondack Steel property. The ditch also borders the west side of the Canadian Pacific railroad right-of-way (ROW). The drainage ditch is a concrete and rip-rap lined swale. The ditch primarily consists of surface water runoff from the site and discharge from OU-3 drainage ditch. Water in the ditch is stagnant at some locations and flows south starting from a grade break located near the southern end of OU-3 (**Figure 2**) south of the metal

building. North of this point, it drains in a northerly direction to where it extends below Barker Lane, to a point near Early Drive where it turns east, crossing below the Canadian Pacific railroad ROW. Sediment and soil within the drainage ditch is contaminated with PCBs originally released from OU-1, with higher detections located at the confluence of the OU-3 and OU-2 drainage ditches. Surface water south of the grade break flows south through the drainage ditch off-site near Watervliet-Shaker Road.

- **OU-3:** Comprised of the onsite drainage ditch and adjacent uplands consisting primarily of fill material and associated surface debris piles located sporadically within the boundaries of OU-1 and OU-3. It contains portions of the property with PCB contaminated soil not included in OU-1. To the west and north, OU-3 borders a large foundation slab and other unused buildings, and an active rail line to the east. A PDI was completed at OU-3 in October and November 2016.

The Former Adirondack Steel Site property is zoned "industrial" and has recently been acquired by a private party. A composting facility has been constructed on the offsite western portion of the property not impacted by PCBs. The area surrounding the Adirondack Steel Co. property is a mix of industrial and residential use. A site layout map is provided in **Figure 2**.

Remedial Investigation/Selected Remedy

A Remedial Investigation (RI) was performed for OU-1 and OU-3 between 2005 and 2007[4]. In 2008, Ecology and Environment Engineering, P.C. further assessed the lateral extent of PCB contamination in sediment identified during the RI. Based on the results, an interim remedial measure was conducted to excavate PCB contaminated soil in OU-1 and OU-3[5]. In March 2010, NYSDEC completed the ROD for OU-1[6] and in 2011, the U.S. Environmental Protection Agency (EPA) conducted PCB delineation sampling in OU-2 and OU-3. A supplemental RI was also performed for OU-3 in 2014[7]. Potential remedial alternatives for OU-2 were identified, screened, and evaluated in the 2014 Feasibility Study (FS)[8]. Based on the RI and FS, the NYSDEC issued the ROD that identified the selected remedy for the Site[9]. The remedy includes excavation and disposal of PCB contaminated soil, sediment, and fill from OU-2 to the extent feasible (due to the proximity of the active railroad), backfilling of the excavation with clean fill and development of a corresponding site management plan. Components of the selected remedy (i.e., excavation areas, depth of excavation, etc.) in the ROD will be refined during the RD.

SCOPE OF WORK

The primary focus of this Work Assignment is to design the construction plans and specifications of the selected remedial action (RA) at the Former Adirondack Steel Site OU-2. Prior to the

[4] Ecology and Environment Engineering, P.C. 2008. Final Remedial Investigation Report for the Former Adirondack Steel Site, Colonie, New York.
[5] Ecology and Environment Engineering, P.C. 2010. Final Interim Remedial Measure Report for the Former Adirondack Steel Site, Colonie, New York.
[6] NYSDEC. 2010. Former Adirondack Steel Site Record of Decision OU-1. March.
[7] Ecology and Environment Engineering, P.C. 2014. Draft Supplemental Remedial Investigation Report. February.
[8] Ecology and Environment Engineering, P.C. 2014. Final Feasibility Study Report for Former Adirondack Steel Site Operable Unit OU-2. May.
[9]NYSDEC. 2016. Record of Decision. March.

design of the RA, additional PDI activities will be performed to refine the extent of off-site soil and sediment contamination. **Table 1** outlines the proposed sampling and analysis plan. **Figures 3 through 6** depict the PDI sampling locations.

Sediment Sampling

EA will perform sediment sampling in OU-2 to further define the extent of PCB contamination. This data will be used to refine the lateral extent of contamination and the quantities of potential toxic substances control act (TSCA) and non-TSCA waste materials within the RD package. EA is not proposing to vertically delineate low-level contaminated sediments at depths below 4 feet (ft) bgs.

EA applied a 25 ft by 25 ft grid to the site and evaluated the existing data for data gaps. In the drainage ditch, EA first evaluated areas with PCB concentrations exceeding the definition of hazardous waste: PCBs exceeding 50 ppm as defined by TSCA. EA will collect samples in un-sampled grids upstream and downstream of grid spaces with PCBs greater than 50 ppm. Five such samples will be collected from 0-6 inches bgs interval in grid spaces near grids with historic PCB concentrations exceeding 50 ppm. One of these five samples (SD-AA17) is located in grid space AA' -17', which is located just south of the boundary of OU-2, downstream from a grid space containing historically high concentrations of PCBs. Five additional samples will be collected throughout the drainage ditch to fill data gaps in a few un-delineated stretches of the drainage ditch.

Sediment samples will be collected by hand using a drain spade, hand auger, or multi-stage sediment sampler, depending on which piece of equipment yields the best recovery in the field. Descriptions of the sample texture, composition, color, consistency, moisture content, odor, photoionization detector (PID) readings, and staining will be documented. Samples will be analyzed for PCBs by EPA Method 8082.

Soil Sampling

EA will collect six samples from three locations in the upland areas of OU-2 (**Figures 3 and 5**). A sample will be collected from the 0-12 inches bgs interval and 12-24 inches bgs interval. The sampling grids selected are un-delineated grids adjacent to grid spaces with historic PCB concentrations exceeding 1 ppm. The purpose of sampling these grid spaces is to determine horizontal and vertical limits of contamination on the north-west bank of OU-2.

Soil samples will be collected by hand using a hand auger. Description of the sample texture, composition, color, consistency, moisture content, odor, PID readings, and staining will be documented. Samples will be analyzed for PCBs by EPA Method 8082.

Debris Pile Sampling

EA will collect 12 composite samples from the 6 debris pile areas identified during the OU-3 PDI. The debris piles located in OU-3 were identified during the topographic survey and soil sampling. The piles are a combination of concrete and asphalt rubble and other various debris. Samples will composite a minimum of 5 locations within each debris pile sampling location

(**Figures 3 and 4**). EA will use a hammer drill to collect and composite material. Following 40 Code of Federal Regulations 761.286, the sampler will have a diameter greater than 2 centimeters (cm) and less than 3 cm, and the depth of collection will not exceed 7.5 cm (~2.95 in). Samples will be screened with a PID and analyzed for PCBs by EPA Method 8082.

Site Surveying

Popli Design Group (Popli) will conduct a limited survey for OU-2 primarily focused on the confluence of the OU-3 and OU-2 drainage ditches that will tie into the previous surveys of the two OUs. Popli will extend the survey area to the north of the OU-3 drainage ditch and to the west of the OU-2 drainage ditch, as these areas will be required for access during the RA. Popli will also mark out the sampling locations prior to sampling. EA will provide field oversight of Popli during performance of the site surveys. The survey is expected to take 2 days to complete.

Documentation

Field activities will be documented in a dedicated field logbook that will be maintained for all site activities. Field forms including soil and sediment logs will be used during onsite work. Photographs will also be taken to document field activities, as appropriate.

Investigation Derived Waste/Decontamination

All sampling equipment will be decontaminated between sampling locations. Any fluids and soil waste produced during sampling and decontamination will be containerized in 55-gallon Department of Transportation drums and staged onsite for disposal during the RA.

Final Report

Upon completion of the PDI activities, all data will be evaluated relative to the ROD. Based on this evaluation, a final report will be completed to identify necessary requirements to complete the RD, including any recommended changes or additions to the selected remedy as described in the ROD. The final report will include at a minimum:

- Summary of task activities with regard to pre-design investigation
- Necessary requirements to excavate, manage, and properly dispose of contaminated sediment
- Identify other concerns which may affect the public health, the environment, or implementation of the remedy
- Summary tables of analytical results
- Conclusions and recommendations for the RD.

The final report will be produced by EA, analyzed, and submitted to NYSDEC for review.

PROJECT SCHEDULE

This Scope of Work is to be completed in one mobilization and is estimated to require five days to complete during Spring/Summer 2017. A preliminary schedule of milestones is provided in the following project schedule table. Key milestones are identified in order to monitor work progress throughout the duration of the project.

Project Schedule

Investigation Milestone	Estimated days from Submittal of Work Plan
Prepare PDI Work Plan to NYSDEC	—
Receive comments from NYSDEC	15
Submit Final PDI Work Plan NYSDEC	5
Initiate field activities	15
Submit PDI report to NYSDEC	60

If you have any questions or require additional information, please do not hesitate to contact me at 315-565-6570.

Sincerely yours,

EA SCIENCE AND TECHNOLOGY

Ben Young
Project Manager

Don Conan, P.E.
Vice President

Attachment A: Health and Safety Plan Addendum

cc: S. Dewes (NYSDEC)
R. Casey (EA)
B. Conden (EA)

Figures

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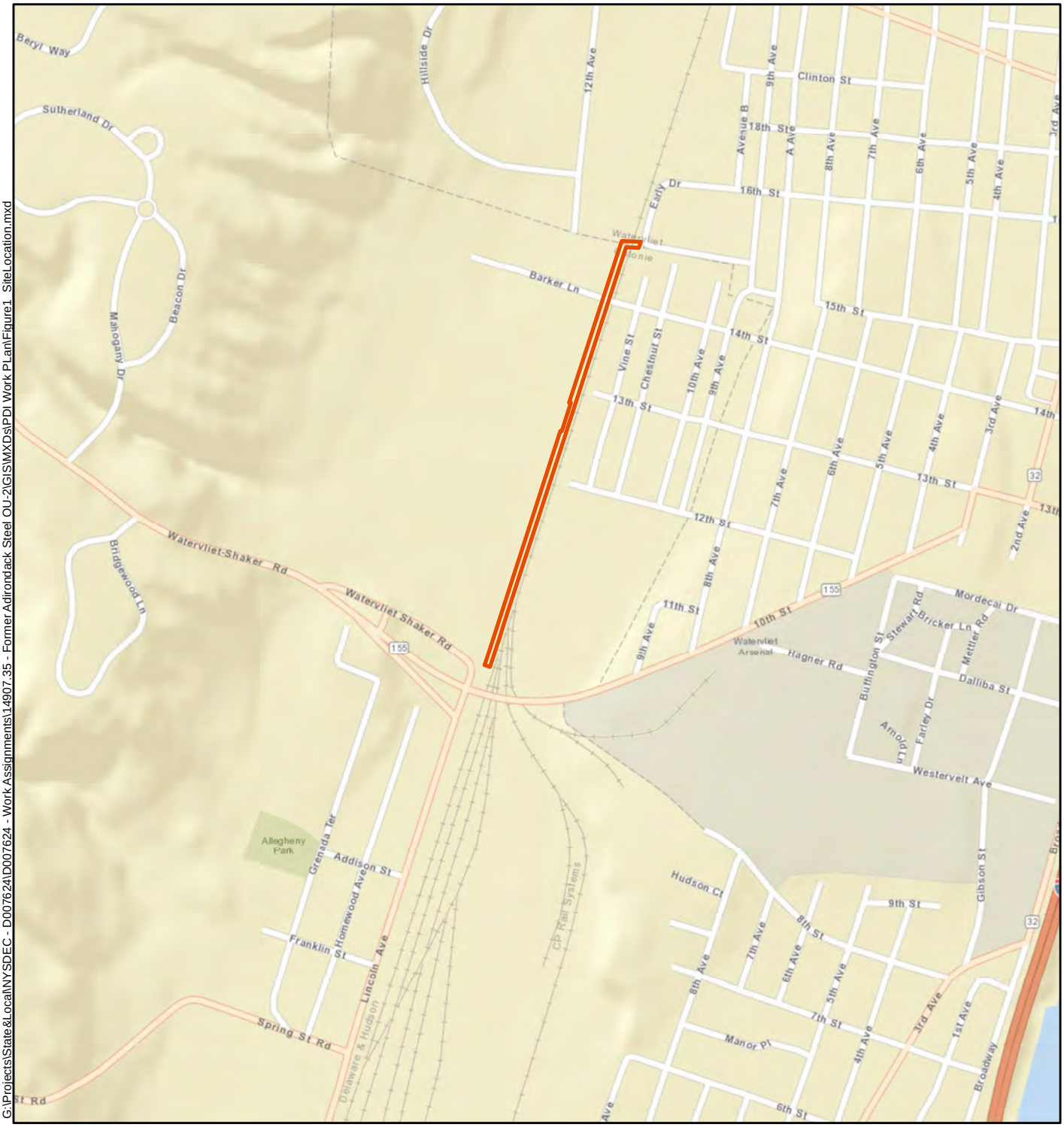

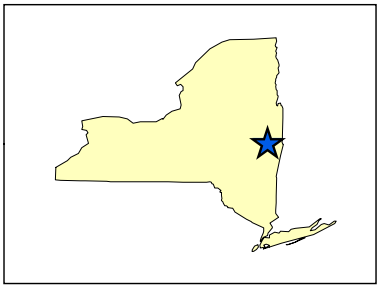

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Legend

OU-2 Approximate Boundary

Figure 1
Site Location
Former Adirondack Steel OU-2 Site (401039)
Colonie, New York

Map Date: 3/8/2017
Source: ESRI, 2011
Projection: NAD 1983 State Plane New York East

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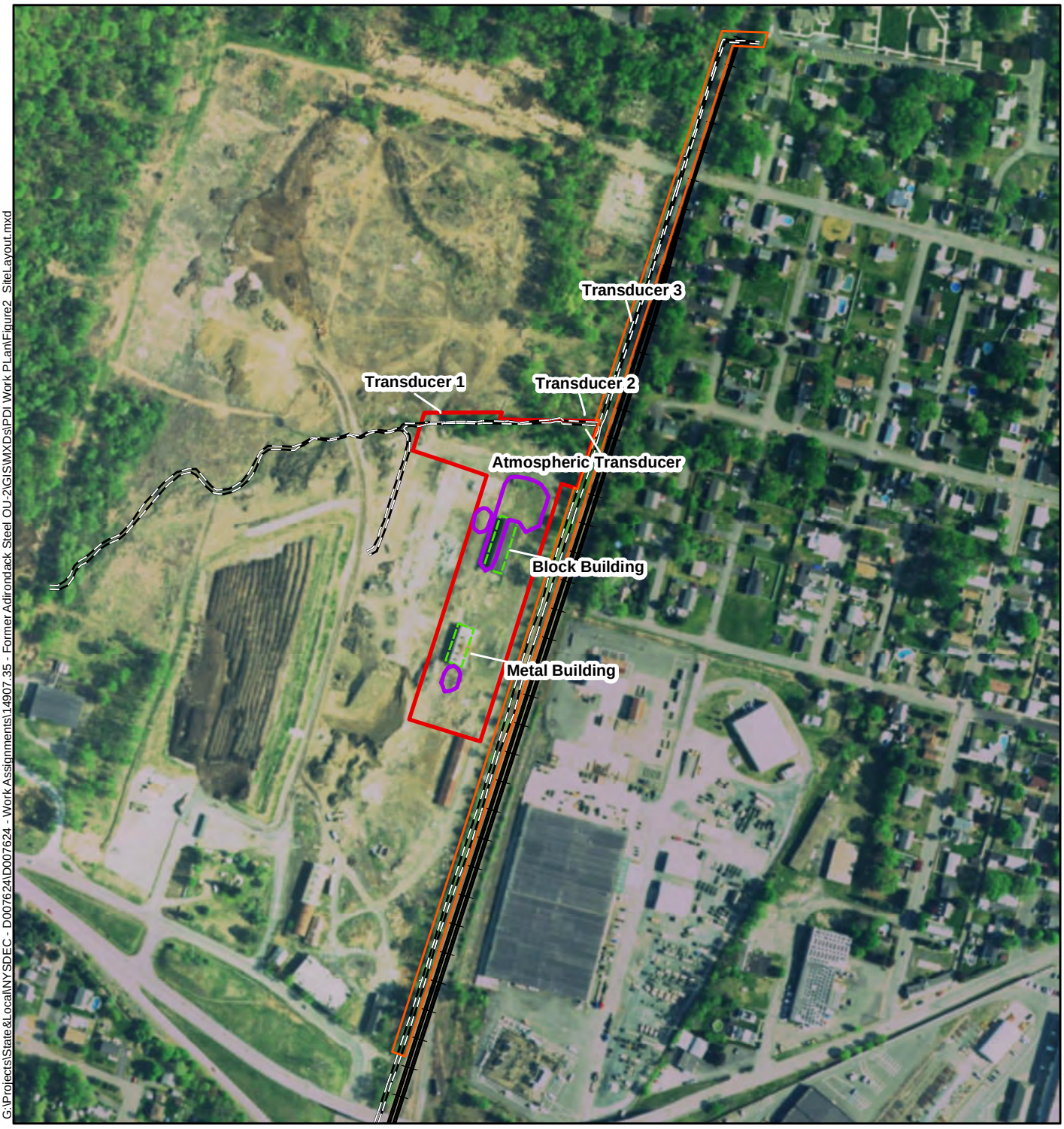

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Legend

- Drainage Ditch
- OU-2 Boundary
- OU-3 Boundary
- OU-3 Buildings
- OU-1 Boundary

Figure 2
Site Layout
Former Adirondack Steel OU-2 (Site No. 401039)
Colonie, New York

Map Date: 3/8/2017
Source: ESRI, 2011
Projection: NAD 1983 State Plane New York East

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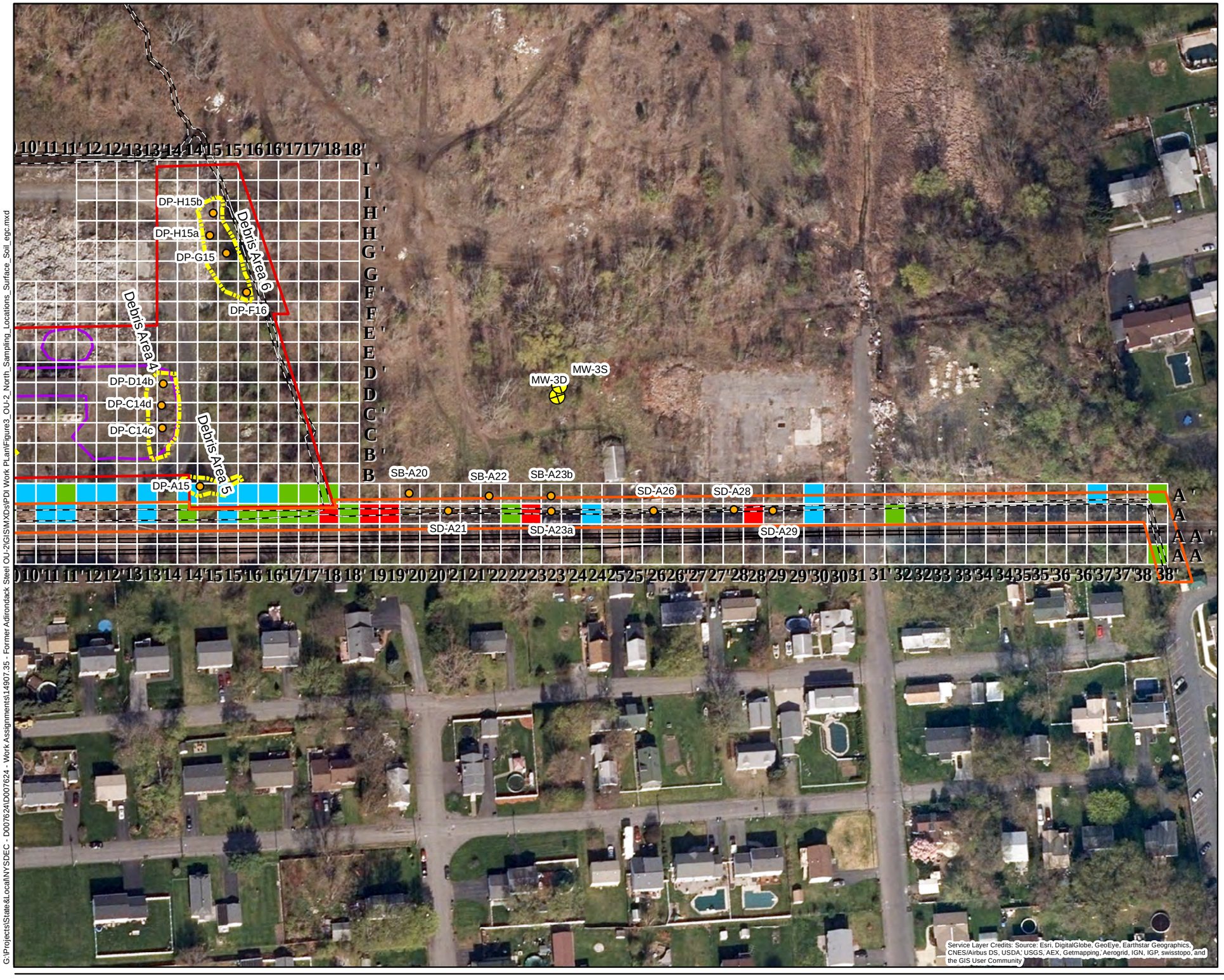

VICINITY MAP

Legend

- Proposed Sampling Locations
- Monitoring Wells
- RailRoad
- Ditch
- Debris Pile
- OU-1 Boundary
- OU-2 Boundary
- OU-3 Boundary
- Exceeds TSCA
- Exceeds Residential SCO
- Meets Residential SCO

Note:
SCO: Soil Cleanup Objective
Residential SCO: 1 ppm at all depths
[as determined by NYSDEC 6 NYCRR Table 375-6.8(b)]
TSCA: Toxic Substance Control Act
TSCA applies to PCBs greater than or equal to 50 ppm.
ppm: parts per million

Map Date: 3/7/2017
Source: ESRI, 2011
Projection: NAD 1983 State Plane New York East

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Figure 3
OU-2 North Sampling Locations - Surface
FORMER ADIONDACK STEEL OU-2 (Site No. 401039)
COLONIE, NEW YORK

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VICINITY MAP

Legend

- Proposed Sampling Locations
- Monitoring Wells
- RailRoad
- Ditch
- Debris Pile
- OU-1 Boundary
- OU-2 Boundary
- OU-3 Boundary
- Exceeds TSCA
- Exceeds Residential SCO
- Meets Residential SCO

Note:
SCO: Soil Cleanup Objective
Residential SCO: 1 ppm at all depths
[as determined by NYSDEC 6 NYCRR Table 375-6.8(b)]
TSCA: Toxic Substance Control Act
TSCA applies to PCBs greater than or equal to 50 ppm.
ppm: parts per million

Map Date: 3/7/2017
Source: ESRI, 2011
Projection: NAD 1983 State Plane New York East

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Figure 4
OU-2 South Sampling Locations - Surface
FORMER ADIONDACK STEEL OU-2 (Site No. 401039)
COLONIE, NEW YORK

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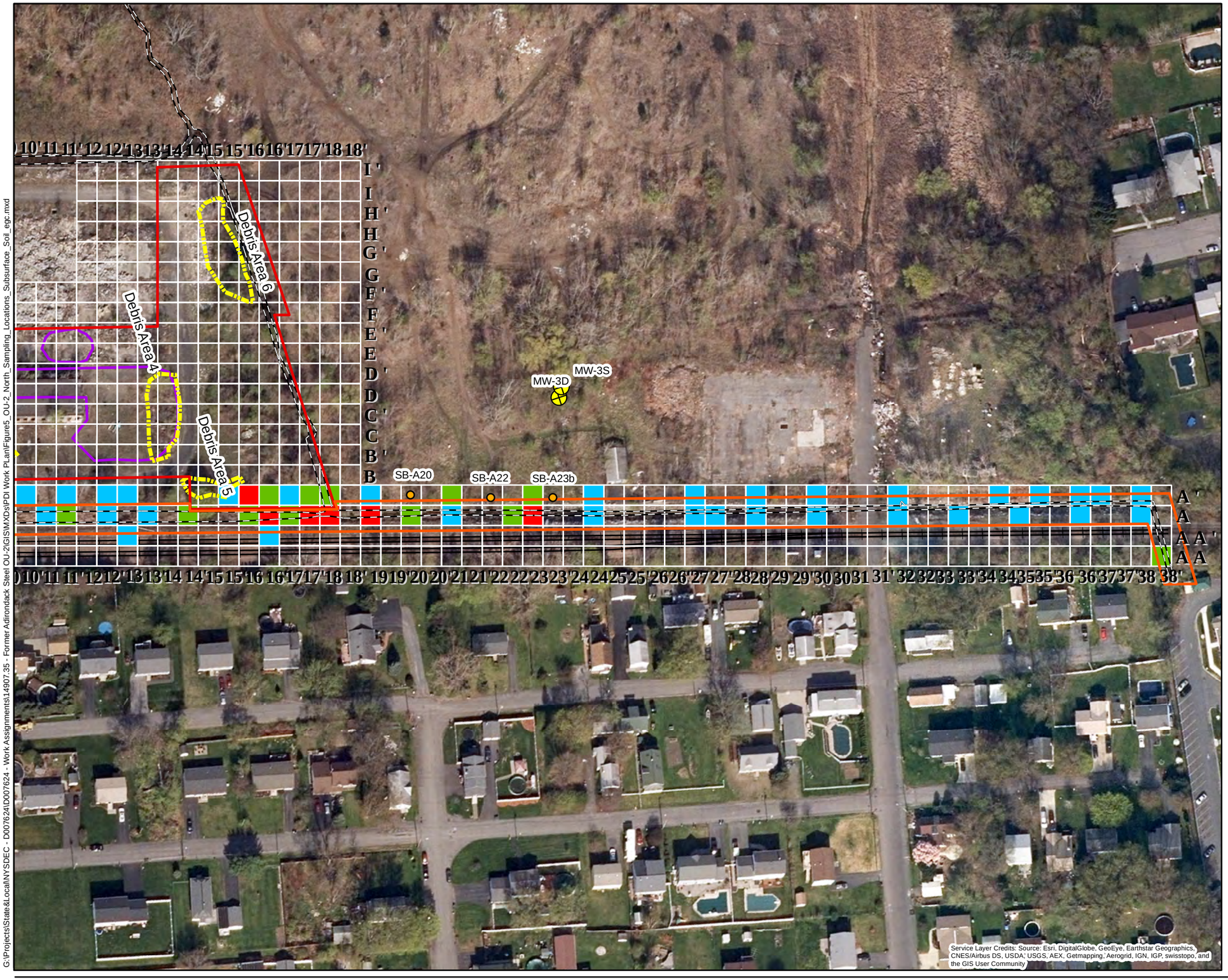

VICINITY MAP

Legend

- Proposed Sampling Locations
- Monitoring Wells
- RailRoad
- Ditch
- Debris Pile
- OU-1 Boundary
- OU-2 Boundary
- OU-3 Boundary
- Exceeds TSCA
- Exceeds Residential SCO
- Meets Residential SCO

Note:
SCO: Soil Cleanup Objective
Residential SCO: 1 ppm at all depths
[as determined by NYSDEC 6 NYCRR Table 375-6.8(b)]
TSCA: Toxic Substance Control Act
TSCA applies to PCBs greater than or equal to 50 ppm.
ppm: parts per million

Map Date: 3/7/2017
Source: ESRI, 2011
Projection: NAD 1983 State Plane New York East

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Figure 5
OU-2 North Sampling Locations - Subsurface
FORMER ADIONDACK STEEL OU-2 (Site No. 401039)
COLONIE, NEW YORK

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VICINITY MAP

Legend

- Ditch
- Exceeds TSCA
- Exceeds Residential SCO
- Meets Residential SCO
- Railroad
- Transducer Locations
- Proposed Sampling Location

Note:
SCO: Soil Cleanup Objective
Residential SCO: 1 ppm at all depths
[as determined by NYSDEC 6 NYCRR Table 375-6.8(b)]
TSCA: Toxic Substance Control Act
TSCA applies to PCBs greater than or equal to 50 ppm.
ppm: parts per million

Map Date: 3/10/2017
Source: ESRI, 2011
Projection: NAD 1983 State Plane New York East

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Figure 6
OU-2 Site Profile and Sampling Plan
FORMER ADIONDACK STEEL OU-2 (Site No. 401039)
COLONIE, NEW YORK

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Tables

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Table 1 Sampling and Analysis Plan

SN	Sampling Location/ID Number*	Northing	Easting	Depth (in bgs)	Sample Type	Analysis	Rationale
1	SB-A20	1418858.4216	703398.5219	0-12	Grab	PCBs by EPA Method 8082	Horizontally Unbound
2				12-24	Grab	PCBs by EPA Method 8082	
3	SB-A22	1418951.1426	703433.0609	0-12	Grab	PCBs by EPA Method 8082	Horizontally Unbound
4				12-24	Grab		
5	SB-A23b	1419023.8474	703457.3876	0-12	Grab	PCBs by EPA Method 8082	Horizontally Unbound
6				12-24	Grab		
7	SD-A21	1418897.3823	703434.4053	0-6	Grab	PCBs by EPA Method 8082	Horizontally Unbound
8	SD-A23a	1419018.0571	703475.3960	0-6	Grab	PCBs by EPA Method 8082	Horizontally Unbound
9	SD-A26	1419138.1511	703514.9654	0-6	Grab	PCBs by EPA Method 8082	Horizontally Unbound
10	SD-A28	1419232.9855	703544.9391	0-6	Grab	PCBs by EPA Method 8082	Horizontally Unbound
11	SD-A29	1419278.3972	703561.4794	0-6	Grab	PCBs by EPA Method 8082	Horizontally Unbound

Note: New sampling location IDs were determined by grid location and type of material to be sampled.

bgs = below ground surface
in = Inches
DP = Debris Pile
ID = Identification
SN = Sample number
SB = Soil boring
SD = Sediment
PCB = Polychlorinated biphenyl
EPA = U.S. Environmental Protection Agency

Table 1 Sampling and Analysis Plan

SN	Sampling Location/ID Number*	Northing	Easting	Depth (in bgs)	Sample Type	Analysis	Rationale
12	SD-AA17	1417090.4457	702855.1499	0-6	Grab	PCBs by EPA Method 8082	Horizontally Unbound
13	SD-AA5	1417676.6095	703048.9271	0-6	Grab	PCBs by EPA Method 8082	Horizontally Unbound
14	DP-A15	1418615.5716	703308.2487	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 5
15	DP-B10	1418395.9628	703183.8772	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 3
16	DP-B3	1418069.3692	703106.8211	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 1
17	DP-B5	1418188.4734	703114.1593	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 2
18	DP-C1	1418007.7185	703039.7051	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 1
19	DP-C14c	1418594.3612	703224.8012	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 4
20	DP-C14d	1418602.2422	703198.2382	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 4
21	DP-D14b	1418612.9420	703173.5826	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 4
22	DP-F16	1418746.4535	703098.9472	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 6
23	DP-G15	1418738.1743	703044.9572	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 6
24	DP-H15a	1418725.9384	703017.5874	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 6
25	DP-H15b	1418738.5843	702992.8604	0-3	Composite	PCBs by EPA Method 8082	Waste Characterization of Debris Area 6

Attachment A

Health and Safety Addendum

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Health and Safety Plan Addendum
Former Adirondack Steel Site OU-2 and OU-3 (401039)
Colonie, New York

Prepared for

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by

EA Engineering, P.C., and Its Affiliate
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March 2017
Version: FINAL
EA Project No. 14907.35

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Health and Safety Plan Addendum
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Don Conan, P.E., Vice President — Date
EA Engineering, P.C.

Ben Young, Project Manager — Date
EA Science and Technology

March 2017
Version: FINAL
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TABLE OF CONTENTS

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LIST OF FIGURES

LIST OF ACRONYMS

°F	Degrees Fahrenheit
CFR	Code of Federal Regulations
DER	Division of Environmental Remediation
DEET	N,N-Diethyl-meta-toluamide
EA	EA Engineering, P.C. and its Affiliate EA Science and Technology
EEEPC	Ecology and Environment Engineering, P.C.
EPA	United States Environmental Protection Agency
FS	Feasibility Study
HASP	Health and Safety Plan
IRM	Interim remedial measure
No.	Number
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration Standards
OU	Operable units
PCB	Polychlorinated biphenyl
PDI	Pre-design investigation
ppm	Parts per million
RI	Remedial investigation
ROD	Record of Decision
SHSO	Site Health and Safety Officer
TSCA	Toxic Substances Control Act

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1. INTRODUCTION

1.1 GENERAL

A Generic Health and Safety Plan (HASP)[1] was developed by EA Engineering, P.C. and its Affiliate EA Science and Technology (EA) for field activities performed under the New York State Department of Environmental Conservation (NYSDEC) Standby Contract Number (No.) D007624. This HASP Addendum is to supplement the Generic HASP[1] with site-specific information to protect the health and safety of personnel while performing field investigation activities to complete implementation of a pre-design investigation (PDI) for the Former Adirondack Steel Site OU-2 and OU-3, Colonie, Albany County, New York (NYSDEC Site No.401039).

This HASP Addendum describes the safety organization, procedures, and protective equipment that have been established based on an analysis of potential physical, chemical, and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential for accidents or injuries to occur. One copy of the Generic HASP[1] and this HASP Addendum will be maintained for use during the scheduled field investigation activities. The copies will be made available for site use and employee review at all times.

This HASP Addendum addresses regulations and guidance practices set forth in the Occupational Safety and Health Administration Standards (OSHA) for Construction Industry, 29 Code of Federal Regulations (CFR) 1926, including 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response and 29 CFR 1926.59, Hazardous Communications.

The following are provided as attachments:

- **Attachment A:** Worker Training and Physical Examination Record
- **Attachment B:** Health and Safety Plan Addendum Review Record
- **Attachment C:** Site Entry and Exit Log
- **Attachment D:** Accident/Loss Report
- **Attachment E:** Emergency Telephone Numbers and Hospital Directions
- **Attachment F:** Emergency Equipment Available Onsite
- **Attachment G:** Map to Hospital
- **Attachment H:** Personal Protective Equipment Activity Record
- **Attachment I:** Material Safety Data Sheets

NOTE: This site-specific HASP Addendum should be left open to display Attachment E (Emergency Telephone Numbers and Hospital Directions) and made available to all site personnel in a conspicuous location for the duration of field investigation activities in the event of an emergency.

[1] EA. 2011. Generic Field Activities Plan for Work Assignments under NYSDEC Contract D007624. April.

1.2 SITE DESCRIPTION

The Former Adirondack Steel Site is currently a Class 2 site listed on the NYSDEC Registry of Inactive Hazardous Waste Sites (Site No. 401039). The site is an abandoned steel mill called the Adirondack Steel Casting Co. Inc. located at 191 Watervliet-Shaker Road in the Town of Colonie, Albany County, New York. It is located within one mile of five other sites in the New York State Remedial Program.

The site currently occupies 4.2 acres of the 38.5-acre former industrial property and includes three operable units (OU): OU-1 (0.4 acres onsite), OU-2 (2.1 acres offsite), and OU-3 (3.8 acres onsite). The property contains eight dilapidated, unoccupied buildings, foundation slabs of the original production buildings, deteriorating access roads, and emerging tree growth. Drainage ways also border the east and north sides of the property. The drainage way to the east (OU-2) is largely stagnant and is located between the site and an active rail line owned and operated by Canadian Pacific. OU-3 contains the northern drainage way, which flows between the site and an industrial landfill, and the polychlorinated biphenyl (PCB) contaminated soil in the adjacent uplands

The area surrounding the property is a mix of industrial/residential use. The OU-3 site borders on undeveloped land to the west and north, and an active rail line to the east. The property itself is zoned industrial and has recently been acquired by a private party who is actively developing the property surrounding OU-3 into an industrial park. OU-3 is comprised of building foundations and debris, a clean-fill area, a recyclable material stockpile and brownfield areas with the previously noted drainage way, which also contains PCB contaminated sediment.

OU-2 is the offsite drainage ditch that runs along the eastern and northern boundary of the Adirondack Steel property. The ditch also borders the west side of the Canadian Pacific railroad right-of-way (ROW). The drainage ditch is a concrete and rip-rap lined swale. The ditch primarily consists of surface water runoff from the site and discharge from OU-3 drainage ditch. Sediment and soil within the drainage ditch is contaminated with PCBs originally released from OU-1, with higher detections located at the confluence of the OU-3 and OU-2 drainage ditches.

1.3 SITE HISTORY

Adirondack Steel Casting Co. produced steel casting for various industrial customers. The site contained transformers associated with the steel mill that were the source of the known PCB contamination. A variety of tenants also occupied the property while it was known as the Adirondack Industrial Park. PCBs are understood to have reached the soils at the site through routine maintenance of transformers, poor handling of used fluids, and/or unauthorized scavenging. In 1993, the United States Environmental Protection Agency (EPA) responded to spilled PCBs and soil contamination by excavating soil and disposing of it; however, significant PCB soil contamination remained.

A Remedial Investigation (RI) was performed for OU-1 and OU-3 between 2005 and 2007[2]. In 2008, Ecology and Environment Engineering, P.C. further assessed the lateral extent of PCB contamination in sediment identified during the RI. Based on the results, an interim remedial measure was conducted to excavate PCB contaminated soil in OU-1 and OU-3[3]. In March 2010, NYSDEC completed the ROD for OU-1[4] and in 2011, the U.S. Environmental Protection Agency (EPA) conducted PCB delineation sampling in OU-2 and OU-3. A supplemental RI was also performed for OU-3 in 2014[5]. Potential remedial alternatives for OU-2 were identified, screened, and evaluated in the 2014 Feasibility Study (FS)[6]. Based on the RI and FS, the NYSDEC issued the ROD that identified the selected remedy for the Site[7]. The remedy includes excavation and disposal of PCB contaminated soil, sediment, and fill from OU-2 to the extent feasible (due to the proximity of the active railroad), backfilling of the excavation with clean fill and development of a corresponding site management plan. Components of the selected remedy (i.e., excavation areas, depth of excavation, etc.) in the ROD will be refined during the RD.

1.4 POLICY STATEMENT

EA will take every reasonable step to provide a safe and healthy work environment; and to eliminate or control hazards in order to minimize the possibility of injuries, illnesses, or accidents to site personnel. EA and EA subcontractor employees will be familiar with this HASP Addendum for the project activities that they are involved in. Prior to entering the site, the HASP Addendum will be reviewed, and an agreement to comply with the requirements will be signed by EA personnel, subcontractors, and visitors (Attachment B).

Operational changes that could affect the health and safety of the site personnel, community, or environment will not be made without approval from the Project Manager and the Program Health and Safety Officer. This document will be periodically reviewed to ensure that it is current and technically correct. Any changes in site conditions and/or the scope of work will require a review and modification to the HASP Addendum. Such changes will be documented in the form of a revision to this Addendum.

[2] Ecology and Environment Engineering, P.C. 2008. Final Remedial Investigation Report for the Former Adirondack Steel Site, Colonie, New York.
[3] Ecology and Environment Engineering, P.C. 2010. Final Interim Remedial Measure Report for the Former Adirondack Steel Site, Colonie, New York.
[4] NYSDEC. 2010. Former Adirondack Steel Site Record of Decision OU-1. March.
[5] Ecology and Environment Engineering, P.C. 2014. Draft Supplemental Remedial Investigation Report. February.
[6] Ecology and Environment Engineering, P.C. 2014. Final Feasibility Study Report for Former Adirondack Steel Site Operable Unit OU-2. May.
[7]NYSDEC. 2016. Record of Decision. March.

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2. KEY PERSONNEL

The following table contains information on key project personnel:

Title	Name	Telephone No.
Program Health and Safety Officer	Peter Garger, Certified Industrial Hygienist	732-404-9370
Program Manager	Don Conan	315-431-4610
Quality Assurance/Quality Control Officer	Frank Barranco	315-431-4610
Project Manager	Ben Young	315-431-4610
Site Manager/Site Health and Safety Officer (SHSO)	Emily Cummings	860-309-3837
Site Geologist/Scientist	Emily Cummings Kritika Thapa	860-309-3837 478-390-2213
NYSDEC Project Manager	Nathan Freeman	518-402-9767

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3. SCOPE OF WORK

This HASP Addendum was developed to designate and define site-specific health and safety protocols applicable to project activities to be implemented and followed during field activities and consulting work at the Former Adirondack Steel Site, Colonie, New York. The Scope of Work covered by this HASP Addendum includes the following PDI activities:

- Surface/subsurface soil sampling and laboratory analysis
- Sediment sampling and laboratory analysis
- Debris pile sampling and laboratory analysis
- Site surveying.

Each of these activities is summarized below and additional detail for each activity is provided in the Letter Work Plan[8].

3.1 SITE SURVEY

EA and EA's subcontractor (Popli Design Group) will conduct survey work to compliment the previous surveys conducted during the RI and OU-3 PDI. This survey work will include a topographic survey of a portion of OU-2 and OU-3, and all PDI sampling locations.

3.2 SOIL AND SEDIMENT SAMPLING PROGRAM

EA will implement an sediment and soil sampling program as described in the Letter Work Plan to further define the nature and extent of contamination in the soil at the site and quantify the volume of potential toxic substance control act (TSCA) and non-TSCA waste material within the remedial design package.

Soil/sediment samples will be collected from 10 locations. The sediment/soil sampling locations will be flagged before sampling so their locations can be recorded with a high-precision global positioning system unit. Proposed soil and sediment sampling locations are shown on Figures 3-6 of the Letter Work Plan.

3.3 DEBRIS PILE SAMPLING

EA will collect 12 composite samples from the 6 debris piles identified in OU-3 as described in the Letter Work Plan. Samples will be analyzed for PCBs to determine if the piles are classified as TSCA or non-TSCA waste material.

3.4 STORAGE AND DISPOSAL OF WASTE

EA is responsible for the proper storage, handling, and disposal of investigative-derived waste including personal protective equipment, and solids and liquids generated during sampling activities. All drummed materials will be clearly labeled as to their contents and origin. All

[8] EA. 2017. Pre-Design Investigation Letter Work Plan. Former Adirondack Steel Site OU-2 (401039). March.

investigative-derived waste will be managed in accordance with NYSDEC-Division of Environmental Remediation (DER)-10 Technical and Administrative Guidance Memorandum 4032[9].

[9] NYSDEC. 2010. DER-10/Technical Guidance for Site Investigation and Remediation. May.

4. POTENTIAL HAZARD ANALYSIS

Based on the field activities detailed in Section 3, the following potential hazard conditions may be anticipated:

- The use of mechanical equipment such as hammer drills can create a potential for crushing and pinching hazards due to movement and positioning of the equipment; movement of leverage arms; entanglement of clothing and appendages in exposed drives and augers; and impact of steel tools and cable cords should equipment fail or become lodged within a concrete slab. If possible, personnel not operating mechanical equipment must remain outside the turning radius of moving equipment. At a minimum, personnel must maintain visual contact with the equipment operator. When not operational, equipment must be set, locked and unplugged from the power source so that it cannot be activated, released, dropped, etc.

- Equipment can be energized due to contact with underground electrical lines or utilities impaired by excavation of communication or potable/wastewater lines, or a potential for fire or explosion may occur due to penetration of below ground propane/natural gas lines. Prior to commencement of invasive operations, a drilling area will be inspected and flagged. Personnel should be aware that although an area may be cleared, it does not mean that unanticipated hazards will not appear. Workers should always be alert for unanticipated events such as snapping cables, drilling into unknown underground utilities, etc. Such occurrences should prompt involved individuals to halt work immediately and take appropriate corrective measures to gain control of the situation.

- Personnel may be injured during physical lifting and handling of heavy equipment, construction materials, or containers. Additionally, personnel may encounter slip, trip, and fall hazards associated with sampling activities. Precautionary measures should be taken in accordance with the Generic HASP[1] and this HASP Addendum.

- Field operations conducted during the winter months can impose excessive heat loss to personnel conducting strenuous activities during unseasonably cold weather days, and can impose cold-related illness symptoms during unseasonably cold weather days or when the wind chill is high. In addition, heavy rains, electrical storms, and high winds may create extremely dangerous situations for employees.

- Field operations conducted during the summer months can impose heat stress on field personnel conducting strenuous activities during unseasonably hot weather days. Because wearing personal protective equipment can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses and be able to recognize these signs and symptoms in both themselves and their co-workers.

- Entry into a confined space in support of this project is forbidden. However, it is not anticipated that confined space entry will be required during the completion of the field activities.

- Field investigation activities intended to define potential sources of environmental contamination often require employees to be in direct proximity or contact with hazardous substances. Employees may be exposed through inhalation of toxic dusts, vapors, or gases. Normal dust particulates from surficial soil may have adsorbed or absorbed toxic solvents, petroleum compounds, or toxic metal salts or metal particulates. Air monitoring equipment will be used to monitor airborne organic vapors and particulates. Toxic materials contained in dusts or particulates can be ingested if eating, smoking, drinking, and gum chewing are permitted prior to personnel washing their hands and face or removing contaminated work clothing and personal protective equipment. Some chemicals may be absorbed directly through the skin. Personal protective equipment, properly designed for the chemicals of concern, will always be provided and worn when a potential for skin contact is present.

- Biological Hazards—Potential hazards may be present at the site due to bites from stray domestic and wild animals (to include rodents), spiders, bees, and other venomous arthropods. Potential hazards may also be present at the site in the form of poisonous plant life, which can result in skin rashes or abrasions. In the case of an animal or insect bite that can be serious or fatal, workers must seek immediate medical attention and report the incident to the SHSO prior to leaving the site. An employee known to be allergic or sensitive to poisonous insects should alert the Site Manager and SHSO. The following are the main potential biological hazards at the site:

  — Deer Ticks (*Ixodes scapularis*) or black-legged ticks are potentially present throughout forested areas at the site and can transmit Lyme disease to humans. The limiting of exposed skin and use of DEET and permethrin is the most effective means to avoid tick bits.

  — Poison ivy (*Toxicodendron radicans*) is present throughout forested areas in and around Colonie, New York and may occur as a climbing vine or a rooted, singular plant. It can be identified by three shiny leaves that grow outward from a thick woody vine or thin pale stem. Urushiol, an oil that causes rash on human skin, is present on the entire plant. Proper identification and avoidance are the best options when conducting field work at the site.

- The potential chemicals of concern present at the site include, but are not limited to, volatile organic compounds, semi-volatile organic compounds, PCBs, pesticides, and metals. Material safety data sheets for these chemicals are provided in Attachment I.

5. PERSONAL PROTECTIVE EQUIPMENT

Based upon currently available information, it is anticipated that Level D personal protective equipment will be required for currently anticipated conditions and activities; however, Level C equipment is to be available for all site workers during sampling activities. If, at any time, the sustained level of total organic vapors in the worker breathing zone exceeds 5 parts per million (ppm) above background, site workers will evacuate the area and the condition will be brought to the attention of the SHSO. Efforts will be undertaken to mitigate the source of the vapors. Once the sustained level of total organic vapors decreases to below 5 ppm above background, site workers will be allowed to continue activities at the direction of the SHSO. If respirable dust levels exceed the OSHA[1] Permissible Exposure Limit (5 milligrams per cubic meter) dust masks will be worn by all onsite personnel until water methods reduce the levels.

The personal protective equipment components for use during this project are detailed in the Generic HASP[1]. The components of Level D personal protective equipment are summarized below. Level D will be worn for initial entry onsite and initially for all activities and will consist of the following:

- Coveralls or appropriate work clothing
- Steel-toe, steel-shank safety boots/shoes
- Hard hats (when overhead hazards are present or as required by the SHSO)
- Chemical resistant gloves (nitrile/neoprene) when contact with potentially contaminated soil or water is expected
- Safety glasses with side shields
- Hearing protectors (during operations producing excessive noise).

In the event that Level C is deemed necessary, the following will be worn:

- Boot covers (optional unless in contact with visually contaminated soil or water)
- Respirators and appropriate cartridges (i.e., combination particulate/organic vapor cartridge)
- Poly-coated coveralls (when contact with contaminated soil and water is anticipated, (e.g., when surging/pumping wells and pressure-washing equipment).

Insulated clothing, hats, etc. must be worn when temperatures or wind chill fall below 40°F.

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6. SITE CONTROL AND SECURITY

Only authorized personnel will be permitted to conduct field activities. Authorized personnel include those who have completed hazardous waste operations initial training, as defined under OSHA Regulation 29 CFR 1910.120/29 CFR 1926.65, have completed their training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations.

6.1 SAFE WORK PRACTICES

Safe work practices that will be followed by site workers include, but are not limited to, the following rules:

- Working before or after daylight hours without special permission are prohibited.
- Do not enter restricted or posted areas without permission from the SHSO.
- Smoking is limited to designated areas.
- Possessing, using, purchasing, distributing, or having controlled substances in their system throughout the day or during meal breaks is prohibited.
- Consuming or possessing alcoholic beverages is prohibited.
- Good housekeeping—employees will be instructed about housekeeping throughout field activities.
- Sitting or kneeling in areas of obvious contamination is prohibited.
- Avoid overgrown vegetation and tall grass areas.
- Employees must be aware, and inform their partners or fellow team members, of the potential non-visible effects of exposure to toxic materials. The symptoms of such exposures may include:

  — Headaches
  — Dizziness
  — Nausea
  — Blurred vision
  — Cramps
  — Irritation of eyes, skin, or respiratory tract.

6.2 DAILY STARTUP AND SHUTDOWN PROCEDURES

The following protocols will be followed daily prior to start of work activities:

- The SHSO will review site conditions to determine if modification of work and safety plans is needed.
- Personnel will be briefed and updated on new safety procedures as appropriate.
- Safety equipment will be checked for proper function.
- The SHSO will ensure that the first aid kit is adequately stocked and readily available.
- Onsite equipment and supplies will be locked and secure.

Figures

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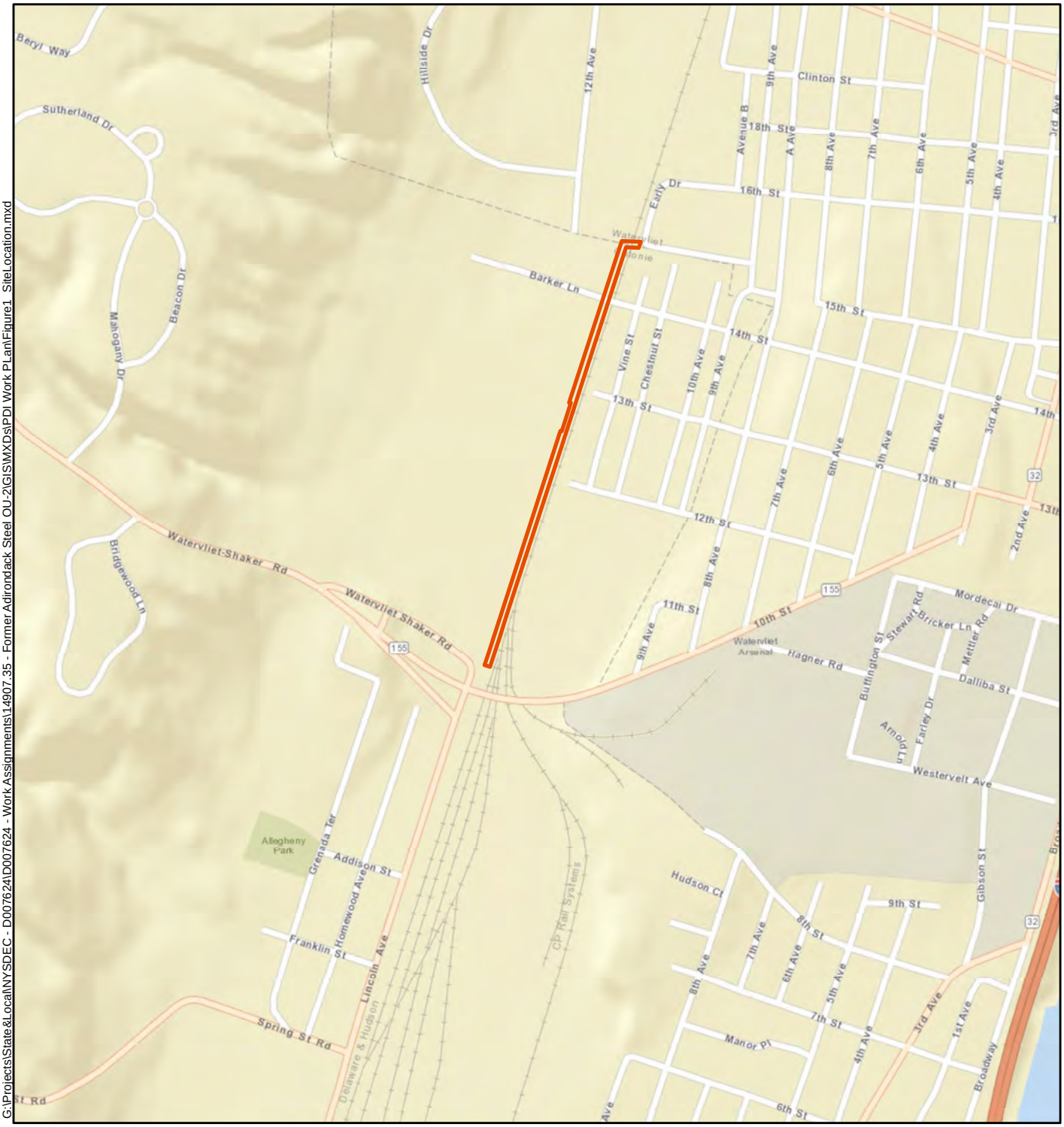

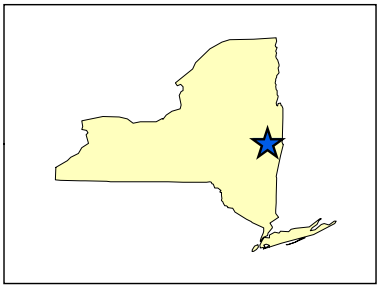

0 0.125 0.25
Miles
N

Legend

OU-2 Approximate Boundary

Figure 1
Site Location
Former Adirondack Steel OU-2 Site (401039)
Colonie, New York

Map Date: 3/8/2017
Source: ESRI, 2011
Projection: NAD 1983 State Plane New York East

NEW YORK STATE OF OPPORTUNITY Department of Environmental Conservation

G:\Projects\State&Local\NYSDEC - D007624\D007624 - Work Assignments\14907.35 - Former Adirondack Steel OU-2\GIS\MXDs\PDI Work PLan\Figure1_SiteLocation.mxd

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Attachment A

Worker Training and Physical Examination Record

ATTACHMENT A

WORKER TRAINING AND PHYSICAL EXAMINATION RECORD

SITE: Former Adirondack Steel Site OU-2, Colonie, New York

Name	OSHA 40-hour Hazardous Waste Operations Training		OSHA Hazardous Waste Supervisor Training	CPR (date of expiration)	First Aid (date of expiration)	Date of Last Physical Examination
	Initial	Annual				
EA PERSONNEL						
Ben Young	1989	1/13/16	1992	—	—	
Robert Conden	5/12/15	3/6/14	2005	—	—	6/8/15
Emily Cummings	1/15/14	5/11/16	—	11/12/17	11/12/17	8/17/15
Kritika Thapa	12/4/15	3/4/17	—	4/8/17	4/8/17	3/8/17
SUBCONTRACTOR OR ADDITIONAL PERSONNEL						
—	—	—	—	—	—	—
—	—	—	—	—	—	—

NOTE**:** Prior to performing work at the site, this Health and Safety Plan Addendum must be reviewed and an agreement to comply with the requirements must be signed by all personnel, including contractors, subcontractors, and visitors. Contractors and subcontractors are ultimately responsible for ensuring that their own personnel are adequately protected. In signing this agreement, the contractors and subcontractors acknowledge their responsibility for the implementation of the Health and Safety Plan Addendum requirements. All personnel onsite shall be informed of the site emergency response procedures and any potential safety or health hazards of the operations.

CPR = cardiopulmonary resuscitation

OSHA = Occupational Safety and Health Administration Standards

Attachment B

Health and Safety Plan Addendum
Review Record

ATTACHMENT B

HEALTH AND SAFETY PLAN ADDENDUM REVIEW RECORD

I have read the Health and Safety Plan Addendum for this site and have been briefed on the nature, level, and degree of exposure likely as a result of participation in this project. I agree to conform to all the requirements of this Plan.

SITE: Former Adirondack Steel Site OU-2, Colonie, New York			
Name	Signature	Affiliation	Date

Attachment C

Site Entry and Exit Log

ATTACHMENT C

SITE ENTRY AND EXIT LOG

SITE: Former Adirondack Steel Site OU-2, Colonie, New York				
Name	**Date**	**Time of Entry**	**Time of Exit**	**Initials**

Attachment D

Accident/Loss Report

ACCIDENT/LOSS REPORT

THIS REPORT MUST BE COMPLETED BY THE INJURED EMPLOYEE OR SUPERVISOR AND FAXED TO EA CORPORATE HUMAN RESOURCES WITHIN 24 HOURS OF ANY ACCIDENT. THE FAX NUMBER IS **(410) 771-1780**.

NOTE: WHENEVER AN EMPLOYEE IS SENT FOR MEDICAL TREATMENT FOR A WORK RELATED INJURY OR ILLNESS, PAGE 4 OF THIS REPORT MUST ACCOMPANY THAT INDIVIDUAL TO ENSURE THAT ALL INVOICES/BILLS/CORRESPONDENCE ARE SENT TO HUMAN RESOURCES FOR TIMELY RESPONSE.

A. DEMOGRAPHIC INFORMATION:

NAME OF INJURED EMPLOYEE:_____
HOME ADDRESS:_____
HOME PHONE:_____ DATE OF BIRTH:
AGE:_____ SEX: M F
MARITAL STATUS:_____ NAME OF SPOUSE (if applicable):_____
SOCIAL SECURITY NUMBER:_____ DATE OF HIRE:_____
NUMBER OF DEPENDENTS:_____
EMPLOYEES JOB TITLE:_____
DEPT. REGULARLY EMPLOYED:_____
WAS THE EMPLOYEE INJURED ON THE JOB: Y N
PRIMARY LANGUAGE OF THE EMPLOYEE:_____

B. ACCIDENT/INCIDENT INFORMATION:

DATE OF ACCIDENT:_____ TIME OF ACCIDENT:_____
REPORTED TO WHOM:_____ NAME OF SUPERVISOR:_____
EXACT LOCATION WHERE ACCIDENT OCCURRED (including street, city, state and County): _____
_____
_____

EXPLAIN WHAT HAPPENED (include what the employee was doing at the time of the accident and how the accident occurred):_____
_____
_____
_____
_____

DESCRIBE THE INJURY AND THE SPECIFIC PART OF THE BODY AFFECTED (i.e., laceration, right hand, third finger):_____
_____
_____

OBJECT OR SUBSTANCE THAT DIRECTLY INJURED EMPLOYEE:_____

_____

NUMBER OF DAYS AND HOURS EMPLOYEE USUALLY WORKS PER WEEK:_____
IS THE EMPLOYEE EXPECTED TO LOSE AT LEAST ONE FULL DAY OF WORK?_____
DOES THE EMPLOYEE HAVE A PREVIOUS CLAIM? Y N If yes, STATUS Open Closed
WAS THE EMPLOYEE ASSIGNED TO RESTRICTED DUTY?_____

C. ACCIDENT INVESTIGATION INFORMATION

WAS SAFETY EQUIPMENT PROVIDED? Y N If yes, was it used? Y N
WAS AN UNSAFE ACT BEING FORMED ? Y N If yes, describe_____
WAS A MACHINE PART INVOLVED? Y N If yes, describe_____
WAS THE MACHINE PART DEFECTIVE? Y N If yes, in what way_____
WAS A 3RD PARTY RESPONSIBLE FOR THE ACCIDENT/INCIDENT? Y N
If yes, list name, address, and phone number_____

_____

WAS THE ACCIDENT/INCIDENT WITNESSED? Y N
If yes, list name, address, and phone number:_____

_____

D. PROVIDER INFORMATION

WAS FIRST AID GIVEN ONSITE? Y N
If yes, what type of medical treatment was given_____
PHYSICIAN INFORMATION (if medical attention was administered)
NAME:_____
ADDRESS (include city, state, and zip):_____
PHONE:_____

HOSPITAL ADDRESS (include name, address, city, state, zip code, and phone)

_____

_____

WAS THE EMPLOYEE HOSPITALIZED? Y N If yes, on what date_____
WAS THE EMPLOYEE TREATED AS AN OUTPATIENT, RECEIVE EMERGENCY
TREATMENT OR AMBULANCE SERVICE?_____

PLEASE ATTACH THE PHYSICIANS WRITTEN RETURN TO WORK SLIP

NOTE: A PHYSICIAN'S RETURN TO WORK SLIP IS REQUIRED PRIOR TO ALLOWING THE WORKER TO RETURN TO WORK.

E. AUTOMOBILE ACCIDENT INFORMATION (complete if applicable)

AUTHORITY CONTACTED AND REPORT #_____
EA EMPLOYEE VEHICLE YEAR, MAKE AND MODEL_____

V.I.N. _____ PLATE/TAG# _____
OWNER'S NAME AND ADDRESS: _____

_____
DRIVER'S NAME AND ADDRESS: _____

_____
RELATION TO INSURED: _____ DRIVER'S LICENSE # _____
DESCRIBE DAMAGE TO YOUR PROPERTY: _____

_____

_____
DESCRIBE DAMAGE TO OTHER VEHICLE OR PROPERTY: _____

_____

_____
OTHER DRIVER'S NAME AND ADDRESS: _____

_____
OTHER DRIVER'S PHONE: _____
OTHER DRIVER'S INSURANCE COMPANY AND PHONE: _____

_____
LOCATION OF OTHER VEHICLE: _____
NAME, ADDRESS, AND PHONE OF OTHER INJURED PARTIES: _____

_____

_____
WITNESSES

NAME: _____ PHONE: _____
ADDRESS: _____
STATEMENT: _____

_____
SIGNATURE: _____

NAME: _____ PHONE: _____
ADDRESS: _____
STATEMENT: _____

_____
SIGNATURE: _____

F. ACKNOWLEDGEMENT

NAME OF SUPERVISOR: _____
DATE OF THIS REPORT: _____ REPORT PREPARED BY: _____

I have read this report and the contents as to how the accident/loss occurred are accurate to the best of my knowledge.

Signature: _____ Date: _____
Injured Employee

I am seeking medical treatment for a work related injury/illness.

Please forward all bills/invoices/correspondence to:

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC
225 SCHILLING CIRCLE
SUITE 400
HUNT VALLEY, MD 21031

ATTENTION: Michele Bailey
HUMAN RESOURCES

(410) 584-7000

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Attachment E

Emergency Telephone Numbers and Hospital Directions

ATTACHMENT E

EMERGENCY TELEPHONE NUMBERS AND HOSPITAL DIRECTIONS

SITE: Former Adirondack Steel Site OU-2, Colonie, New York	
Police: Colonie Police Department	9-1-1 / (518) 783-2744
Fire: Colonie Fire Department	9-1-1 / (518) 869-9306
Ambulance: Colonie EMS	9-1-1 / (518) 782-2645
Hospital: Albany Memorial Hospital	(518) 471-3221
New York Regional Poison Control Center: 219 Bryant St., Buffalo New York, 14222	(716) 878-7654 800-222-1222 (emergency)
Directions to Albany Memorial Hospital: Starting at 191 Watervliet-Shaker Road, travel 0.2 miles east on 12th Street toward Vine Street. Turn right onto 8th Avenue and travel 0.2 miles. Take a right onto NY-155/10th Street and travel 0.4 miles. Turn right onto Lincoln Ave followed by a quick right to stay on Lincoln Ave for another 0.6 miles. Continue onto Spring Street for 1.2 miles, then make a left on Schuyler Road. A left turn onto NY-378E is followed by a quick left onto NY-377 S / Van Rensselaer Blvd. After 1.5 miles, turn right onto Norther Blvd to Albany Memorial Hospital. Travel time is approximately 11 minutes.	
Program Safety and Health Officer: ***Pete Garger, CIH***	(410) 584-7000
Program Manager: ***Don Conan***	(315) 431-4610 Office (315) 877-7403 Cell
EA Project Manager ***Ben Young***	(315) 431-4610 Office (315) 430-7429 Cell
In case of spill, contact ***James Hayward, P.E.***	(315) 431-4610
EA Medical Services (Physician) All One Health Services	(800) 229-3674
Field Manager/Site Health and Safety Officer: ***Emily Cummings***	(315) 431-4610 Office (860) 309-3837 Cell
Site Geologist/Scientist: ***Emily Cummings (EA)*** ***Kritika Thapa (EA)***	(315) 431-4610 (860) 309-3837 Cell (478) 390-2213 Cell
In case of accident or exposure incident, contact Corporate Health and Safety Officer ***Peter Garger, Certified Industrial Hygienist***	(410) 584-7000

Attachment F

Emergency Equipment Available Onsite

ATTACHMENT F

EMERGENCY EQUIPMENT AVAILABLE ONSITE

Type of Equipment	Location
Communications Equipment	
Mobile Telephone	In EA vehicle
Medical Support Equipment	
First Aid Kits	In EA vehicle
Eye Wash Station	In EA vehicle
Firefighting Equipment	
Fire Extinguishers	In EA vehicle

Attachment G

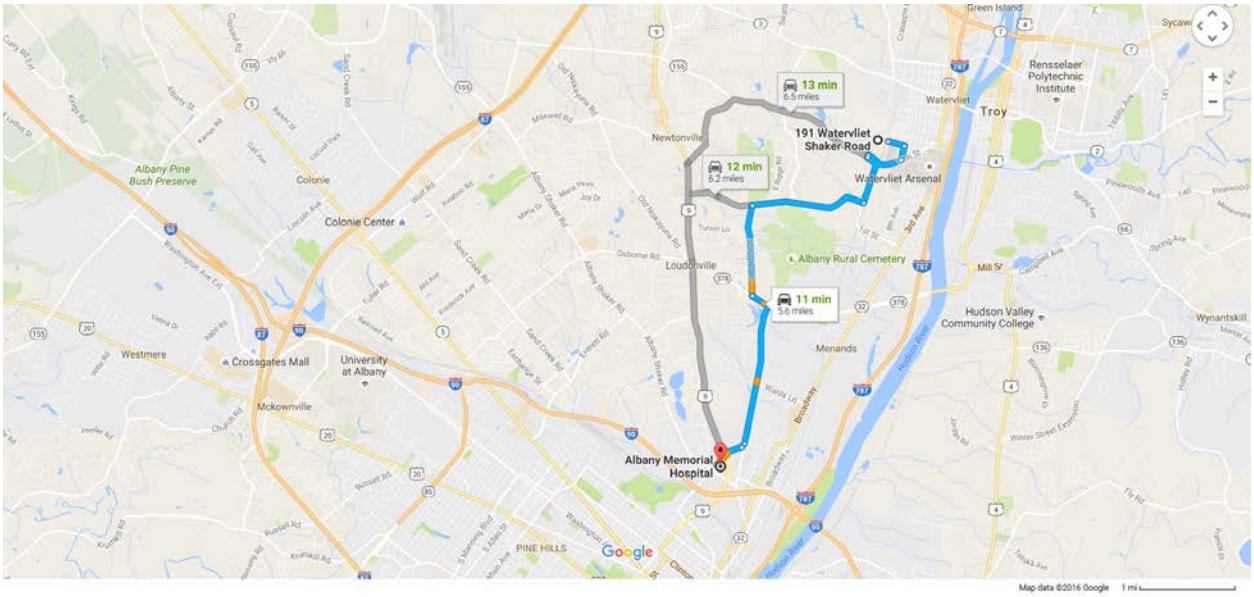
Map to Hospital

ATTACHMENT G

MAP TO HOSPITAL

Directions to Albany Mercy Hospital:

Starting at 191 Watervliet-Shaker Road, travel 0.2 miles east on 12th Street toward Vine Street. Turn right onto 8th Avenue and travel 0.2 miles. Take a right onto NY-155/10th Street and travel 0.4 miles. Turn right onto Lincoln Ave followed by a quick right to stay on Lincoln Ave for another 0.6 miles. Continue onto Spring Street for 1.2 miles, then make a left on Schuyler Road. A left turn onto NY-378E is followed by a quick left onto NY-377 S / Van Rensselaer Blvd. After 1.5 miles, turn right onto Norther Blvd to Albany Memorial Hospital. Travel time is approximately 11 minutes.



Attachment H

Personal Protective Equipment Activity Record

ATTACHMENT H

PERSONAL PROTECTIVE EQUIPMENT ACTIVITY RECORD

SITE: Former Adirondack Steel Site OU-2, Colonie, New York	
Weather Condition:	Onsite Hours: From To

Changes in Personal Protective Equipment Levels[(a)]	Work Operations	Reasons for Change

Site Health and Safety Plan Violations	Corrective Action Specified	Corrective Action Taken (yes/no)

Observations and Comments:

Completed by:

_____

Site Health and Safety Officer Date

(a) Only the Site Health and Safety Officer may change personal protective equipment levels, using only criteria specified in the Health and Safety Plan Addendum.

Attachment I

Material Safety Data Sheets

PCB DISPOSAL

MATERIAL SAFETY DATA SHEET

(POLYCHLORINATED BIPHENYLS)

COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients Name: polychlorinated biphenyls (PCBs)

HAZARD IDENTIFICATION

Reports of Carcinogenicity: YES

HEALTH HAZARDS ACUTE AND CHRONIC

- **Eyes**: Moderately irritating to eye tissues.
- **Skin**: Can be absorbed through intact skin, may cause de-fatting, potential for chloracne.
- **Inhalation**: Possible liver injury.
- **Ingestion**: Slightly toxic; reasonably anticipated to be carcinogenic.

EFFECTS OF OVER-EXPOSURE

Can cause dermatological symptoms; however, these are reversible upon removal of exposure source.

FIRST AID MEASURES

- **Eyes**: Irrigate immediately with copious quantities of running water for at least 15 minutes if liquid or solid PCBs get into them.
- **Skin:** Contaminated clothing should be removed and the skin washed thoroughly with soap and water. Hot PCBs may cause thermal burns.
- **Inhalation**: Remove to fresh air; if skin rash or respiratory irritation persists, consult a physician (if electrical equipment arcs over, PCBs may decompose to produce hydrochloric acid).
- **Ingestion**: Consult a physician. Do not induce vomiting or give any oily laxatives. (If large amounts are ingested, gastric lavage is suggested).

FIRE FIGHTING MEASURES: Flash Point: >141 ^{o}C (285.8 ^{o}F)

EXTINGUISHING MEDIA: PCBs are fire-resistant compounds.

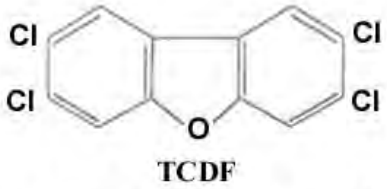
FIRE-FIGHTING PROCEDURES

Standard fire-fighting wearing apparel and self-contained breathing apparatus should be worn when fighting fires that involve possible exposure to chemical combustion products. Fire fighting equipment should be thoroughly cleaned and decontaminated after use.

UNUSUAL FIRE/EXPLOSION HAZARD

If a PCB transformer is involved in a fire-related incident, the owner of the transformer is required to report the incident. Consult and follow appropriate federal, provincial and local regulations.

***Note**: When askarel liquid becomes involved in a fire, toxic by-products of combustion are typically produced including polychlorinated dibenzofurans and polychlorinated dibenzodioxins, both known carcinogens. The structures of these chemical species are as follows:*

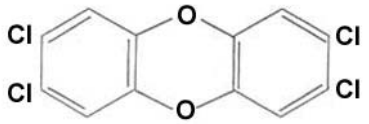


$C_{12}H_{8-n}Cl_nO$

$n = 4 - 8$

TCDF

2,3,7,8-tetrachlorodibenzofuran



$C_{12}H_{8-n}Cl_nO_2$

$n = 4 - 8$

TCDD

2,3,7,8-tetrachloro-dibenzo-p-dioxin

***Note**: 2,3,7,8-tetrachloro-dibenzo-p-dioxin is one of the most potent teratogenic, mutagenic and carcinogenic agents known to man.*

SPILL RELEASE PROCEDURES

Cleanup & disposal of liquid PCBs are strictly regulated by the federal government. Ventilate area. Contain spill/leak. Remove spill by means of absorptive material. Spill clean-up personnel should use proper protective clothing. All wastes and residues containing PCBs should be collected, containerized, marked and disposed of in the manner prescribed by applicable federal, provincial and local laws.

HANDLING AND STORAGE PRECAUTIONS

Care should be taken to prevent entry into the environment through spills, leakage, use, vaporization, or disposal of liquid. Avoid prolonged breathing of vapours or mists. Avoid contact with eyes or prolonged contact with skin. Comply with all federal, provincial and local regulations.

OTHER PRECAUTIONS

Federal regulations require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be appropriately labelled.

RESPIRATORY PROTECTION

Use OHSA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended and, if used, replaces need for face shield and/or chemical splash goggles. The respirator use limitations specified by the manufacturer must be observed.

VENTILATION

Provide natural or mechanical ventilation to control exposure levels below airborne exposure levels.

PROTECTIVE GLOVES: Wear appropriate chemical resistant gloves to prevent skin contact.

EYE PROTECTION: Wear chemical splash goggles and have eye baths available.

OTHER PROTECTIVE EQUIPMENT

Wear appropriate protective clothing. Provide a safety shower at any location where skin contact can occur.

WORK HYGIENIC PRACTICES

Wash thoroughly after handling. Supplemental safety and health : none

PHYSICAL/CHEMICAL PROPERTIES

- **Vapour pressure:** (mm Hg @100 ^{o}F) 0.005 - 0.00006
- **Viscosity:** (CENTISTOKES) 3.6 - 540
- **Stability indicator/materials to avoid:** Yes
- **Stability Condition to Avoid:** PCBs are very stable, fire-resistant compounds.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide, hydrogen chloride, phenolics, aldehydes, furans, dioxins

WASTE DISPOSAL METHODS

Consult the applicable PCB regulations prior to any disposal of PCBs or PCB-contaminated items.

MATERIAL SAFETY DATA SHEET

UNITED MINERAL & CHEMICAL CORPORATION
1100 VALLEY BROOK AVENUE
LYNDHURST, NJ 07071
TEL: 201-507-3300 FAX: 201-507-1506

FOR EMERGENCY CALL:
C H E M T R E C
1-800-424-9300

SECTION A - PRODUCT INFORMATION

TRADE NAME : ARSENIC METAL:
MBE CHARGES, ARSENIC CHUNK & GRANULE
REVISION DATE : NOVEMBER 16, 2007

CAS NUMBER : 7440-38-2
SYNONYMS : METALLIC ARSENIC; GREY ARSENIC; ARSENIA
CHEMICAL FAMILY : METALS - GROUP 5a
FORMULA : As

SECTION B - HAZARDOUS COMPONENTS

COMPONENT	CAS NO.	%	PEL/TLV
ARSENIC METAL (As)	7440-38-2	100	0.01mg/m^3 ACGIH TWA AS As 0.01mg/m^3 OSHA TWA, INORGANIC COMPOUNDS AS As (SEE 29 CFR 1910.1018) 0.5 mg/m^3 OSHA TWA, ORGANIC COMPOUNDS AS As 0.002 mg/m^3/15 min. CEILING-NIOSH, INORGANIC CMPD. 5 mg As/m^3 IDLH-CARCINOGEN, INORGANIC COMPOUNDS

TWA – Time Weighted Average over 8 hours
IDLH - Immediately dangerous to life & health

See the OSHA Inorganic Arsenic Standard at 29 CFR 1910.1018 before processing.

SECTION C - PHYSICAL PROPERTIES

BOILING POINT (°C) : SUBLIMES @ 615
MELTING POINT (°C) : 817 @ 3.6477 Mpa
VAPOR PRESSURE (mm Hg) : 1mm @ 372°C
VAPOR DENSITY (AIR=1) : N/A
SOLUBILITY IN WATER : INSOLUBLE
ODOR THRESHOLD : N/A
APPEARANCE & ODOR : SILVER GRAY CRYSTALLINE CHUNKS, RODS, OR GRANULES; NO ODOR AS METAL AS COMPOUND, AsH_3 HAS GARLIC ODOR

SPECIFIC GRAVITY : 5.72
FREEZING POINT (°) : N/A
PERCENT VOLATILE (BY WT.) : N/A
EVAPORATION RATE : N/A
pH (0 % IN WATER) : NONE

SECTION D - FIRE & EXPLOSION DATA

FLASH POINT (°) : NONE
FLAMMABLE LIMITS : **LEL : (N/A)** **UEL : (N/A)** **AUTO IGNITION TEMP (° F): (UNKNOWN)**
EXTINGUISHING MEDIA : **WATER : ()** **FOAM : (X)** **CO_2: (X)** **DRY CHEMICAL: (X)**

SPECIAL FIRE FIGHTING PROCEDURES : ARSENIC IN MASS FORM IS NON-FLAMMABLE. IN THE EVENT OF A FIRE, RESTRICT PERSONS NOT WEARING PROTECTIVE EQUIPMENT FROM AREA. TRY TO SNUFF FIRE WITH SAND, DRY MEDIA, FOAM OR CO_2. IF NO OTHER OPTIONS AVAILABLE, USE WATER & ALWAYS WEAR SELF CONTAINED BREATHING APPARATUS OR NIOSH TOXIC VAPOR RESPIRATOR. POISONOUS GASES ARE PRODUCED IN FIRE, INCLUDING ARSENIC OXIDES.

UNUSUAL FIRE & EXPLOSION HAZARDS : ARSENIC, WHEN HEATED OR IN CONTACT WITH ACID OR ACID FUMES, CAN PRODUCE HIGHLY TOXIC FUMES (SUCH AS ARSINE). ARSENIC REACTS VIGOROUSLY WITH OXIDIZING MATERIALS. ARSENIC IS FLAMMABLE IN THE FORM OF DUST WHEN EXPOSED TO HEAT OR FLAME OR BY CHEMICAL REACTION WITH POWERFUL OXIDIZERS (SEE SECTION E). SLIGHT EXPLOSION HAZARD EXISTS IN THE FORM OF DUST WHEN EXPOSED TO FLAME. IN THE EVENT OF A FIRE OR SPILL, CONTACT THE STATE DEPT. OF THE ENVIRONMENT & YOUR REGIONAL OFFICE OF THE FEDERAL ENVIRONMENTAL PROTECTION AGENCY.

SECTION E - REACTIVITY DATA

STABILITY : STABLE
INCOMPATIBILITY : HYDROGEN GAS CAN REACT WITH INORGANIC ARSENIC TO FORM THE HIGHLY TOXIC GAS ARSINE. INCOMPATIBLE WITH BROMINE AZIDE, DIRUBIDIUM ACETYLIDE, HALOGENS, PALLADIUM ZINC, PLATINUM, NCl_3, $AgNO_3$, CrO_3, Na_2O_2, HEXAFLUOROISOPROPYLIDENEAMINO LITHIUM. CAN REACT WITH ACIDS OR ACID FUMES AND POWERFUL OXIDIZERS SUCH AS BROMATES, CHLORATES, IODATES, PEROXIDES, LITHIUM, $NaCl_3$, KNO_3, $KMnO_3$, Rb_2C_2, $AgNO_4$, NOCl, IF_5, CrO_3, ClF_3, ClO, BrF_3, BrF_5, BrN_3, RbC_3BCH, CsC_3BCH.
HAZARDOUS DECOMPOSITION PRODUCTS : ARSENIC FUMES, ARSINE, OTHER ARSENIC COMPOUNDS
HAZARDOUS POLYMERIZATION : WILL NOT OCCUR
CONDITIONS TO AVOID : AVOID OPEN CONTAINERS AND CONTACT WITH INCOMPATIBLE MATERIALS

N/A = NOT APPLICABLE

SECTION F - PERSONAL PROTECTIVE EQUIPMENT INFO

RESPIRATORY EQUIPMENT : FOR HANDLING ELEMENTAL ARSENIC IN CHUNK, ROD, OR GRANULES USE NIOSH APPROVED, AIR PURIFYING, TOXIC VAPOR RESPIRATOR FOR PARTICULATE & FUME/ AIR LEVEL. IF PROCESSING MATERIAL INTO INORGANIC ARSENIC COMPOUNDS, CHOOSE PROPER RESPIRATORY PROTECTION IN ACCORDANCE WITH THE OSHA INORGANIC ARSENIC STANDARD AT 29 CFR 1910.1018 (h). FOR UNKNOWN CONCENTRATIONS OF INORGANIC ARSENIC OR UNDER FIRE-FIGHTING CONDITIONS USE FULL FACEPIECE SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE.

PROTECTIVE GLOVES : NEOPRENE OR PLASTIC

EYE PROTECTION : FACE SHIELD OR VENTED GOGGLES FOR WHEN DUST/ FUME OR INORGANIC COMPOUNDS ARE GENERATED.

VENTILATION : LOCAL EXHAUST/MECHANICAL(GENERAL) SCRUBBER OR TRAP IF POSSIBLE TO MAINTAIN EXPOSURE TO LESS THAN PERMISSIBLE LIMITS FOR ELEMENTAL ARSENIC AND ANY COMPOUNDS BEING GENERATED (SEE SECTION B)

OTHER PROTECTIVE EQUIPMENT : LAB COAT, COVERALLS, COVERLETS FOR SHOES, AND ACCESS TO EYEWASH FOUNTAIN FOR DUST OR INORGANIC COMPOUND GENERATION

SECTION G - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE : 0.01mg/m^3 TWA ARSENIC, ELEMENTAL & INORGANIC COMPOUNDS(EXCEPT ARSINE), AS As

PRIMARY ROUTES OF EXPOSURE : INHALATION OF FUMES, DUST, REACTION GASES; INGESTION; SKIN CONTACT

ORAL LD_{50} : 763 mg/m^3 RAT; ORAL RAT TDLo 605 micrograms/kg – REPRODUCTIVE EFFECTS; ORAL-MAN TDLo 7857 mg/kg/55 year old – SKIN & GASTROINTESTINAL EFFECTS

DERMAL IRRITATION-RABBIT : UNKNOWN; SUBCUTANEOUS RABBIT LDLo: 300 mg/kg

EYE IRRITATION-RABBIT : UNKNOWN

OSHA PEL : 0.01mg/m^3 TWA INORGANIC COMPOUNDS AS As; 0.5 mg/m^3 TWA ORGANIC COMPOUNDS AS As.

ACGIH TLV : 0.01mg/m^3 TWA ELEMENTAL ARSENIC & INORGANIC COMPOUNDS (EXCEPT ARSINE), AS As

EFFECTS OF OVEREXPOSURE : ARSENIC METAL IS NOT AS READILY AVAILABLE IN THE BODY AS ARSENIC IN THE FORM OF DUST OR VAPOR OR WHEN PROCESSED INTO ARSENIC COMPOUNDS (ARSENICALS). INORGANIC ARSENICALS ARE MORE TOXIC THAN ORGANIC ARSENICALS.

ACUTE EFFECTS: ARSENIC IS A POISON BY SUBCUTANEOUS, INTRAMUSCULAR, AND INTRAPERITONEAL ROUTES. ACUTE ARSENIC POISONING FROM INGESTION RESULTS IN BURNING LIPS, THROAT CONSTRICTION, ABDOMINAL PAIN, MARKED IRRITATION OF THE STOMACH AND INTESTINES WITH NAUSEA, VOMITING, AND DIARRHEA. IN SEVERE CASES THE STOOLS AND VOMIT ARE BLOODY AND THE PATIENT MAY GO INTO COLLAPSE AND SHOCK WITH WEAK, RAPID PULSE, COLD SWEATS, COMA, AND DEATH. INHALATION MAY CAUSE ULCERATION OF NASAL SEPTUM, RESPIRATORY IRRITATION (COUGH, SORE THROAT), SHORTNESS OF BREATH AND WEAKNESS. SKIN OR EYE CONTACT MAY CAUSE DERMATITIS, SKIN AND EYE IRRITATION. AFTER ABSORPTION, ARSENIC MAY CAUSE MULTI-ORGAN FAILURE AS DELAYED EFFECTS. ARSENIC IS AN EXPERIMENTAL TERATOGEN (MAY CAUSE DAMAGE TO THE DEVELOPING FETUS) AND MAY CAUSE SPONTANEOUS ABORTION OR STILLBIRTH WITH EITHER ACUTE OR CHRONIC POISONING.

CHRONIC EFFECTS: ARSENIC IS A CONFIRMED HUMAN CARCINOGEN AND HAS BEEN ASSOCIATED WITH LUNG, BLADDER, SKIN, AND OTHER CANCERS IN HUMANS. CHRONIC ARSENIC POISONING MAY INCLUDE ANY OR ALL OF THE FOLLOWING: DIGESTIVE SYSTEM DISTURBANCES, LOSS OF APPETITE, CRAMPS, NAUSEA, CONSTIPATION, DIARRHEA; LIVER DAMAGE WHICH MAY RESULT IN JAUNDICE; DISTURBANCES OF THE BLOOD, KIDNEYS AND NERVOUS SYSTEM; SKIN ABNORMALITIES INCLUDING ITCHING, PIGMENTATION, AND POSSIBLE CANCEROUS CHANGES. ARSENIC HAS INDUCED DNA DAMAGE IN HUMAN CELLS.

TARGET ORGANS (NIOSH) : (FOR INORGANIC COMPOUNDS AS As): LIVER, KIDNEYS, SKIN, LUNGS, LYMPHATIC SYSTEM

KNOWN EFFECTS ON OTHER ILLNESSES : EXPECTED TO AGGRAVATE PRE-EXISTING GASTROINTESTINAL, NERVOUS SYSTEM, SKIN, LIVER & KIDNEY PROBLEMS.

LISTED CARCINOGEN : NONE **()** OSHA **(YES)** NTP **(YES)** IARC **(YES)** OTHER **(YES)**

SECTION H – EMERGENCY & FIRST AID DATA

SKIN : FLUSH WITH SOAP & WATER. AVOID RUBBING INTO THE SKIN. CONTACT PHYSICIAN IMMEDIATELY.

EYES : FLUSH WITH WATER FOR AT LEAST 15 MINUTES, LIFTING UPPER AND LOWER EYELIDS. CONTACT PHYSICIAN IMMEDIATELY.

INHALATION : REMOVE TO FRESH AIR. PROVIDE OXYGEN IF NECESSARY. CONTACT PHYSICIAN IMMEDIATELY.

INGESTION : IMMEDIATELY CALL POISON CONTROL OR A PHYSICIAN. DO NOT INDUCE VOMITING UNLESS DIRECTED TO DO SO BY POISON CONTROL OR EMERGENCY MEDICAL PERSONNEL. TAKE TO HOSPITAL IMMEDIATELY.

MEDICAL NOTE: AGGRESSIVE DECONTAMINATION WITH GASTRIC LAVAGE IS RECOMMENDED. IF AN X-RAY INDICATES THE PRESENCE OF ARSENIC IN THE LOWER GI TRACT, WHOLE BOWEL IRRIGATION SHOULD BE CONSIDERED. ACTIVATED CHARCOAL MAY NOT BIND SIGNIFICANT AMOUNTS BUT IS RECOMMENDED UNTIL DEFINITIVE QUANTITATIVE DATA IS AVAILABLE. FLUID REPLETION SHOULD BEGIN AS SOON AS POSSIBLE.

SECTION I - SPILL & DISPOSAL INFORMATION

STEPS TO BE TAKEN IN CASE OF SPILL OR LEAK:

EVACUATE THE DANGER AREA. WEARING FULL PROTECTIVE EQUIPMENT (RESPIRATOR, GLOVES, GOGGLES, LAB COAT), GATHER UP CHUNKS, RODS, OR GRANULES WITH VACUUM OR UTENSILS RESERVED FOR POISONOUS SOLIDS AND PLACE IN SUITABLE CONTAINER AND SEAL. DO NOT RELEASE TO THE ENVIRONMENT. AVOID GENERATING DUST. VENTILATE THE AREA AFTER CLEANUP OF MATERIAL AND RESIDUE IS COMPLETE.

WASTE DISPOSAL INFORMATION:

SOLID WASTES SHOULD BE VITRIFIED, PLACED IN LABELED CONTAINER & BURIED IN AN EPA SUPERVISED FACILITY. ETCHING SOLUTIONS & CUTTING WASTES SHOULD BE PRECIPITATED, CEMENTED/VITRIFIED & PLACED IN METAL/PLASTIC LABELED CONTAINERS & BURIED IN EPA SUPERVISED FACILITY. PASS GAS THROUGH POTASSIUM PERMANGANATE, PRECIPITATE & TREAT AS ABOVE. WASTE MAY BE CONSIDERED HAZARDOUS DEPENDING ON LEVEL OF TOXICITY CHARACTERISTIC OF ARSENIC. SEE 40 CFR 261.24 FOR DETERMINATION.

RCRA HAZARDOUS WASTE : NO **()** YES **(**X)** **RCRA # :** (**D004)

** - IF TESTED POSITIVE AS CHARACTERISTIC OF TOXICITY FOR ARSENIC

CERCLA : NO **()** YES **(X)** **RQ** (1 LB. RQ IS APPLICABLE ONLY IF THE DIAMETER OF THE PIECES OF THE SOLID METAL RELEASED IS LESS THAN 100 MICROMETERS OR 0.004 INCH. THIS PRODUCT FORM IS LARGER THAN 100 MICROMETERS AND HAS NO RQ IN ITS CURRENT FORM. IF AS HAZARDOUS WASTE CHARACTERISTIC OF ARSENIC, THEN RQ=1 LB.)

FOLLOW ALL LOCAL, STATE AND FEDERAL INFORMATION AND REGULATIONS

SECTION J - OTHER REGULATORY INFORMATION

TSCA: WE CERTIFY THAT ALL COMPONENTS OF THIS PRODUCT ARE REGISTERED UNDER THE REGULATIONS OF THE TOXIC SUBSTANCES CONTROL ACT.

SARA TITLE III, SECT. 313: **LISTED (X)** **UNLISTED ()**

DOT REGULATED: **YES:** (X) **NO: ()** **RQ:** (N/A - PIECES ARE LARGER THAN 100 MICROMETERS IN DIAMETER)

IF REGULATED, PROPER SHIPPING NAME: ARSENIC **HAZARD CLASS:** (6.1)

IDENTIFICATION NO.: (UN1558) **PACKING GROUP:** (II) **LABEL REQUIRED:** (POISON)

INLAND B/L: UN1558, ARSENIC, 6.1, PACKING GROUP II, POISON

EMERGENCY RESPONSE GUIDE NO.: (152)

SECTION K - SPECIAL PRECAUTIONS

FOR INDUSTRIAL USE ONLY

HANDLING & STORAGE INFORMATION:

PRIOR TO WORKING WITH ARSENIC, PERSONNEL SHOULD BE TRAINED IN PROPER HANDLING & STORAGE. STORE IN ORIGINAL PACKAGING IN COOL DRY AREA. WHEN HANDLING, WEAR FULL PROTECTIVE EQUIPMENT (SEE SECTION F). PLACE INTO INERT ATMOSPHERE IMMEDIATELY. IF PROCESSING INTO INORGANIC ARSENIC COMPOUNDS, FOLLOW THE OSHA STANDARD AT 29 CFR 1910.1018. DO NOT INGEST. DO NOT INHALE DUST OR ANY PROCESSING FUMES. AVOID SKIN AND EYE CONTACT.

NOTE: MAINTENANCE PERSONNEL OF PROCESSING AND EXTRACT EQUIPMENT MUST ALSO WEAR FULL PROTECTIVE EQUIPMENT (SEE SECTION F) AND OBSERVE THE REQUIREMENTS OF THE OSHA INORGANIC ARSENIC STANDARD (29 CFR 1910.1018) AS RESIDUES MAY CONTAIN ARSENIC PARTICLES AND VARYING COMPOUNDS OF ARSENIC.

OTHER PRECAUTIONS :

MINIMUM - HAVE QUARTERLY MEDICAL CHECKS INCLUDING URINE TESTS OF PERSONNEL WORKING WITH ARSENIC OR ARSENIC COMPOUNDS. DO NOT EAT, DRINK OR SMOKE IN THE WORK AREA.

Cerilliant
Analytical Reference Standards

Safety Data Sheet

Revision Date:12/5/2010

Section I - Identification

Product Identity: Benzo(a)pyrene

Product Number: **SCB-007**

Manufacturer: Cerilliant Corporation
811 Paloma Drive, Suite A
Round Rock, TX 78665

Phone: 512-310-5100
FAX: 512-238-9129
Emergency (ChemTrec) 800-424-9300
703-527-3887

Section II - Hazard Information

Target Organs: N/A

Signal Words: Danger

GHS/CLP Classification:

Carcinogen-Cat 1B

Mutagen-Cat 1B

Reproductive toxicity-Cat 1B

Skin sensitisation-Cat 1

Aquatic toxicity, acute-Cat 1

Aquatic toxicity, chronic-Cat 1

Hazard Statements:

H317	May cause an allergic skin reaction.
H340	May cause genetic defects
H350	May cause cancer.
H360	May damage fertility or the unborn child
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements:

P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.

EU Directives Classification:

Symbol of Danger: **Indication of Danger:**

N/A

Risk Phrases:

R43	May cause sensitization by skin contact.
R45	May cause cancer.
R46	May cause heritable genetic damage.
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R60	May impair fertility.
R61	May cause harm to the unborn child.

Safety Phrases:

S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S53	Avoid exposure - obtain special instructions before use.
S60	This material and its container must be disposed of as hazardous waste.
S61	Avoid release to the environment. Refer to special instructions/Safety data sheets.

Section III - Composition/Information on Ingredients

Hazardous Components	CAS Number	Molecular Formula	Molecular Weight	EC Number	CLP Index Number	%
Benzo(a)pyrene	50-32-8	C20H12	252.32	200-028-5	601-032-00-3	100

Section IV - First Aid Measures

Eye Contact: Flush eyes with copious amounts of water for a minimum of 15 minutes and consult a physician.

Ingestion: Do not induce vomiting. Rinse mouth with water and consult a physician.

Skin Contact: Wash affected areas with copious amounts of water and consult a physician.

Inhalation: Remove to fresh air. If breathing is disturbed, give artificial respiration while transporting to a medical facility.

Section V - Fire Fighting Measures

Flash point: N/A

Flammable Limits:

Method Used: N/A

LEL: N/A **UEL:** N/A

Autoignition Temperature: N/A

Extinguishing Media: Water spray, chemical, or carbon dioxide extinguisher.

Special Fire Fighting Procedures: Wear SCBA and protective clothing to prevent contact with skin and eyes.

Unusual Fire and Explosion Hazards: N/A

Section VI - Accidental Release Measures

Evacuate area. Remove all sources of ignition. Use inert absorbent to pick up all spilled material. Transfer to a suitable waste container with non-sparking tools. Wash spill site with appropriate cleaning agents to remove residual traces of spilled material.

Section VII - Handling and Storage

Handling: Do not breathe dust or vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged, repeated exposure. Wash thoroughly after handling.

Storage: Room Temperature. Protect from light. Keep container closed. Keep away from ignition sources.

Section VIII - Exposure Controls/Personal Protection

As appropriate to quantity handled.

Ventilation-Local Exhaust: Use with forced ventilation.

General Mechanical: Normal laboratory air exchange.

Respiratory Protection: NIOSH approved cartridge type respirator with organic vapor cartridge with HEPA pre-filter recommended.

Eye Protection: Safety glasses with side shields or chemical safety goggles.

Protective Gloves: Compatible chemical resistant gloves.

Other Protective Clothing or Equipment: Lab Coat

Work/Hygienic Practices: Only experienced personnel should be allowed to handle this material.

Exposure Limits				
	OSHA PEL	ACGIH TLV	DFG MAK	Other Limits
Benzo(a)pyrene	TWA 0.2 mg/m3	N/A	N/A	N/A

Section IX- Physical and Chemical Properties

Boiling Point (°C):	N/A
Melting Point (°C):	176.5
Specific Gravity (Water =1):	1.351
Vapor Pressure (mm Hg):	N/A
Vapor Density (Air =1):	N/A
Evaporation Rate (Butyl Acetate =1):	N/A
Solubility in Water:	0.00162 mg/L @ 25 °C
Appearance and Odor:	Pale-yellow crystals

Section X- Stability and Reactivity

Stability:	Stable
Conditions to Avoid:	N/A
Incompatible Materials:	Strong oxidizing agents
Hazardous Decomposition Products:	carbon monoxide and carbon dioxide

Section XI- Toxicological Information

Routes of Entry: Inhalation: Yes Ingestion: Yes Skin: No

Carcinogenicity:
IARC: Group 1-Carginogenic to humans
NTP: Reasonably anticipated to be a carcinogen.
OSHA: N/A

Symptoms of Exposure: N/A

Toxicity Data:

Oral-mouse TDLO: 1280 mg/kg (female 16D pre-5D post) teratogen
Oral-rat TDLO: 15 mg/kg carcinogen

The toxicological properties of Benzo(a)pyrene have not been fully investigated. It should be assumed to have toxic effects and, therefore, procedures appropriate for the safe handling of hazardous chemicals should be followed.

Section XII- Ecological Information

N/A

Section XIII- Disposal Considerations

Waste materials should be disposed of under conditions that meet Federal, State, and Local environmental control regulations. Contact a licensed waste disposal specialist to dispose of this material.

Section XIV- Transport Information

DOT		**IATA**	
Proper Shipping Name:	Environmentally hazardous substance, solid n.o.s.	Proper Shipping Name:	Environmentally hazardous substance, solid, n.o.s.
UN Number:	3077	UN Number:	3077
Class:	9	Class:	9
Packing Group:	III	Packing Group:	III
PIH:	N	PIH:	N
Small quantities exempted		Small quantities exempted	

Section XV- Regulatory Information

SARA 302:	No
SARA 313:	Listed
RCRA Code:	U022
CERCLA RQ (pounds):	1

Section XVI- Other Information

The information contained herein is believed to be accurate and is supplied in good faith. Cerilliant Corporation makes no warranty with respect to and assumes no legal responsibility for use or reliance upon this information. Individuals receiving this data must exercise their own judgement in determining its suitability for a particular purpose.

Material Safety Data Sheet

Version 4.2
Revision Date 01/19/2012
Print Date 04/10/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Cadmium
Product Number	:	414891
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Target Organ Effect, Highly toxic by inhalation, Toxic by ingestion, Reproductive hazard, Mutagen

Target Organs

Lungs, Kidney

GHS Classification
Acute toxicity, Inhalation (Category 2)
Acute toxicity, Oral (Category 3)
Germ cell mutagenicity (Category 2)
Carcinogenicity (Category 1B)
Reproductive toxicity (Category 2)
Specific target organ toxicity - repeated exposure (Category 1)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H301	Toxic if swallowed.
H330	Fatal if inhaled.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P284	Wear respiratory protection.
P310	Immediately call a POISON CENTER or doctor/ physician.
P501	Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	4
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be fatal if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : Cd
Molecular Weight : 112.41 g/mol

Component		Concentration
Cadmium		
CAS-No.	7440-43-9	-
EC-No.	231-152-8	
Index-No.	048-002-00-0	

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Cadmium/cadmium oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Air sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Cadmium	7440-43-9	TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
Remarks	Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.			
		CEIL	0.3 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.			
		TWA	0.0020 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Suspected human carcinogen			
		TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen			
		TWA	0.002 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen			
	See 1910.1027. See Table Z-2 for the exposure limits for any operations or sectors where the exposure limits in 1910.1027 are stayed or are otherwise not in effect.			
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2

	Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.			
		CEIL	0.6 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.			
	Potential Occupational Carcinogen See Appendix A			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	granular
Colour	light grey

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 320.9 °C (609.6 °F) - lit.
Boiling point	765 °C (1,409 °F) - lit.
Flash point	not applicable
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	8.65 g/cm3 at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available

Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Oxidizing agents, acids

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Cadmium/cadmium oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 225 mg/kg

Inhalation LC50
LC50 Inhalation - rat - 30 h - 25 mg/m3
Remarks: Lungs, Thorax, or Respiration:Dyspnea.

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
In vitro tests showed mutagenic effects

Carcinogenicity

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Cadmium)
NTP:	Known to be human carcinogen (Cadmium)
	Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Cadmium)
OSHA:	1910.1027 (Cadmium)

Reproductive toxicity

Suspected human reproductive toxicant

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

Inhalation	May be fatal if inhaled. May cause respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Damage to the lungs., Kidney injury may occur., prolonged or repeated exposure can cause:, Vomiting, Diarrhoea. Lung irritation

Synergistic effects
no data available

Additional information
RTECS: EU9800000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 0.0015 mg/l - 96 h
	LC50 - Pimephales promelas (fathead minnow) - 1.0 µg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	mortality NOEC - Daphnia - 0.019 mg/l - 24 h
	mortality LOEC - Daphnia - 0.039 mg/l - 24 h
	EC50 - Daphnia magna (Water flea) - 0.024 mg/l - 48 h
Toxicity to algae	Growth inhibition IC50 - Chaetoceros sp. - 0.028 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
Bioaccumulation: Oncorhynchus mykiss (rainbow trout) - 72 d
Bioconcentration factor (BCF): 55

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2570 Class: 6.1 Packing group: I
Proper shipping name: Cadmium compounds (Cadmium)
Reportable Quantity (RQ): 10 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2570 Class: 6.1 Packing group: I EMS-No: F-A, S-A
Proper shipping name: CADMIUM COMPOUND (Cadmium)
Marine pollutant: No

IATA
UN number: 2570 Class: 6.1 Packing group: I
Proper shipping name: Cadmium compound (Cadmium)
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Highly toxic by inhalation, Toxic by ingestion, Reproductive hazard, Mutagen

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Cadmium	7440-43-9	1993-04-24

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	1993-04-24

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Cadmium	7440-43-9	2009-02-01

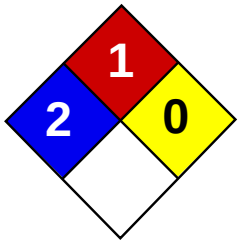
California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Cadmium	7440-43-9	2009-02-01

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Chromium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chromium

Catalog Codes: SLC4711, SLC3709

CAS#: 7440-47-3

RTECS: GB4200000

TSCA: TSCA 8(b) inventory: Chromium

CI#: Not applicable.

Synonym: Chromium metal; Chrome; Chromium Metal Chips 2" and finer

Chemical Name: Chromium

Chemical Formula: Cr

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Chromium	7440-47-3	100

Toxicological Data on Ingredients: Chromium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 580°C (1076°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame. Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence. Pyrophoric chromium unites with nitric oxide with incandescence. Incandescent reaction with nitrogen oxide or sulfur dioxide.

Special Remarks on Explosion Hazards:
Powdered Chromium metal +fused ammonium nitrate may react violently or explosively. Powdered Chromium will explode spontaneously in air.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 (mg/m3) from ACGIH (TLV) [United States] TWA: 1 (mg/m3) from OSHA (PEL) [United States] TWA: 0.5 (mg/m3) from NIOSH [United States] TWA: 0.5 (mg/m3) [United Kingdom (UK)] TWA: 0.5 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 52 g/mole

Color: Silver-white to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 2642°C (4787.6°F)

Melting Point: 1900°C (3452°F) +/- !0 deg. C

Critical Temperature: Not available.

Specific Gravity: 7.14 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Soluble in acids (except Nitric), and strong alkalies.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Not available.

Special Remarks on Reactivity:
Incompatible with molten Lithium at 180 deg. C, hydrogen peroxide, hydrochloric acid, sulfuric acid, most caustic alkalies and alkali carbonates, potassium chlorate, sulfur dioxide, nitrogen oxide, bromine pentafluoride. It may react violently or ignite with bromine pentafluoride. Chromium is rapidly attacked by fused sodium hydroxide + potassium nitrate. Potentially hazardous incompatibility with strong oxidizers.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause cancer based on animal data. There is no evidence that exposure to trivalent chromium causes cancer in man.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: May cause skin irritation. Eyes: May cause mechanical eye irritation. Inhalation: May cause irritation of the respiratory tract and mucous membranes of the respiratory tract. Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea. Chronic Potential Health Effects: Inhalation: The effects of chronic exposure include irritation , sneezing, reddness of the throat, bronchospasm, asthma, cough, polyps, chronic inflammation, emphysema, chronic bronchitis, pharyngitis, bronchopneumonia, pneumoconoisis. Effects on the nose from chronic chromium exposure include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur. Ingestion or Inhalation: Chronic exposure may cause liver and kidney damage.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Chromium Illinois toxic substances disclosure to employee act: Chromium Illinois chemical safety act: Chromium New York release reporting list: Chromium Rhode Island RTK hazardous substances: Chromium Pennsylvania RTK: Chromium Minnesota: Chromium Michigan critical material: Chromium Massachusetts RTK: Chromium Massachusetts spill list: Chromium New Jersey: Chromium New Jersey spill list: Chromium Louisiana spill reporting: Chromium California Director's List of Hazardous Substances: Chromium TSCA 8(b) inventory: Chromium SARA 313 toxic chemical notification and release reporting: Chromium CERCLA: Hazardous substances.: Chromium: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R40- Limited evidence of carcinogenic effect S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:16 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Material Safety Data Sheet

Copper, powder or dust

MSDS# 05430

Section 1 - Chemical Product and Company Identification

MSDS Name:	Copper, powder or dust
Catalog Numbers:	C431-500, C434-500
Synonyms:	None.
Company Identification:	Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	201-796-7100
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#:	7440-50-8
Chemical Name:	Copper
%:	100
EINECS#:	231-159-6

Hazard Symbols:	None listed
Risk Phrases:	None listed

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Warning! Flammable solid. Causes respiratory tract irritation. May cause lung damage. May cause liver and kidney damage. Causes eye and skin irritation. Inhalation of fumes may cause metal-fume fever. Can be explosive when exposed to heat or flames. Target Organs: Kidneys, liver, lungs.

Potential Health Effects

Eye:	Causes eye irritation.
Skin:	Causes skin irritation. May cause skin discoloration.
Ingestion:	Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause liver and kidney damage.
Inhalation:	Dust is irritating to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.
Chronic:	Prolonged or repeated skin contact may cause dermatitis. May cause liver and kidney damage. May cause lung damage.

Section 4 - First Aid Measures

Eyes:	Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:	Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion:	Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation:	Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:	Individuals with Wilson's disease are more susceptible to chronic copper poisoning.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Dust can be an explosion hazard when exposed to heat or flame. Flammable solid. May burn rapidly with flare burning effect. May re-ignite after fire is extinguished. Finely divided dusts may exhibit pyrophoric tendencies.

Extinguishing Media: Use dry sand, Met-L-X powder, or G-1 graphite powder. Contact professional fire-fighters immediately. Use dry sand, graphite powder, dry sodium chloride-based extinguishers. Dousing metallic fires with water may generate hydrogen gas, an extremely dangerous explosion hazard, particularly if fire is in a confined environment.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: 2; flammability: 2; instability: 0;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Avoid generating dusty conditions. Remove all sources of ignition.

Section 7 - Handling and Storage

Handling: Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with skin and eyes. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not expose to air.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Copper	0.2 mg/m3 (fume); 1 mg/m3 (dust and mist, as Cu)	1 mg/m3 TWA (dust and mist) 100 mg/m3 IDLH (dust, fume and mist)	0.1 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist)

OSHA Vacated PELs: Copper: 0.1 mg/m3 TWA (dust, fume, mists, as Cu)

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

Exposure Limits

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State:	Powder
Color:	red to brown
Odor:	none reported
pH:	Not available
Vapor Pressure:	1 mm Hg @1628C
Vapor Density:	Not available
Evaporation Rate:	Not applicable.
Viscosity:	Not applicable.
Boiling Point:	2595 deg C (4,703.00°F)
Freezing/Melting Point:	1083 deg C (1,981.40°F)
Decomposition Temperature:	Not available
Solubility in water:	Insoluble in water.
Specific Gravity/Density:	8.92
Molecular Formula:	Cu
Molecular Weight:	63.54

Section 10 - Stability and Reactivity

Chemical Stability:	Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid:	Ignition sources, dust generation, moisture, exposure to air, excess heat.
Incompatibilities with Other Materials	Strong oxidizing agents.
Hazardous Decomposition Products	Copper fumes.
Hazardous Polymerization	Has not been reported.

Section 11 - Toxicological Information

RTECS#:	CAS# 7440-50-8: GL5325000 GL7440000 GL7590000
LD50/LC50:	RTECS: Not available.
Carcinogenicity:	Copper - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
Other:	See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Not available

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: METAL POWDERS, FLAMMABLE, N.O.S.
Hazard Class: 4.1
UN Number: UN3089
Packing Group: II
Canada TDG
Shipping Name: METAL POWDER, FLAMMABLE, N.O.S. (Copper)
Hazard Class: 4.1
UN Number: UN3089
Packing Group: II

USA RQ: CAS# 7440-50-8: 5000 lb final RQ (no reporting of releases of this hazardous substa

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:Not available

Risk Phrases:

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 7440-50-8: 0

Canada

CAS# 7440-50-8 is listed on Canada's DSL List

Canadian WHMIS Classifications: D2B, B4

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 7440-50-8 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 7440-50-8 is listed on the TSCA Inventory.

Section 16 - Other Information

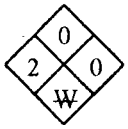
MSDS Creation Date: 12/12/1997

Revision #7 Date 7/20/2009

MATERIAL SAFETY DATA SHEET

VENDEE AND THIRD PERSONS ASSUME THE RISK OF INJURY PROXIMATELY CAUSED BY THIS PRODUCT IF REASONABLE SAFETY PROCEDURES ARE NOT FOLLOWED AS PROVIDED FOR IN THE DATA SHEET, AND VENDOR SHALL NOT BE LIABLE FOR SUCH INJURY. FURTHERMORE, VENDOR SHALL NOT BE LIABLE FOR INJURY TO VENDEE OR THIRD PERSONS PROXIMATELY CAUSED BY ANY ABNORMAL USE OF THIS PRODUCT EVEN IF REASONABLE SAFETY PROCEDURES ARE FOLLOWED.
ALL PERSONS USING THIS PRODUCT, ALL PERSONS WORKING IN AN AREA WHERE THIS PRODUCT IS USED, AND ALL PERSONS HANDLING THIS PRODUCT SHOULD BE FAMILIAR WITH THE CONTENTS OF THIS DATA SHEET. POSTING THIS DOCUMENT FOR EMPLOYEE NOTIFICATION IS RECOMMENDED BY THE VENDOR.

N. F. P. A.



1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TRADE NAMES Pure Lead **TELEPHONE #** 585-442-8500

SYNONYMS Pure Pig Lead, Pure Block Lead , Lead, Lead Strips **TELEPHONE #** 585-442-8500

MANUFACTURER'S NAME Rochester Lead Works **TRANSP. EMERGENCY #**

ADDRESS 76 Anderson Ave., Rochester, NY 14607 **INTENDED USE** Industrial

PREPARED BY Rochester Lead Works **DATE** Dec-00 Revised

2. COMPOSITION, INFORMATION ON INGREDIENTS

MATERIAL OR COMPONENT (CAS#)	WEIGHT %	OSHA PEL/TWA	OSHA Ceiling	ACGIH TLV/TWA	ACGIH TLV/STEL	Other
Lead (CAS# 7439-92-1)	99.9-100	50µg/m³	None	50µg/m³	None	30µg/m³ Action Level

*Fume **Respirable Dust ***Ceiling Limit

3. HAZARDS IDENTIFICATION

Routes of Exposure for Users

Skin Contact	Dust, vapor or fume may cause irritation.
Skin Absorption	Not readily absorbed through the skin.
Eye Contact	Dust, vapor or fume may cause irritation.
Ingestion	Dust, vapor or fume may be absorbed by the digestive system and can result in both acute and chronic overexposure.
Inhalation	Dust, vapor or fume may be absorbed by the respiratory system and can result in both acute and chronic overexposure as well as respiratory irritation.

Effects of Overexposure

Acute If left untreated: weakness, vomiting, loss of appetite, uncoordinated body movements, convulsions, stupor and possibly coma.

Chronic If left untreated: weakness, insomnia, hypertension, slight irritation to skin and eyes, metallic taste in mouth, anemia, constipation, headache, muscle and joint pains, neuromuscular dysfunction, possible paralysis and encephalopathy. Lead exposure can pose risk to developing fetuses and may also impair the reproductive systems in both men and women. Damage to the kidneys, hematopoietic and/or central nervous system may occur.

Signs and Symptoms of Exposure Irritation and effects of overexposure as described above.

Aggravated Medical Conditions Chronic forms of kidney, hematopoietic or neurologic diseases; preexisting skin or respiratory disorders may be aggravated by exposure to this product.

Notes to Physician Lead and its inorganic compounds are neurotoxins which may produce peripheral neuropathy. For an overview of the effects of lead exposure, consult Appendix A of OSHA's Occupational Exposure to Lead (29 C.F.R. §1910.1025). For combustion product effects see Hazardous Combustion Products in Section 5. Fire Fighting Measures.

4. FIRST AID MEASURES

Eyes	Flush with copious amounts of water. Get immediate medical attention.
Skin	Wash thoroughly with soap and water. If irritation occurs, get medical attention.
Ingestion	Get immediate medical attention.
Inhalation	Remove from exposure. Get medical attention if experiencing effects of overexposure.

5. FIRE FIGHTING MEASURES

Flash Point Not Applicable Test Method: Not Applicable

Flammable Limits in Air (% by volume, estimated) Lower: Not Applicable Upper: Not Applicable

Auto-ignition Temperature Not Applicable

Hazardous Combustion Products High temperatures may produce heavy metal fume, vapor, and/or dust. Combustion products may cause effects of overexposure as noted in Section 3. Hazards Identification. Other unidentified health effects may occur.

Conditions Contributing to Flammability Not Applicable

Extinguishing Media Dry chemical or carbon dioxide should be used on surrounding fire. Do not use water on fires where molten metal is present.

Special Fire Fighting Procedures Use full-body protection and full-face, self-contained breathing apparatus operated in a positive-pressure mode.

Unusual Fire and Explosion Hazards Molten metals produce fume, vapor or dust that may be toxic or respiratory irritants. The product, or its dust, can react vigorously with strong oxidizing agents.

Sensitivity to Impact Not Applicable **Sensitivity to Static Discharge** Not Applicable

6. ACCIDENTAL RELEASE MEASURES

Steps to be Taken if Material is Released or Spilled Dust material should be vacuumed, or wet swept where vacuuming is not feasible. Particulate matter should be stored in dry containers for later disposal or reclamation. Do not use compressed air or dry sweeping as a means of cleaning. Assure conformity with applicable governmental regulations.

Neutralizing Chemicals Not Applicable

7. HANDLING AND STORAGE

The two major means of metal absorption are inhalation and ingestion. Most inhalation problems can be prevented with adequate use of Section 8 ventilation and respirator information. Always exercise normal, good personal hygiene prior to smoking, eating or drinking. Smoking, eating and drinking should be confined to uncontaminated areas. Avoid skin contact. Wash hands, face, neck and arms thoroughly with soap and water before eating, drinking or smoking. Work clothes and equipment should remain in designated lead contaminated areas; never taken home or laundered with personal clothing. Launder contaminated clothing before reuse.

This product is intended for industrial use only. Isolate from children and their environment.

Store in a dry area where accidental contact with acids is not possible.

Adhere to all personal protection equipment procedures when handling, and ventilation requirements when heavy metal exposures are above permissible exposure limits or threshold limit values.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

Ventilation Requirements Ventilation, as described in Industrial Ventilation, A Manual of Recommended Practice, produced by the American Conference of Governmental Industrial Hygienists, shall be provided in areas where exposures are above the permissible exposure limits or threshold limit values specified by OSHA or other local, state and federal regulations.

Specific Personal Protection Equipment

RESPIRATORY As specified by 29 C.F.R. §1910.1025 Subpart (f) of the Federal Occupational Safety and Health Administration Standard for Occupational Exposure to Lead. Other local and state regulations may also apply.

EYE Face shield or vented goggles should be worn around molten metal.

GLOVE Gloves should be worn when handling this product.

OTHER CLOTHING AND EQUIPMENT Coveralls or other full body clothing shall be worn during product use and properly laundered after use, with the wash water disposed of in accordance with local, state and federal regulations. Hard hat, safety boots and other safety equipment should be worn as appropriate for the industrial environment. Personal clothing and shoes should be protected from contamination with this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT @ 760 mm Hg	3164°F (1740°C) Approx.	**MELTING POINT**	621°F (327°C)
SPECIFIC GRAVITY (H_2O = 1)	11.3 Approx.	**VAPOR PRESSURE (Reference Temperature)**	Negligible
VAPOR DENSITY (Air = 1)	Not Applicable	**SOLUBILITY IN H_2O (% by wt.)**	Insoluble
% VOLATILE BY VOLUME	Negligible	**EVAPORATION RATE (Butyl Acetate = 1)**	Negligible
COEFF. WATER/OIL DISTRIBUTION	Not Applicable	**pH**	Not Applicable
FREEZING POINT	See melting point	**ODOR THRESHOLD**	Not Applicable

APPEARANCE AND ODOR Silver-gray metal, tarnishes; no apparent odor.

10. STABILITY AND REACTIVITY

Conditions Contributing to Instability Not Applicable **Reactivity** Not Applicable

Incompatibility Strong oxidizers combined with this product may liberate hydrogen gas.

Hazardous Decomposition Products Under normal temperatures this product will not decompose.

Conditions Contributing to Hazardous Polymerization Not Applicable

11. TOXICOLOGICAL INFORMATION

Toxicity, Mutagenic, Teratogenic, Synergistic and Sensitization Information LD_{50} and LC_{50} information is not available.

Carcinogenicity
Listed by: [X] IARC 2B [ ] NTP [ ] OSHA [X] California Component: LEAD

12. ECOLOGICAL INFORMATION

Not Available

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method
Dispose or recycle toxic substances and hazardous wastes in accordance with local, state, and federal regulations.

14. TRANSPORT INFORMATION

U.S. Department of Transportation No special requirements for solid metal. Quantities less than 100µm in diameter and greater than or equal to 10 pounds in one container are considered by DOT as an Environmentally Hazardous Substance, Solid, n.o.s., Class 9, UN3077, Packing Group III.

Canadian Transportation of Dangerous Goods This product is not considered a Hazardous Material for shipping under Canadian Transportation of Dangerous Goods.

15. REGULATORY INFORMATION

Toxic Chemical Release Reporting, EPA Regulation 40 C.F.R. §372 (SARA Section 313)
Reportable chemicals in product: 99.9-100% lead (CAS #7439-92-1)

California Safe Drinking Water and Toxic Enforcement Act of 1986 ("Proposition 65")
WARNING: This product contains lead, a chemical known to the State of California to cause cancer, birth defects or other reproductive harm. Overexposure from this product may be prevented by following the recommendations throughout this MSDS.

Toxic Substances Control Act (TSCA), EPA Regulation 40 C.F.R. §710
The chemical ingredients in this product are in the Section 8(b) Chemical Substance Inventory (40 C.F.R. §710) and/or are otherwise in compliance with TSCA.

Canadian Workplace Hazardous Materials Information System
This product is considered controlled in Canada and has been placed in WHMIS Subdivision B of Division 2 of Class D due to lead content. This MSDS has been prepared to meet WHMIS and OSHA requirements using the ANSI 16 heading MSDS format.

16. OTHER INFORMATION

Before Using This Product Be Familiar With The Information Contained In: The Federal Standard for Occupational Exposure to Lead (29 C.F.R. §1910.1025), published in the Federal Register on Tuesday, November 14, 1978, by the Occupational Safety and Health Administration.

Material Safety Data Sheet

NICKEL SHOT

Revised: 10/13/2011
Replaces: 07/13/2010
Printed: 10/13/2011

Carolina Biological Supply Company
2700 York Rd | Burlington, NC 27215 • to order: 800.334.5551 • for support: 800.227.1150

CAROLINA
www.carolina.com

Section 1 - Product Description

Product Name: Nickel, Shot / Metal
Product Code(s): 87-6998, 87-7000
Size: 100 g, 500 g
Chemical Name: Nickel, Metal
CAS Number: 7440-02-0
Formula: Ni
Synonyms: N/A
Distributor: Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215
Chemical Information: 800-227-1150 (8am-5pm (ET) M-F) **Chemtrec** 800-424-9300 (Transportation Spill Response 24 hours)

Section 2 - Hazard Identification

Emergency Overview: Harmful if inhaled or swallowed.
Potential Health Effects:
Eyes: May cause irritation.
Ingestion: Harmful if swallowed.
Skin: Irritating to skin.
Inhalation: Irritating to respiratory system.

Section 3 - Composition / Information on Ingredients

Principal Hazardous Components: Nickel, Metal (CAS#7440-02-0) 100%
TLV units: Nickel, Metal: ACGIH-PEL 0.1 mg/m3 (TWA)
PEL units: Nickel, Metal: OSHA-PEL 0.1 Ni mg/m3

Section 4 - First Aid Measures

Emergency and First Aid Procedures:
Eyes - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Skin - After contact with skin, take off immediately all contaminated clothing, and wash immediately with plenty of water.
Ingestion - If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.
Inhalation - In case of accident by inhalation: remove casualty to fresh air and keep at rest.

Section 5 - Firefighting Procedures

Flash Point (Method Used): N/A
NFPA Rating:

Health: 2
Fire: 4
Reactivity: 0
Extinguisher Media: Use dry chemical, CO2 or appropriate foam.
Flammable Limits in Air % by Volume: N/A
Autoignition Temperature: N/A
Special Firefighting Procedures: Firefighters should wear full protective equipment and NIOSH approved self-contained breathing apparatus.
Unusual Fire and Explosion Hazards: Avoid Dusting. May become explosive when dispersed in air.

Section 6 - Spill or Leak Procedures

Steps to Take in Case Material Is Released or Spilled: Ventilate area of spill. Clean-up personnel should wear proper protective equipment. Avoid creating dust. Sweep or scoop up and containerize for disposal.

Section 7 - Special Precautions

Precautions to Take in Handling or Storing: Do not breathe dust.
Keep away from ... (incompatible materials to be indicated by the manufacturer). Keep in a cool, well-ventilated place away from ... (incompatible materials to be indicated by the manufacturer).

Section 8 - Protection Information

Respiratory Protection (Specify Type): None needed under normal conditions of use with adequate ventilation. A NIOSH/MSHA chemical cartridge respirator should be worn if PEL or TLV is exceeded.
Ventilation:
Local Exhaust: Yes
Mechanical(General): Yes
Special: No
Other: No
Protective Gloves: Natural rubber, Neoprene, PVC or equivalent.
Eye Protection: Splash proof chemical safety goggles should be worn.
Other Protective Clothing or Equipment: Lab coat, apron, eye wash, safety shower.

Section 9 - Physical Data

Molecular Weight: 58.71 g/mol
Boiling Point: 2900 °C
Vapor Density(Air=1): N/A
Percent Volatile by Volume: N/A
Solubility in Water: Practically Insoluble
Melting Point: 1455 °C
Vapor Pressure: N/A
Specific Gravity (H2O=1): 8.9
Evaporation Rate (BuAc=1): N/A
Appearance and Odor: Clear, Yellow-Green fluorescent liquid with piney odor.

Section 10 - Reactivity Data

Stability: Stable
Conditions to Avoid: Avoid dusting.
Keep away from heat.
Keep away from sources of ignition - No smoking.
Incompatibility (Materials to Avoid): Acids,
Hazardous Decomposition Products: Metal Fumes,
Hazardous Polymerization: Will not occur

Section 11 - Toxicity Data

Toxicity Data: Nickel Shot: itr-rat LD-lo 12 mg/kg
Effects of Overexposure:

Acute: See Section 2
Chronic: Certain components or species of this product are considered potential carcinogens.
Conditions Aggravated by Overexposure: N/A
Target Organs: Eyes, Mucous Membranes,
Primary Route(s) of Entry: Inhalation, ingestion, eye or skin contact.

Section 12 - Ecological Data

EPA Waste Numbers: N/A

Section 13 - Disposal Information

Waste Disposal Methods: Dispose in accordance with all applicable Federal, State and Local regulations. Always contact a permitted waste disposer (TSD) to assure compliance.

Section 14 - Transport Information

DOT Proper Shipping Name: N/A

Section 15 - Regulatory Information

EPA TSCA Status: On TSCA Inventory
Hazard Category for SARA Section 311/312 Reporting: Acute

Name List:
Nickel, Metal - Yes

Chemical Category:
Nickel. Metal - Nickel Compounds

CERCLA Section 103 RQ(lb.): Nickel, Metal - No
RCRA Section 261.33: Nickel, Metal - No

Section 16 - Additional Information

The information provided in this Material Safety Data Sheet represents a compilation of data drawn directly from various sources available to us. Carolina Biological Supply makes no representation or guarantee as to the suitability of this information to a particular application of the substance covered in the Material Safety Data Sheet. Any employer must carefully assess the applicability of any information contained herein in regards to the particular use to which the employer puts the material.

Glossary

ACGIH	American Conference of Governmental Industrial Hygienists
CAS Number	Chemical Services Abstract Number
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation
IARC	International Agency of Research on Cancer
N/A	Not Available
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act

MSDS FOR ZINC DUST 122 ZC-D004

SECTION I - GENERAL INFORMATION

NAME: ZINC DUST

MANUFACTURER:
HORSEHEAD CORPORATION
300 Frankfort Road
Monaca, PA 15061
724-774-1020

TRANSPORTATION EMERGENCY:
CHEMTREC: 800-424-9300

CHEMICAL FAMILY: Nonferrous Metal **CAS NO.:** 7440-66-6

FORMULA: Zn

DOT HAZARD CLASS: See Below* **UN NO.:** N/A **NA NO.:** N/A

SARA SECTION 313: This product is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act and 40 CFR 372. The materials underlined below are present in quantities above the applicable deminimis concentrations and are listed as Toxic Chemicals in 40 CFR 372.65.

ISSUE DATE: 2/25/88 **REVISION DATE:** 10/14/2010

*This product has been tested using the applicable tests in Section 33 of the Second Revised Addition of the United Nations Recommendations on the Transportation of Dangerous Goods, Manual of Test and Criteria. Results of the testing show that the sample did not meet the minimum standards for classification into either Division 4.1 Flammable Solid or Division 4.3 Dangerous when Wet. Because it does not meet the classification criteria in paragraph 173.124, it is not a DOT hazardous material as shipped.

SECTION II - INGREDIENTS

MATERIAL	CAS NO.	%
ZINC DUST	7440-66-6	97
ZINC OXIDE	1314-13-2	3
LEAD	7439-92-1	0.01 max.
CADMIUM	7440-43-9	0.002 max.

SECTION III PHYSICAL DATA

BOILING POINT (760 MM HG): 1665^{o} F **MELTING POINT:** 788^{o} F

SPECIFIC GRAVITY: 7.11 **EVAPORATION RATE (=1):** N/A

VAPOR DENSITY (air = 1): N/A **SOLUBILITY IN WATER:** Reacts with water.

PERCENT VOLATILE BY VOLUME (%): N/A **VAPOR PRESSURE AT 20^{o} C:** N/A

APPEARANCE AND ODOR: Very fine blue-gray powder

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

MINIMUM EXPLOSION CONCENTRATION: 460,000 mg/M^{3}

IGNITION TEMPERATURE: Cloud 690^{o} C
Layer 540^{o} C

NFPA FIRE RATING

HEALTH	0
FLAMMABILITY	1
REACTIVITY	1

IGNITION SENSITIVITY: < 0.1

EXPLOSION SEVERITY: < 0.1

Dust with an ignition sensitivity less than 0.2 and an explosion severity less than 0.5 should be considered as constituting only a weak explosion hazard. Class II electrical equipment should not be required.*

EXTINGUISHING MEDIA: Smother and cool with a suitable dry extinguishing agent (Class D fires) such as dry powder (Ansul Met-L-X), zinc oxide or dry sand. Do not use water.

SPECIAL FIRE FIGHTING PROCEDURES: Use NIOSH/MSHA approved self-contained breathing apparatus. Do not spread burning material. Smother and allow fire to go out. Dry zinc dust will not ignite spontaneously, but once ignited, may burn readily in air.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Bulk dust in contact with water or damp air evolves hydrogen. The heat produced during this reaction could ignite the hydrogen. An explosive condition may exist if this happens in a confined space. Dry dust may form a dust explosive mixture in air. Zinc oxide fume may result from combustion of zinc dust.

*National Materials Advisory Board Publication 353-4 issued July, l982.

SECTION V - HEALTH HAZARD DATA

MATERIAL	FORM	OSHA-PEL TWA mg/m³	ACGIH-TLV TWA mg/m³	ACGIH-TLV STEL mg/m³
ZINC	Oxide Fume	5	2	10
ZINC OXIDE	Total Dust	15	10	--
	Respirable (Fume)	5	2	10

ROUTES OF ENTRY

PRIMARY: Inhalation

SECONDARY: Ingestion

EFFECTS OF SHORT TERM OVEREXPOSURE:

ZINC/ZINC OXIDE: Inhalation of high levels of zinc oxide may result in tightness of chest, metallic taste, cough, dizziness, fever, chills, headache, nausea, and dry throat. Overexposure may produce symptoms known as metal fume fever or "zinc shakes"; an acute, self-limiting condition without recognized complications. Symptoms of metal fume fever include: chills, fever, muscular pain, nausea and vomiting. Like any finely divided particulate matter, zinc oxide may cause mechanical irritation to skin and eyes.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Inhalation of dust may be an irritant to pre-existing respiratory conditions.

EMERGENCY AND FIRST AID PROCEDURES: Symptoms resulting from inhalation overexposure usually disappear within 24 hours. Symptomatic treatment, such as bed rest and possibly aspirin is recommended to provide relief from fever and chills. Eye contact, flush eyes with copious amounts of water. In all cases, consult physician for medical attention.

EFFECTS OF LONG TERM OVEREXPOSURE:

ZINC/ZINC OXIDE: Chronic exposure to zinc may cause respiratory tract irritation with nasopharyngitis and laryngitis.

CARCINOGENIC ASSESSMENT:

NTP? No **IARC MONOGRAPH?** No **OSHA?** No

SECTION VI - REACTIVITY DATA

STABILITY: ( ) Unstable
(X) Stable

CONDITIONS TO AVOID: Hydrogen may evolve when in contact with water or damp air.

INCOMPATIBILITY (MATERIALS TO AVOID): Avoid contact with water, acids, and alkalis.

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION: ( ) May occur
(X) Will not occur

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Avoid contact with water. Material should be contained for recycling.

WASTE DISPOSAL METHOD: Contain in a dry closed container. Material may be recycled or disposed of in accordance with Federal, State, and Local Environmental Regulations. This material may be regulated under CERCLA, TSCA, SARA, and/or RCRA Regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): Use NIOSH/MSHA approved type respirator for protection against dust and metal fumes.

VENTILATION: Local exhaust ventilation to reduce dust concentrations to less than permissible exposure limits.

PROTECTIVE GLOVES: Recommended to prevent skin irritation in hypersensitive individuals.

EYE PROTECTION: Use safety eyewear for protection against airborne particulate matter.

OTHER PROTECTIVE EQUIPMENT: Barrier creams may help prevent skin irritation in hypersensitive individuals. Fire resistant coveralls are recommended.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in a cool, dry, well-ventilated location, separate from acids and alkalis. Protect from physical damage.

OTHER PRECAUTIONS: Practice good personal hygiene when working in areas where this material is used. Avoid prolonged contact with skin.

DISCLAIMER: As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of the material. Information contained herein is believed to be true and accurate but all statements or suggestions are made without any warranty, express or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from the use thereof.