WORK PLAN

DIXON ROAD SITE

$1110^{1/2}$ – 1112 and 1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number: C5M5
Administrative Settlement Agreement and Order on Consent for
Removal Action Docket Number V-W-15•C-021

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1.0 Background

1.1 Introduction

This Work Plan has been prepared for the Potentially Responsible Parties (PRPs), the City of Kokomo, Indiana, and the Vernon L. Graves Revocable Living Trust, designated as the "Respondents" in Administrative Settlement Agreement and Order on Consent for Removal Action Docket Number V-W-15•C-021 ("Agreement"). A copy of the Agreement is included in **Appendix A**. The approved Work Plan is a fully enforceable part of the Agreement. The project site (hereafter referred to as "Site"), consists of an approximate 10.08 acre commercial property that is being used as a roll-off container rental and concrete crushing facility. A topographic map showing the Site location is included as **Figure 1**.

The objective of this project is to address Section VIII of the Agreement, titled Work To Be Performed. The following activities will be performed:

- Develop and implement Site plans including a Site-specific Health and Safety Plan (HASP), a Quality Assurance Project Plan (QAPP), a Site Emergency Contingency Plan, and a Work Plan;
- Establish Site security;
- Conduct a comprehensive site assessment and engineering evaluation to determine the extent of buried drums and contamination in soil; and evaluate potential control and/or removal option to control, contain, and/or remove drums, waste, and contaminated soil;
- Implement selected control and/or removal action as approved by EPA;
- Perform sampling and analysis to determine disposal options; and,
- Consolidate and package hazardous substances, pollutants, and contaminants for transportation and off-Site disposal in accordance with the U.S. EPA Off-Site Rule, 40 Code of Federal Regulations (CFR) §300.440.

In conjunction with the work required to be completed per the Agreement, the following tasks will be performed:

- Site boundary survey;
- Geophysical survey;
- Surface and subsurface soil sampling (soil borings);
- Test pits based on results of geophysical survey; and
- Development of a Summary Report detailing the work performed and recommendations for additional work.

It should be noted that the work described in this Work Plan will be completed in a phased approach. Due to the nature of the Site, the extent of contamination will be determined in a series of steps and not during one (1) mobilization to the Site. It is expected that Site work will be completed in a span of five (5) to six (6) months following Work Plan approval, dependent upon turn-around times for the U.S. EPA to review required documents. All

work will be conducted in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300.

It should be noted that this Work Plan is intended to be a working document open to multiple iterations based on results of investigations necessary to meet the requirements of the Agreement. Results from investigation activities will be used to develop a Conceptual Site Model (CSM) and data gap analyses will be performed following data collection based on the CSM. After investigation activities have sufficiently defined the extent of buried drums and contamination in soil per the Agreement, Site plans will be modified to reflect the activities that must be completed to bring the Site to closure.

1.2 Site History

The Site lies adjacent to the Kokomo Dump Site (EPA Site Spill Identification Number C564) which is still owned by the City of Kokomo. The City operated an incinerator and municipal landfill at the Kokomo Dump Site from approximately 1963 to the 1970s. The Site was operated as a dump in the 1950s. Westside Salvage, Inc. operated at the Site beginning in 1961. Edward Graves was the President of Westside Salvage, Inc. between 1961 and 1976. In 1978 the name of the corporation was changed to Graves Westside Auto Parts, Inc. and the auto parts business was moved to 1105 South Home Avenue, Kokomo, Indiana. Auto parts, vehicle towing, and metals recycling businesses have been attributed to the Site through 2014. As of 2015, the property was being leased to Bunn Inc. for use as a roll-off container rental and concrete crushing facility.

The Indiana Department of Environmental Management (IDEM) discovered drums at the neighboring Kokomo Dump Site in April 2011 during an oil spill at the nearby Haynes International property. At that time, IDEM documented drums and waste piles on the property to the north (Dixon Road Site). Drums were exposed on the banks of Wildcat Creek on the Site. IDEM subsequently requested assistance from the EPA at both the Kokomo Dump and Dixon Road Sites.

The EPA, IDEM, and the Superfund Technical Assessment and Response Team (START) conducted a Site Assessment at the Site on December 3, 2012. During the assessment, the EPA documented numerous drums and waste piles. Waste was noted extending down the bank of Wildcat Creek. Site assessment activities included sampling surface soil, subsurface soil, waste piles, and buried waste. High concentrations of lead and Polychlorinated Biphenyls (PCBs) were confirmed in both surface and subsurface soils. A high concentration of hexavalent chromium and mercury was encountered in one (1) surface soil sample; also, a high concentration of mercury was encountered in one (1) subsurface soil sample. In addition, three (3) surface soil samples contained lead, one (1) surface soil sample contained cadmium, and one (1) subsurface soil sampled contained cadmium in excess of the TCLP Regulatory Limit. As a result of these findings, U.S. EPA determined that conditions at the Site met the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) § 300.415(b)(2) criteria for a time-critical removal action.

1.3 Site Description

The Site, located at 1110½ to 1112, and 1114 S. Dixon Road, Kokomo, Indiana, is comprised of approximately 10.08 acres, and is currently in use as a roll-off container rental and concrete crushing facility, with a residence located on the west side of the property. The Site is bordered by a Wildcat Creek to the north, beyond which is vacant property formerly owned by Continental Steel. The northwestern corner of the Site is bordered by a commercial/industrial warehouse facility. The former Kokomo Dump Site (currently a yard waste recycling center) borders the Site to the south. A residence and Dixon Road border the Site to the west. An office/garage building is present on the Site near the northwest boundary. One storage shed/trailer is located near the center of the property along the northern boundary. The vast majority of the Site is dedicated to storage of construction materials. Site features are depicted on **Figure 2**.

According to U.S. Census data published in 2012, Kokomo has a population of approximately 56,866. The majority of the population of Kokomo is located east and northeast of the subject Site. The area immediately around the Site is commercial/industrial and agricultural use. Residential properties are located south of the Site and at the west end of the Site. Surrounding properties are depicted on **Figure 2**.

Wildcat Creek, the main surface drainage feature in the area, is located adjacent north of the Site. Kitty Run is located approximately 80 feet west of the Site and is channelized through a culvert running north-south parallel to Dixon Road. A topographic map is included as **Figure 1.** Topography of the Site has been altered and generally slopes to the west.

No wetlands are mapped adjacent to or in the immediate vicinity of the Site, according to the online U.S. Fish and Wildlife Service National Wetlands Inventory Mapper. A copy of the map is included in **Appendix B**. A quarry is located west of Dixon Road and is likely influencing deep groundwater flow in the vicinity. A Bedrock Groundwater Elevation Map is presented in **Appendix C**.

Site-specific geology consists of topsoil or fill at the ground surface overlying silt and clay. Fill has been logged greater than nine (9) feet thick in some locations. Groundwater was not encountered during previous investigations and is expected to be greater than 20 feet bgs. Shallow groundwater flow is expected to be towards Wildcat Creek to the north, with possible influence from the quarry to the west.

Based on previous soil sampling results, concentrations of hexavalent chromium, lead, mercury, and PCBs exceeding the IDEM *Remediation Closure Guide* (RCG) Direct Contact Industrial Screening Levels (DCISLs) are present. In addition, arsenic, cadmium, and benzo(a)pyrene were previously found above IDEM RCG Direct Contact Residential Screening Levels (DCRSLs). Soil analytical results are presented on **Figure 3** and in **Tables 1-4.**

Due to the presence of PCBs in the subsurface soil, the U.S. EPA has expressed concern regarding the potential presence of dioxin. Due to historic use as a landfill, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) may also be encountered.

2.0 Site Mobilization

2.1 Site Safety

A Health and Safety Plan (HASP) meeting the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR 1910.120 is included in **Appendix D**. A SESCO representative will fulfill the role of Response Manager and a representative of Environmental Restoration, LLC (ER) will fulfill the role of Site Health and Safety Officer.

2.2 Pre-Work Meeting

Prior to implementing on-Site investigation activities, a meeting will be scheduled to discuss the approved Work Plan. All pertinent project personnel will be required to attend, including the PRP representatives, U.S. EPA On-Scene Coordinator (OSC), SESCO, ER, and any other necessary subcontractors. During the pre-work meeting, all participants will read and formally acknowledge provisions of the HASP prior to initiating on-Site work.

2.3 Site Security

The Site is secured on the south, west, and a portion of the north side by a fence. Access to the Site is provided through a locked gate located along Dixon Road. The east side of the property is accessible through an inactive railroad line; however, the area is wooded, making access difficult. No manned security is planned for the Site. During non-working hours, all Site equipment will be staged in a designated equipment staging area. During implementation of work presented in this Work Plan, all Site workers, subcontractors, and visitors, will be required to sign in and out each day. The sign-in sheet will record the individuals printed name, signature, affiliation, time on-Site, time off-Site, and comment section. The sign-in sheet will be maintained at the Site entrance. Work areas will be delineated during Site investigation and removal activities dependent upon the nature and expected duration of activities. Excavation or construction-related activities or long-term activities will be delineated with temporary construction/safety fencing to prevent unauthorized access; localized soil borings or short-term/temporary activities will be delineated via safety cones and caution tape. Additionally, it should be noted that the facility is generally accessed only by Vernon L. Graves and Bunn Inc. employees on a limited basis. The HASP contains additional information in **Section 9.0** pertaining to the various work zones on the Site.

2.4 Site Control Measures

Site control measures meeting the requirements of 29 CFR 1910.120 (d) are presented in the HASP in **Appendix D**.

2.5 Office Trailers/Decontamination Trailers

An on-Site office/garage building will be available as a project office and emergency shelter; however, a mobile office building will be established at the Site, if requested by the EPA

Decontamination stations will be set up in the Contamination Reduction Zone (CRZ) with a trailer available for changing clothes (in the event the work occurs in cold weather). In the event that the scope of work turns into an abatement project that requires a more thorough decontamination, ER will mobilize a decontamination trailer to the Site, which will include the following equipment:

- Shower stalls with three-flap OSHA compliant air lock curtains
- Electric water heater
- Polyethylene holding tank
- Floor drains installed on dirty and clean sides plumbed to holding tank
- Personnel lockers secured to walls in clean room
- Benches
- Clothing hooks/hangers
- Contaminated PPE disposal area
- Clean PPE (unused) storage
- Exterior hand wash units and portable toilets

2.6 Site Preparation

Prior to performing any subsurface activities, public utilities will be located by notifying Indiana 811 at least 48 working hours prior to any subsurface work. During a Site visit on March 18, 2015, an overhead telephone line was identified entering the on-Site building. No visible structures or utility conduits were identified during the visit; however, a private utility locate will be conducted to locate utilities to the Site. Utility locations will be presented on Site maps. Results of the utility locates will be used to analyze potential preferential pathways for contaminant migration. Utility locations will also be analyzed to alter or enhance safety requirements during subsurface activities and may require amendments to proposed work.

Removal or relocation of debris on the Site will be necessary to complete subsurface investigation activities and to allow proper access to a geophysical survey contractor, as well as equipment for subsurface investigations. A tree survey will be performed to determine if potential roost sites for the federally endangered Indiana bat (*Myotis sodalis*) and the federally threatened northern long-eared bat (*Myotis septentrionalis*) are present on-Site.

The purpose of the geophysical survey is to identify buried drums, ferrous and non-ferrous metals, and other anomalies using a highly sensitive electronic metal detector. Following the geophysical survey, Prism GeoImaging of Fishers, IN (Prism) will submit a summary report, complete with color maps, showing the areas of interest and/or buried items. SESCO will summarize the findings from the Prism report and will submit recommendations for additional investigation work.

All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910 and 29 CFR 1926.65. General Site workers engaged in hazardous waste operations will have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations. General Site workers will have completed 8 hours of refresher training (after first initial year after 40 hour training) to maintain qualifications for hazardous waste site field work. On-Site supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least eight (8) hours of additional specialized training on managing such operations.

2.7 Emergency Response Contingency Plan

Emergency plans are presented in **Section 13** of the HASP, included in **Appendix D**. Local emergency response authorities will be contacted prior to mobilization. Emergency response authorities to be contacted include the Kokomo Fire Department, the Kokomo Police Department, the Howard County Health Department, the IDEM Emergency Response Section, and the Department of Homeland Security.

2.8 Project Schedule

A project schedule is included in **Appendix E**.

2.9 Personnel & Equipment Needs

SESCO personnel will provide management and/or oversight of every task to be completed as part of the Work Plan. For more detail of SESCO personnel, refer to **Section 6.1**. For tasks requiring subcontractors, the subcontractors will be responsible for providing appropriate personnel based on the task to be completed. Equipment needs for each task will be determined by SESCO and/or subcontractor personnel based on SOPs and relevant experience in performing similar tasks.

3.0 Sampling Activities

The scope of work for this Work Plan will include the following tasks in chronological order:

- Site boundary survey;

- Geophysical survey;
- Surface and subsurface soil sampling (soil borings); and,
- Test pits based on results of geophysical survey.

3.1 Project Task Objectives

The objectives of these initial investigation activities are to determine if soil and groundwater impacts present an imminent and substantial threat to the public health, welfare, and the environment, as well as to characterize soil impacts and develop data to assist in determining further investigation steps, if necessary. The request for groundwater investigation was submitted via email from the EPA OSC on April 16, 2015, and is included in **Appendix A**. In addition, any drums encountered during investigation activities containing waste will be overpacked, staged on-Site, and sampled for waste characterization. A QAPP is included in **Appendix F**. The following sub-sections list the major categories of work that are planned during the initial investigation.

3.1.1 Site Boundary Survey Objectives

The objective of the Site boundary survey is to establish the legal boundaries of the Site. The survey will help to establish if the drums and debris are located on the Site or an off-Site property.

3.1.2 Geophysical Survey Objectives

The purpose of the geophysical survey is to identify buried drums, ferrous and non-ferrous metals, and other anomalies using a highly sensitive electronic metal detector. The geophysical survey will allow decisions to be made regarding the placement of soil borings and potential test pit locations, if needed.

3.1.3 Surface and Subsurface Soil Sampling, Groundwater Sampling, & Soil Boring Advancement Objectives

The purpose of the surface and subsurface soil sampling, groundwater sampling, and soil boring advancement is to collect soil and groundwater samples, submit samples for laboratory analysis, and characterize soil and groundwater impacts from past operations on the Site.

3.1.4 Test Pit Excavation Objectives

Test pits will be conducted only if the geophysical survey indicates that substantial anomalies are present on-Site, which may indicate the locations of buried drums or other objects. The purpose of completing test pits will be to confirm the results of the geophysical survey and visually determine the contents of the former dump.

3.2 Project Timeframes

A project schedule provided in **Appendix E** depicts the estimated timeframes for the various scopes of work.

3.3 Sampling Plan

This section will provide a detailed description of each scope of work within this Work Plan, including specific procedures that will be followed for geophysical surveying, sampling, investigation work, and excavation activities.

3.3.1 Site Boundary Survey Procedures

The Site boundary survey will be the first step in determining the Site boundaries and will be conducted by Miller Surveying, Inc. of Noblesville, IN.

Records Research

Deed research is done in order to obtain the best description of the Site. This includes deed research of the subject parcel and all abutting parcels. Generally, research for the subject parcel will be done far enough back in time so as to obtain the original description for the parcel(s). Similarly, the abutting parcel's deeds are researched as far back as necessary to ensure that the descriptions are consistent with that of the subject parcel. The records research also entails a review of any title information available from the landowner, as well as a review of other resources which might yield information about the location and description of the parcel. This would include, but not be limited to, a review of records of prior surveys, highway reference material, railroad reference material, records of easements, records of utilities, tax assessor's maps, topographic maps, aerial photographs, local histories, genealogies, and court records.

Field Data

Utilizing the record information obtained above, this segment of a survey begins with a perimeter reconnaissance of the subject and abutting properties. In this phase it is hoped the boundary monumentation called for in the deed descriptions can be recovered. If little or no original monumentation for the subject or abutting properties is found, the scope of field work and consequently, the research portion of the survey, is increased to a point which yields enough information in order to reconstruct the boundaries of the Site.

Boundary evidence, as well as other Site details, is helpful in reconstructing the location of boundary lines that are located from a reference "traverse". The traverse is a control network of reference points, generally wooden stakes or rebar, run very closely to, if not on, the anticipated boundary line utilizing specialized measuring equipment. The equipment used is state of the art Global Positioning Systems (GPS) or theodolite/EDM equipment which yield highly precise measurements.

The base traverse helps to identify other features unique to the Site and will isolate any encroachments if they exist. This aspect of the work provides subsequent reference and working points from which the final monumentation of the parcel is completed using wooden stakes and metal rebar. This entails the setting of any lot corners found to be missing, and can, in wooded areas (such as the Site), involve blazing and painting of boundary lines.

Office Computation & Boundary Decisions

The data gathered in the field is input into the computer and rigorous computations are performed in order to ensure that the accuracy of the traverse meets acceptable standards. The accuracy of the boundary evidence is then checked and this work is "reduced" to a plan format (worksheet).

Using the worksheet and the reference information gathered during the records search, the surveyor makes a determination as to the proper location of the boundary line according to the pertinent laws and rules which govern parcel reconstruction. It can quite often be the case that further reconnaissance and records research may be necessary to explain why boundary evidence and evidence of current occupation aren't consistent with record descriptions for the parcel.

Once a determination has been made, the bearings and distances between the property corners are computed and added to the worksheet. Finally, information gathered during the records search is applied to the Site, details are located, and appropriate notes are written concerning the status of rights-of-way, easements, and encroachments and how they might affect the surveyed premises.

Final Plan

The worksheet plan which is generated, is a working drawing upon which a surveyor makes notes concerning his efforts in trying to reconcile the field evidence with the record descriptions for the Site. From this worksheet, a final draft of the plan is made.

Once the final plan has been rendered, its quality is checked by another surveyor in the office, for transposition/scrivener's errors which might have occurred during the transfer of information from the worksheet to the final plan. Additionally, the bearings and distances depicted on the plan for the boundary lines are checked, mathematically, to ensure accuracy. This plan information is often used in preparing future deed descriptions of the property.

3.3.2 Geophysical Survey Procedures

The purpose of the geophysical survey is to identify buried drums, ferrous and non-ferrous metals, and other anomalies using a highly sensitive electronic metal detector. The geophysical survey for the Site is not intended to identify or delineate a

contaminant plume. The geophysical survey will allow decisions to be made regarding the placement of soil borings and potential test pit locations, if needed.

The geophysical survey will utilize an EM61 Mark II with a high-power modification (EM61-MK2-HP) electromagnetic metal detector manufactured by Geonics Limited. The high-power modification is an optional manufacturer's upgrade that provides an eight-fold increase in the amount of signal received by the instrument, resulting in significant improvements to the signal-to-noise ratio (SNR). Compared to the standard EM61-MK2 (or the older EM61), the HP modification increases the depth of detection by 45%-80% depending on target characteristics. Mapping with the EM61-MK2-HP is a cost effective and highly sensitive method for screening large areas for the presence of buried metallic objects, which is the main target of the geophysical survey.

The EM61-MK2-HP transmits and receives a transient electromagnetic pulse with system logic optimally tuned to observe the characteristic signal associated with buried metallic objects. Target depth is assumed to be within the excavation depth of typical trackhoe excavators, and above the water table (so that the excavation doesn't have to be continually dewatered). The exploration depth of the EM61-MK2-HP is in excess of 18 feet, which is beyond the maximum digging depths of typical excavators and according to previous soil boring data, the water table is more than 20 feet bgs. Data will be collected using a sub-meter accuracy GPS receiver. All data and anomaly locations will be geo-referenced with UTM coordinates. Grid spacing will be nominally one (1) meter, but actual grid dimensions will vary with field conditions and accessible area. This is a relatively tight grid spacing that offers a very good resolution characterization of potential targets. Data maps will be overlaid on aerial photo basemaps to provide easy reference to Site features.

Using receiver coils at two (2) different heights, the system can be used to estimate the size and proximity of metallic objects by the respective signal strengths recorded in millivolts. EM61-MK2-HP data will be collected in a near continuous fashion along parallel lines in all areas of the Site that are accessible with the geophysical equipment. The data will then be downloaded from the instrument to a laptop computer for processing with *DAT61W*, authored by Geonics Ltd. and *Surfer,* authored by Golden Software. The data will be portrayed as color-filled contour maps, which will depict areas of concern such as buried structures and metallic objects. Data maps will be overlaid on aerial photo basemaps to provide easy reference to Site features. The location of surface objects such as fences, heavy equipment, overhead power lines, metal overhangs, etc. will be noted, recorded with photographs, and identified on the maps in the final report.

It's important to note that geophysical methods are unable to determine the physical condition of potential targets with any reasonable reliability. Ground Penetrating Radar (GPR) under controlled conditions could determine a crushed or badly

deteriorated drum from a sound drum, but under typical field conditions with uncontrolled burials this becomes difficult to impossible. EM31 conductivity mapping could potentially detect a plume of leaking material from a drum, if the plume causes a detectable contrast in subsurface materials (which would depend on a number of factors). Geophysical methods can't determine target contents unless they happen to be radioactive. Additionally, geophysical methods can't determine the age of burial. Under controlled conditions, GPR can potentially detect a fresh burial from a historical burial, but again this becomes difficult to impossible under typical field conditions with uncontrolled burials such as the Site. An estimate can be made of how many drums a given metallic anomaly might contain by calculating the area of the anomaly.

3.3.3 Abandoned Drum Removal Procedures

If encountered during investigation activities, waste-containing drum removal procedures will be conducted by ER, with oversight provided by SESCO. The presence of leaking drums was referenced in the Agreement, with locations of the drums reportedly exposed in the bank of Wildcat Creek and lying on the ground surface. The overall goal of Site investigation activities will be to determine the extent of buried drums and contamination in soil, per the Agreement. It is anticipated that removal activities will occur following comprehensive investigation activities, and a future work plan will address drum removal.

In the event drums containing waste are encountered, ER will utilize a trackhoe to mobilize to the location and will pick up the drum and place it into an 85-gallon polyethylene overpack drum. Following the drum removal, the soil immediately beneath the drum will be excavated to a depth of approximately one (1) foot bgs, and the soil will be placed into a UN A1A 55-gallon steel drum. The drums will be moved with the trackhoe to a designated drum staging area (**Figure 2**), properly labeled and assigned a unique identification number. Following the shallow soil removal, the soil beneath the drum will be sampled as described in **Section 3.3.4**.

Drums encountered during site investigation and remediation will be checked for structural integrity, loose or missing bungs, and signs of bulging prior to moving. Drums will then be moved to a drum staging area on-Site, where each drum will be given a unique identifying number. The drum identification number will then be recorded on a site drum inventory sheet. Containers will then be sampled under oversight of the site health and safety officer, samples will be field screened at a minimum for ignitability, water solubility, water reactivity, pH, oxidizer, chlorine, and visual appearance. Each drum will then be assigned to a waste grouping. The field screening data and waste grouping will then be recorded on the drum inventory sheet.

A color coding system will be employed to provide a visual indicator of the waste type (acids, base, cyanide, etc.). Each container will be spray painted with a unique color;
- Acids = Yellow
- Bases = Blue
- CN = Orange
- Flammable = Red
- Other = Green

Each waste grouping will be composite sampled and analyzed for those parameters necessary to adequately characterize the waste stream and obtain a waste disposal approval.

Air monitoring will be performed in the vicinity of drums using a 5-gas meter and supplemental gas detector tubes pursuant to the criteria presented in Section 8.2 of the HASP.

3.3.4 Surface and Subsurface Soil Sampling (Soil Borings) Procedures

In compliance with the request of the U.S. EPA, SESCO proposes to sample surface soil to assist in the determination of contamination in soil that currently could pose a direct contact exposure risk. As shown on **Figure 4**, a total of 45 surface soil samples are proposed and have been established using a grid spacing of approximately 93 feet between sampling locations along the x-axis and approximately 81 feet along the y-axis using a random-start equilateral triangular gridded sampling approach. This grid system was established to allow sufficient coverage of the Site in an effort to determine if surface soils are impacted from historic use of the Site. The 45 samples were determined from Table 5-1 of the Guidance on Choosing a Sampling Design for Environmental Data Collection (EPA QA/G-5S) utilizing the assumptions of a 5% significance level, 95% power, and 50% effect size. In addition, soil borings are proposed at each of the surface soil sample locations throughout the Site in an effort to characterize subsurface soil impacts discovered during the investigation completed by the START contractor on December 3, 2012. Laboratory analytical results of surface soil and subsurface soil from the December 3, 2012, START contractor investigation are summarized in **Tables 1-4**. The procedures for the surface and subsurface sampling are summarized below.

<u>Surface Sampling</u>

The 45 surface soil samples will be collected utilizing a hand auger or Geoprobe®, since the soil samples will be collected between the ground surface and six (6) inches bgs. The soil samples will be collected in accordance with SESCO SOP #WP-01, Surface & Shallow Sub-Surface Sampling SOP, and/or SESCO SOP #WP-04, which are included in **Appendix G and J**, respectively. Each sample will be field screened using a photoionization detector (PID), a flame ionization detector (FID), and x-ray fluorescence (XRF) detector.

Soil samples will be placed into laboratory-supplied sample containers. The sample containers will be properly labeled and will be packed in an iced cooler, maintained at a maximum of 4°C, and submitted, with appropriate chain-of-custody documentation, to Pace Analytical Services, Inc. in Indianapolis, Indiana. The samples will be submitted for analysis of volatile organic compounds (VOCs) using U.S. EPA Method 8260, Resource Conservation & Recovery Act (RCRA) 8 metals using U.S. EPA Methods 6010 and 7470, Hexavalent Chromium using U.S. EPA Method 7196, TCLP metals using U.S. EPA Methods 6010 and 7470, PCBs using U.S. EPA Method 8082, and 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) using U.S. EPA Method 8290. Samples will be delivered to the laboratory by SESCO personnel following proper chain-of-custody procedures in accordance with SESCO SOP #WP-02, which is included in **Appendix H**.

The proposed laboratory analyses for each sample are summarized in **Table 5**. Samples will be delivered to the laboratory by SESCO personnel. Custody seals will be placed on the coolers in accordance with SESCO SOP #WP-03, which is included in **Appendix I.**

Decontamination of field sampling equipment will be accomplished in the following steps:

1. Gross contamination will be removed utilizing a brush and an Alconox®/Water solution
2. Rinse with distilled water
3. Rinse with isopropyl alcohol
4. Rinse with deionized water
5. Wrap equipment in foil if not being used immediately

Decontamination will occur on plastic sheeting and all fluids will be containerized, sampled for laboratory analysis for waste profiling, and properly disposed. Further information regarding sampling equipment to be utilized, sample screening, sampling procedures, QA/QC samples to be collected, sample bottles, and chain-of-custody procedures are provided in the QAPP in **Appendix F**.

Subsurface Sampling (Soil Borings)

The 45 proposed soil borings will be advanced in the locations shown on **Figure 4**. The actual locations of the proposed borings will be adjusted due to topographic variations across the Site or other encumbrances.

The depth to bedrock is estimated to be at 25-35 feet bgs. The soil borings will be advanced by Midway Services, Inc. Soil borings will be advanced utilizing a Geoprobe® 6620 DT direct-push sampling rig or equivalent to depths to bedrock. The soil samples will be collected in accordance with SESCO SOP #WP-04, Subsurface Soil Sampling SOP, which is included in **Appendix J**. Each boring will be field screened from surface to terminal depth using a PID and XRF detector.

A soil sample will be collected at either the base of the fill material or the bottom of each boring if no indicators are encountered via field and visual screening. If elevated field screening readings are encountered, at least two (2) samples will be collected, with at least one being collected from the interval displaying the highest field screening readings. Field screenings will be considered elevated if the PID or FID reading exceeds 10 parts per million vapor (ppmv) above background levels, or the XRF exceeds 90 percent of the IDEM RCG IDCSL. Soil samples will be placed into laboratory-supplied sample containers. The samples will be packed in an iced cooler, maintained at a maximum of 4°C, and submitted, with appropriate chain-of-custody documentation, to Pace for analysis of the constituents identified in **Table 6**. Samples will be delivered to the laboratory by SESCO personnel following proper chain-of-custody procedures in accordance with the SESCO SOP #WP-02, which is included in **Appendix H**. Custody seals will be placed on the coolers in accordance with SESCO SOP #WP-03, which is included in **Appendix I.**

Groundwater Sampling – Vapor Screening

Following the advancement of the soil borings, SESCO will attempt to collect a groundwater sample from each soil boring where groundwater is encountered, if field screening of soil samples indicates potential VOC impacts. The purpose of collecting groundwater samples will be to screen the Site for potential vapor intrusion pathways and to determine if additional sampling is warranted. If the decision is made to sample groundwater, SESCO will instruct the drilling contractor to install a one (1)-inch diameter polyvinyl chloride (PVC) screen and riser pipe in the completed boreholes in an effort to collect groundwater samples. If the boreholes cave in, then a four (4) foot length, stainless steel screenpoint sampler will be pushed into the subsurface with the Geoprobe® until the saturated unit is reached. The probe rods will be retracted to deploy the expendable point on the sampler, thus exposing the four (4) foot long screen. Groundwater samples will be collected using either a mini bailer or a stainless steel check valve and 0.25-inch diameter polyethylene tubing. All reusable equipment will be properly decontaminated prior to and following use. The collected groundwater samples would be submitted for VOC analysis via U.S. EPA Method 8260.

Groundwater Sampling – Ecological Screening

Groundwater, if present, will be collected from 13 locations to evaluate potential ecological risk to Wildcat Creek from groundwater contaminants potentially present at the Site. The proposed groundwater sampling locations, along the northern border of the property, are presented on **Figure 4**. Samples will be collected as described above. The samples will be submitted for analysis of VOCs using U.S. EPA method 8260, RCRA 8 metals using U.S. EPA Methods 6010 and 7470, Hexavalent Chromium using U.S. EPA method 218.6, PCBs using U.S. EPA Method 8082, and 2,3,7,8-TCDD using U.S. EPA Method 8290. Further information is presented in **Table 7**.

3.3.5 Test Pit Excavation Procedures

Test pits will be conducted only if the geophysical survey indicates that substantial anomalies are present on-Site, which may indicate the locations of buried drums or other objects. Substantial anomalies shall be defined as areas exhibiting ferrous metals with an instrument response generally greater than 300 millivolts (mV), extensive areas with instrument responses greater than background, and/or areas where anomalies are oriented indicative of buried drums. The EPA OSC, with input from the geophysical contractor and SESCO, shall determine which anomalies are significant enough to require further investigation. Prior to excavation work, a public and private utility locate will be conducted to locate and mark any underground utilities in the vicinity.

All excavation work will be performed in compliance with applicable OSHA standards (29 CFR 1926). A Competent Person will be on-Site during trenching and excavating who can determine appropriate benching, sloping, shoring, or shielding measures. A test pit or trench will consist of an excavation dug through soil and/or buried material to visually determine the subsurface material. Test pits may be square or rectangular in shape and any size. Trenches are normally excavated with benches not exceeding four (4) feet in height to give an overall slope of 1.4 horizontal to 1.0 vertical ratio. The trench may extend for any length needed to explore Site conditions. Larger and deeper excavations may be required for project specific objectives, or where field conditions warrant. Important: Personnel will not enter a test pit/trench until authorized by the Site Safety Officer. Substantial local, state, and federal regulations and Site-specific health and safety requirements apply for entry into excavations over four (4) feet deep. Test pits would be completed in accordance with SESCO SOP #WP-05, Test Pit Excavation, which is included in **Appendix K**. Test pits are expected to be between five (5) and 12 feet deep, dependent upon Site conditions.

Excavated material will be field screened with a PID and XRF detector. If elevated screening levels are encountered or obvious visual contamination or suspect debris is encountered, a minimum of one (1) sample will be collected at the floor of the excavation at a rate of one (1) for each 400 square feet (20 feet by 20 feet) of excavation. Samples will be submitted for laboratory analysis of RCRA metals, hexavalent chromium, SVOCs, PCBs, 2,3,7,8-TCDD, and VOCs.

Excavated materials will be placed on heavy plastic sheeting. Heavy plastic sheeting will be used to cover excavation stockpiles overnight, during high wind, or during rain. The sheeting will be secured in place with sandbags or boulders. Surface water runoff resulting from rain will be diverted around covered stockpiles.

Excavations will be backfilled with the removed soil material. If drums or metal debris are encountered in excavations, those materials will be removed prior to backfilling. Excavated drums and metal debris will be relocated to the drum staging

area. If further excavation and removal is necessary based on the results of this investigation, it will be addressed in a future work plan.

3.4 Sample Shipping

Samples for laboratory analyses will be transported to Pace in Indianapolis, Indiana, by field personnel following chain-of-custody procedures directly from the project Site or by laboratory-provided courier from SESCO's office. All samples deemed hazardous will be shipped in compliance with 49 CFR, Parts 171-179 or IATA Dangerous Goods Regulations. It should be noted that samples for laboratory analyses are not expected to be considered "dangerous goods" unless indicated by field screening, laboratory analysis, or deemed dangerous goods by the OSC. Additionally, shipment of samples by air shall be limited to samples for dioxin analysis via unpreserved bottles; shipping of these containers will be the responsibility of Pace from their Indianapolis, Indiana laboratory to their laboratory in Minneapolis, Minnesota.

Environmental samples will be packed prior to shipment by air using the following procedures per the U.S. EPA Operating Procedure document titled *Packing, Marking, Labeling and Shipping of Environmental Waste Samples* (Document #SESDPROC-209-R2):

1. Allow sufficient headspace (ullage) in all bottles (except VOA containers with a septum seal) to compensate for any pressure and temperature changes (approximately 10 percent of the volume of the container).
2. Ensure that the lids on all bottles are tight (will not leak).
3. Place bottles in separate and appropriately sized polyethylene bags and seal the bags. If available, the use of Whirl-Pak bags is preferable, if unavailable seal regular bags with tape (plastic electrical tape).
4. Select a sturdy cooler in good repair. Secure and tape the drain plug with fiber or duct tape inside and outside. Line the cooler with a large heavy duty plastic bag.
5. Place cushioning/absorbent material in the bottom of the cooler and then place the containers in the cooler with sufficient space to allow for the addition of cushioning between the containers.
6. Put "blue ice" (or ice that has been "double bagged" in heavy duty polyethylene bags and properly sealed) on top of and/or between the containers. Fill all remaining space between the containers with absorbent material.
7. Securely fasten the top of the large garbage bag with tape (preferably plastic electrical tape).
8. Place the Chain-of-Custody Record or the CLP Traffic Report Form (if applicable) into a plastic bag, and tape the bag to the inner side of the cooler lid.
9. Close the cooler and securely tape (preferably with fiber tape) the top of the cooler shut. Chain-of-custody seals should be affixed to the top and sides of the cooler within the securing tape so that the cooler cannot be opened without breaking the seal.

3.5 Analysis

Laboratory analysis of samples will be conducted as set forth in **Sections 3.3.5** and **3.3.6** and in **Tables 8 & 9**.

4.0 Removal Activities

During this initial phase of investigation, and in compliance with the request of the U.S. EPA, SESCO will remove, if encountered during the course of investigation activities, waste-filled drums in accordance with the procedures in **Section 3.3.3**. The removal of any other drums that are identified during the geophysical survey, will occur at a later date following the submittal of an updated Work Plan to the U.S. EPA for review and approval.

4.1 Cleanup Criteria

It is hereby proposed to utilize IDEM *Remediation Closure Guide (RCG) March 22, 2012 (With Corrections Through 2015)* Screening Levels when evaluating data for delineation of contamination and initial soil removal activities. IDEM RCG Industrial Direct Contact Screening Levels (DCISLs) may be utilized as on-Site cleanup objectives dependent upon investigation results; however, Site-specific risk-based cleanup objectives may be established at a later date, dependent upon risk assessment results. Off-Site cleanup objectives must meet IDEM RCG Residential Direct Contact Screening Levels (DCRSLs). Cleanup Criteria are tabulated and presented in **Appendix L**. In addition, the IDEM Federal Programs Section issued Applicable or Relevant and Appropriate Requirements (ARARs) in an Action Memorandum dated October 10, 2014, which is included in **Appendix M**. The ARARs must be adhered to during investigation and removal activities.

4.1.1 Soil Removal

Soil to be removed beneath an encountered waste-filled drum will be sampled for waste characterization according to the requirements of the disposal facilities (to be determined). The remaining soil left in place following the limited soil removal will be sampled and submitted to Pace for analysis of RCRA 8 metals using U.S. EPA Methods 6010 and 7470, hexavalent chromium using U.S. EPA Method 7196, SVOCs using U.S. EPA Method 8270, PCBs using U.S. EPA Method 8082, and 2,3,7,8-TCDD using U.S. EPA Method 8290. The analytical data will be compared to the IDEM RCG DCISLs.

4.1.2 Surface Sampling

Surface sample analytical data will be compared to DCISLs for all on-Site samples collected. Off-Site delineation samples, if necessary, will be compared to either DCISLs or the DCRSLs, dependent upon current and long-term expected land use.

4.1.3 Subsurface Soil Sampling

Subsurface soil analytical results will be compared to DCISLs. If groundwater contamination is found in excess of U.S. EPA Region 5 Ecological Screening Levels (August 22, 2003), then soil analytical results will be compared to IDEM RCG Migration to Groundwater Screening Levels (MTGSLs).

4.1.4 Groundwater Sampling

Groundwater analytical results will be compared to IDEM RCG vapor screening levels, utilizing residential screening levels for off-Site criteria, and commercial/ industrial screening levels for on-Site criteria. Groundwater samples in the vicinity of Wildcat Creek or that have the potential to affect Wildcat Creek will be compared to U.S. EPA Region 5 Ecological Screening Levels (August 22, 2003).

4.1.5 Test Pits

Performance of test pits will be dependent upon results of the geophysical survey detailed in **Section 3.3.4**, and will be used to develop further investigation and removal plans. Excavated material will be field screened with a PID and XRF detector. If elevated screening levels are encountered or obvious visual contamination or suspect debris is encountered, a minimum of one (1) sample will be collected at the floor of the excavation at a rate of one (1) for each 400 square feet (20 feet by 20 feet) of excavation. Samples will be submitted for laboratory analysis of RCRA metals, hexavalent chromium, SVOCs, PCBs, 2,3,7,8-TCDD, and VOCs. Laboratory analytical results will be compared to MTGSLs.

4.2 Site Cleanup Activities

4.2.1 Utility Clearance

Utility clearance procedures are discussed in **Section 2.6**.

4.2.2 Abandoned Drum Removal

Abandoned drum removal procedures are discussed in **Section 3.3.3**.

4.2.3 Spill Contingencies

In the event of a spill, the release will be contained and cleaned up as soon as possible. Site personnel will control the spill by stopping or securing the spill source.

This could be as simple as up-righting a container, placing a drip pan under a leak, or using floor-dry or absorbent pads to soak up spilled material. Spill clean-up debris/media will be transferred to drums and labeled for proper storage and disposal.

Spill response equipment will be staged near the dual contained fuel storage tank, on at least one (1) Site pick-up truck, and at the Site staging area. A sign will be placed at each location identifying the location of spill response equipment.

4.2.4 Soil Removal

Soil removal beneath abandoned drums is discussed in **Section 3.3.4**.

4.2.5 Air Monitoring

According to 29 CFR 1910.120 (h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on-Site and for protection of off-Site populations. ER shall be tasked for all air monitoring on this project and will maintain an air monitoring program to evaluate concentrations of specific chemical groups or contaminants in ambient air during work activities. This program will include both real-time, direct monitoring equipment, and chemical-specific personal air monitoring as appropriate.

Both area and personal monitoring will be conducted to document potential exposures to hazardous constituents, as well as to evaluate the adequacy of the PPE program.

All air monitoring data will be documented and available in the office building located on the west side of the Site for review by all interested persons. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications. Calibration and maintenance performed will be entered in the Site log and/or instrument log book.

Site-specific air monitoring requirements are presented in the table below as well as the HASP:

Monitoring:					
Real Time (Air, noise, heat, radiation, light)					
Activity	**Target Analyte**	**Instrument**	**Frequency**	**Action Levels**	**Actions/Upgrade and Rationale**
1. Site Setup **2. Soil Excavation** **3. Soil Sampling / Loading** **4. Drum Handling / Sampling** 5. **Backfill** **6. Decontamination**	Flammable atmosphere	Combustible Gas Indicator (MultiRAE Plus) (AreaRAE)	Initial and periodic Continuous during CSE	> 10% LEL Evacuate area/space	Evacuate area Ventilate
	VOCs	Photo – ionization Detector (PID) (MultiRAE Plus) (AreaRAE)	Initial transfer and periodic Continuous during CSE	Background – < 25 ppm 25 ppm - 50 ppm Level C 50 ppm - <250ppm Level C or Level B based on constituent PEL >250 ppm	Level D Air-purifying respirator Supplied-air respiratory protection Evacuate area, until conditions subside
	Oxygen	O_2 Meter (MultiRAE Plus) (AreaRAE)	Initial Continuous during CSE	<19.5% and >23.5% O^2 Evacuate area/space	Evacuate area
During all site activities	Particulates	DataRam	Periodic / Daily(perimeter of the Site)	>2.5 mg/m3 (1/2 PEL)	Apply dust suppression engineering controls
Site wide	Temperature Extremes Cold/Heat stress	N/A – Engineering controls in place	Periodic breaks w/ fluids	Variable depending on the individual and work activity	Participate in Cold / heat stress monitoring program, take breaks in the warmth / shade, drink fluids as allowed

4.2.6 Dust Control

Control measures will be implemented to suppress airborne dust contamination both at the staging area and at the remediation areas. If conditions warrant, a water truck will be utilized to water areas during excavation to reduce dust emissions in the excavation areas. Loose soils around construction entrances will be swept and picked up to prevent additional dust and spread of contamination.

4.2.7 Decontamination

Trucks Exiting Site

If it is necessary for trucks to enter the hot zone, ER will construct a 20' wide by 40' long wheel wash station at the exit of the load out area to eliminate tracking material off-Site. The wheel wash station will consist of constructing a two (2) foot berm on four (4) sides creating a sump, a 40 mil HDPE liner will overlay the sump and berms. Two (2) layers of six (6) ounce non-woven fabric will be placed over the 40 mil liner to protect it, 8"x4'x20' crane mats (or a 1' layer of 2" - 3" washed/rounded river rock) will be placed within the sump to create a wheel wash. The wheel wash will be graded to create a low point to allow for the collection of water. All trucks exiting

the load out area will be required to exit through the wheel wash, following exit of the wheel wash the trucks will cross a 20' wide by 50' long construction exit constructed of 2" - 3" rock.

Low volume pressure washers will be used to clean wheels. The wheel wash water can be containerized via a 1,000 gallon tank, sampled, and if analytical allows be re-used as on site dust control. If analytical does not allow for dust control, the water can be sent off-Site for treatment or disposal. A large volume of wheel wash water is not anticipated.

Heavy Equipment

All equipment leaving the exclusion zone shall be thoroughly decontaminated using dry and/or wet methods, as appropriate. In most cases equipment is not expected to become heavily contaminated. The equipment wet decontamination station shall be constructed large enough to accommodate the equipment being used on Site. A level area shall be chosen for the decontamination pad. At least 6 inches of soil shall be removed and used to create a berm around the pad. The pad will be lined with a 6 mil poly liner. High pressure low volume water spray shall be used for wet decontamination. No runoff from the decontamination pad shall be allowed. All water generated from the cleaning operation shall be contained and handled appropriately. All waste materials generated during the decontamination process shall be characterized prior to final disposal.

Personnel, PPE, and Hand Tools

In general, everything that enters the exclusion zone at this site must either be decontaminated or properly discarded upon exit from the exclusion zone. All personnel, including any state and local officials must enter and exit the hot zone through the decon area. Prior to demobilization, contaminated equipment will be decontaminated and inspected before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area in the exclusion zone until disposal arrangements are made.

NOTE: The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for this site is water. Decontamination solution will be changed daily (at a minimum) and collected and stored on-site until disposal arrangements are finalized.

Procedures for Equipment Decontamination

Following decontamination and prior to exit from the hot zone, the Project Manager or Foreman shall be responsible for insuring that the item has been sufficiently decontaminated. This inspection shall be included in the site log.

Equipment decontamination will consist of the following steps:

1. Primary method will be remove material by using shovels, brooms, and brushes
2. The material removed will be picked up and placed into proper containers for proper disposal
3. If dry decon is not sufficient the equipment may be rinsed with high-pressure washer.
4. Field visual survey by the RM shall be performed before equipment is authorized to demobilize.

Procedure for Personnel Decontamination

This decontamination procedure applies to personnel at this site wearing Level D protection. These are the minimum acceptable requirements.

Station 1: Brush boots clean of debris prior to exiting EZ
Station 2: Remove work gloves
Station 3: Wash hands and face
Station 4: Personnel will not wear or bring dirty/contaminated clothing into the break areas

This decontamination procedure applies to personnel at this site wearing Level C protection. These are the minimum acceptable requirements:

Station 1: Equipment Drop: Deposit equipment used on-site (tools, sampling devices and monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

Station 2: Outer Boot and Outer Glove Wash and Rinse: Scrub outer boots, and outer gloves with water. Rinse off using second water supply and periodically survey workers upon exit of EZ prior to PPE removal to see if PPE has any traces of contaminated.

Station 3: Outer Boot and Glove Removal: Remove boot covers (if applicable) and gloves (if applicable). If outer boots are disposable, deposit in container with plastic liner. If non-disposable, store in a clean dry place.

Station 4: Outer Garment Removal: If applicable, remove particulate barrier outer garments and deposit in container lined with plastic.

Station 5: Respiratory Protection Removal: Remove hard-hat, and face piece (if applicable) and deposit on a clean surface. APR cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respiratory gear in a clean, dry location.

Station 6: Inner Glove Removal: Remove inner gloves (if applicable). Deposit in container for disposal.

Station 7: Field Wash: Thoroughly wash hands and face with wet wipes and/or soap and water. Shower as soon as possible.

Eating, drinking, chewing gum/tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and/or ingestion of materials is prohibited in any areas where the possibility of contamination exists and is permitted only in the designated break area. Personnel will not wear or bring dirty/contaminated clothing into the break areas.

Further equipment decontamination procedures are presented in **Sections 3.3.4** and **5.0**.

4.2.8 Surface and Subsurface Sampling

Surface and subsurface sampling procedures are presented in **Section 3.3.4**.

4.2.9 Test Pit Excavations

Test pit excavation procedures are presented in **Section 3.3.5**.

4.3 Waste Disposal

Proposed waste disposal facilities are presented in the table below. Waste classification sampling procedures are presented in SESCO SOP #QP-01, located in **Table 8** of the QAPP. SESCO will notify the OSC prior to any off-Site shipments to confirm that the disposal facility is in compliance with the Off-Site Rule at the time of disposal.

Waste Stream	Hazard Classification	Proposed Disposal Facility
Soil	Non-Hazardous	Waste Management, Inc. Oak Ridge Landfill 2905 S. Morgan Hill Rd. Logansport, IN 46947
Soil	Hazardous	US Ecology Wayne Disposal, Inc. 49350 N. I-94 Service Drive Belleville, MI 48111 EPA ID: MID048090633

Waste Stream	Hazard Classification	Proposed Disposal Facility
Water	Non-Hazardous	Waste Management, Inc. Twin Bridges RDF 124 Twin Bridges Road Danville, IN 46122
Water	Hazardous	US Ecology Wayne Disposal, Inc. 49350 N. I-94 Service Drive Belleville, MI 48111 EPA ID: MID048090633
Solid Waste	Non-Hazardous	Waste Management, Inc. Oak Ridge Landfill 2905 S. Morgan Hill Rd. Logansport, IN 46947
Solid Waste	Hazardous	US Ecology Wayne Disposal, Inc. 49350 N. I-94 Service Drive Belleville, MI 48111 EPA ID: MID048090633

The proposed hazardous waste disposal facility is in compliance with applicable laws and regulations, including RCRA Section 3004 and 3005, as amended.

Following waste characterization and disposal facility approval, wastes will be removed from the Site and delivered to the approved disposal facilities by American Industrial Services, LLC (AIS) in accordance with all applicable state and federal regulations, including 49 CFR, parts 170-179.

4.4 Schedule

A project schedule is included in **Appendix E**.

5.0 Site Restoration/Project Close-Out Activities

Although project close-out activities will not be performed during this phase of the project, in general, the procedures below will be followed. A more detailed discussion will be provided in a subsequent Work Plan once sufficient data has been collected to establish appropriate removal activities.

After completion of remediation activities all temporary construction/safety fencing will be removed. All excavated areas will be backfilled, all disturbed areas will be graded and topsoil added if necessary and reseeded with a native seed mixture.

Following restoration activities, Site demobilization will begin. A decontamination pad will be constructed by building berms surrounding the pad and placing a plastic liner material within and over the berms. All equipment will be cleaned and removed from the Site. Cleaning will consist of high pressure water washing without the use of surfactants or degreasers. Decontamination water is expected to be minimal and will be pumped into drums for sampling. Depending on analytical results, the water will either be discharged back to the Site at a slow rate as to not cause erosion or the water will be disposed of off-Site at an EPA-approved disposal facility.

Monitoring, operations and maintenance, and long-term sampling plans have not been established for the Site and will be developed based on data generated during Site investigation activities and remediation activities, if necessary.

6.0 Project Management

6.1 Responsibilities and Functions

Safety protocol enforcement and emergency responsibilities are presented in the HASP included in **Appendix D**.

Over-all project planning, including coordination of subcontractors, maintaining the project schedule, and amending the Work Plan as new activities arise will be the responsibilities of Bill Pickard, Senior Project Manager, and Brad Adams, Project Manager. Brad Adams has also been assigned the role of Project Coordinator and Brent Graves has been assigned the role of Quality Assurance Manager.

Administration of the Work Plan in the field, including directing on-Site work and personnel will be the responsibility of Brad Adams, Project Manager, and Heidi Meyer, Staff Project Manager.

Daily communications with the OSC will be performed by Bill Pickard, Senior Project Manager, and Brad Adams, Project Manager.

Maintaining a Site entry and exit log will be the responsibility of Heidi Meyer, Staff Project Manager. Heidi Meyer has also been assigned the role of Response Manager.

Field staff will be responsible for maintaining formal documentation of Site activities, subject to oversight and review by Brad Adams, Project Manager.

Progress reports for submission to the U.S. EPA will be prepared by Brad Adams, Project Manager, and Bill Pickard, Senior Project Manager.

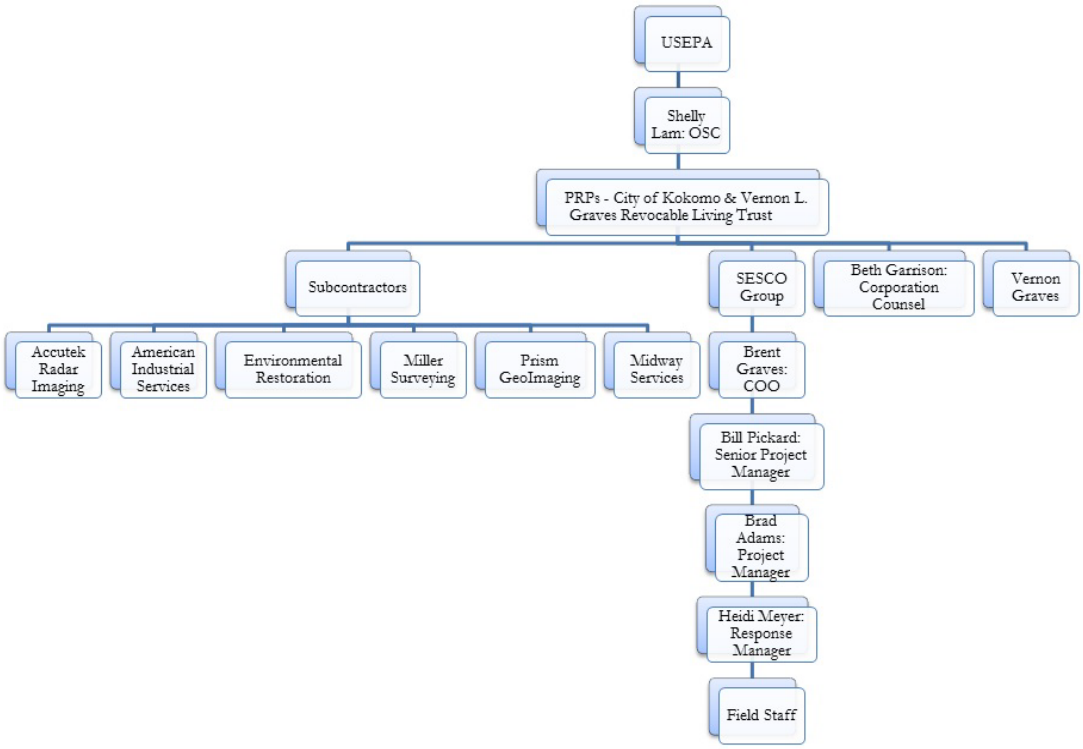
Management of procurement activities, including purchase orders and subcontracts, will be the responsibility of Brent Graves, Chief Operating Officer, Bill Pickard, Senior Project Manager, Brad Adams, Project Manager, and Phil Vogelgesang, Controller.

The PRP representatives for the Site are Beth Garrison, Corporation Counsel for the City of Kokomo, and Vernon L. Graves, Trustee of the Vernon L. Graves Revocable Living Trust. Contact information is as follows:

Beth Garrison
Corporation Counsel
City of Kokomo
100 S. Union Street
Kokomo, Indiana 46901
Phone: (765) 456-7442
Email: bgarrison@cityofkokomo.org

Vernon Graves, Trustee of the
Vernon L. Graves Revocable Living Trust
4510 Lakeshore Drive
Kokomo, Indiana 46901
Phone: (765) 438-0802
Email: sfg10@juno.com

Organizational Chart



6.2 Project Schedule

A project schedule is included in **Appendix E**.

6.3 Reporting

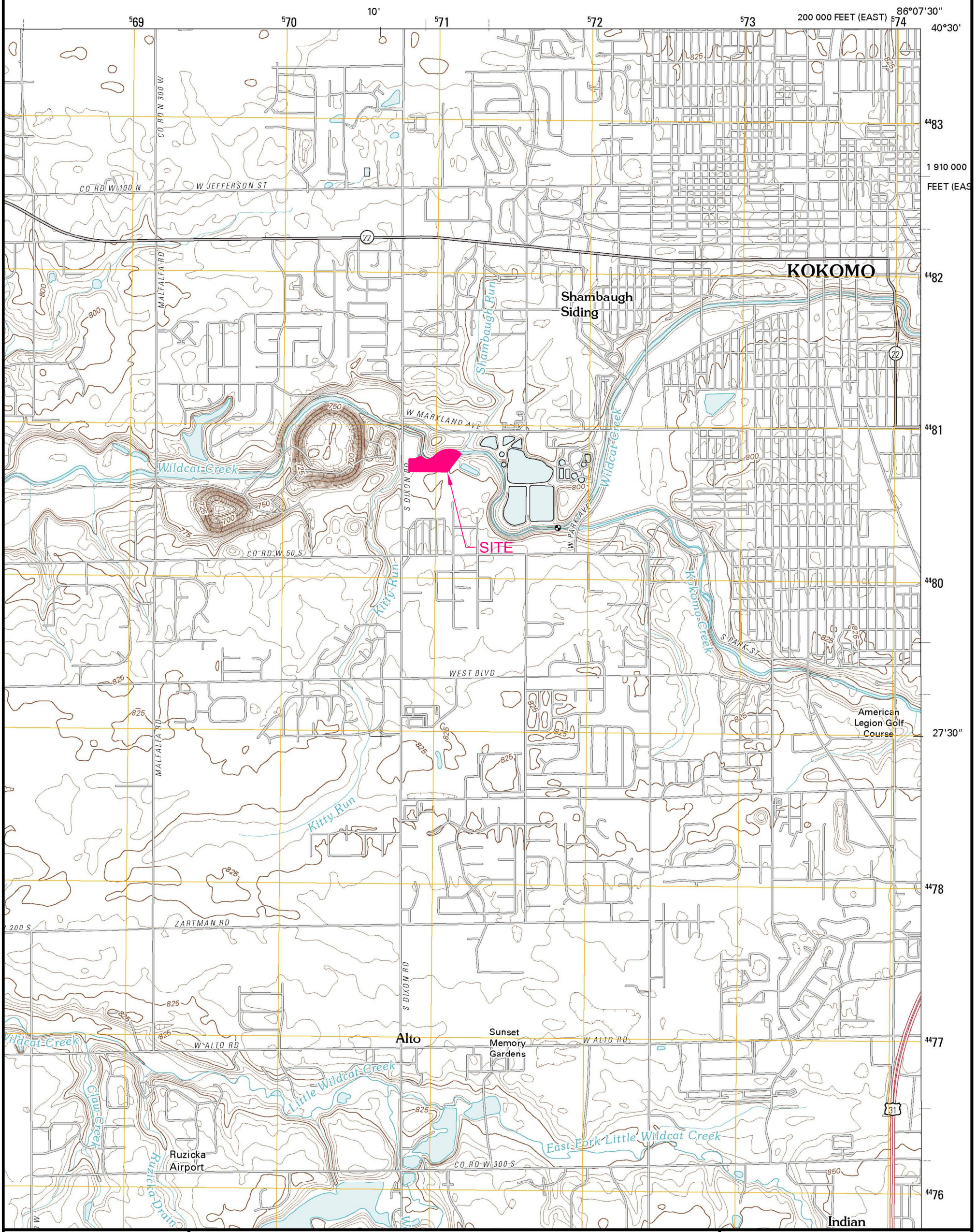
Due to the iterative nature of investigation and remediation activities to be performed at the Site, data will be presented to the U.S. EPA at the completion of the work scope in the form of an investigation report, including tables, figures, and laboratory analytical reports. The report(s) will present conclusions, an updated CSM, and will propose additional work, if necessary. Amendments to the Work Plan, HASP, and QAPP will be developed in concert with the U.S. EPA as part of the iterative process. Following completion of all work, SESCO will submit a final report summarizing the actions taken to comply with the Agreement (**Appendix A**). A final disposal summary will be included with the Summary Report.

Progress reports will be submitted monthly to the OSC.

LIST OF FIGURES

The National Map
US Topo

KOKOMO WEST QUADRANGLE
INDIANA
7.5-MINUTE SERIES



SESCO group
ENVIRONMENTAL SOLUTIONS

1"=2,000'

LEGEND

SITE (APPROXIMATE)

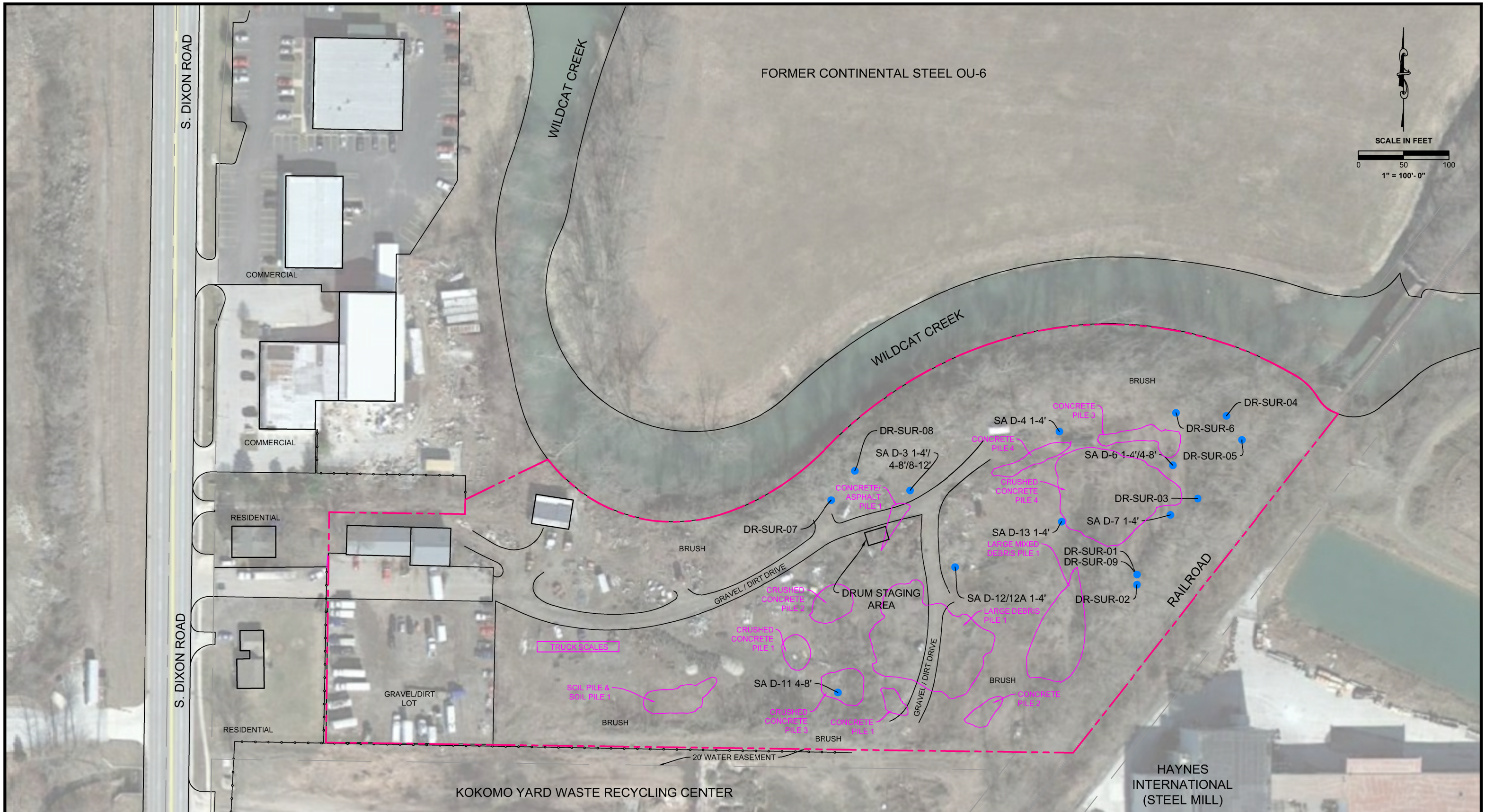
SITE LOCATION MAP

DIXON ROAD SITE
1110 ½ - 1112 and 1114 SOUTH DIXON ROAD
KOKOMO, INDIANA 46901

PROJECT # 4276

FIGURE # 1

O:\Consulting\@SESCO Technical Docs\#4276 Dixon Rd Site - Kokomo\Reports\Work Plan\FIGURES\SITE LOCATION MAP.dwg, 4/22/2015 3:23:39 PM



SESCO group
ENVIRONMENTAL SOLUTIONS

LEGEND

- SOIL BORING - OTIE
- DESIGNATED AREA OF INTEREST
- FENCE
- RAILROAD
- RIGHT OF WAY

NOTE: DEBRIS PILES SURVEYED ON 3-18-2015

SITE MAP

DIXON ROAD SITE
1110 ½ - 1112 and 1114 SOUTH DIXON ROAD
KOKOMO, INDIANA 46901

PROJECT # 4276	FIGURE # 2

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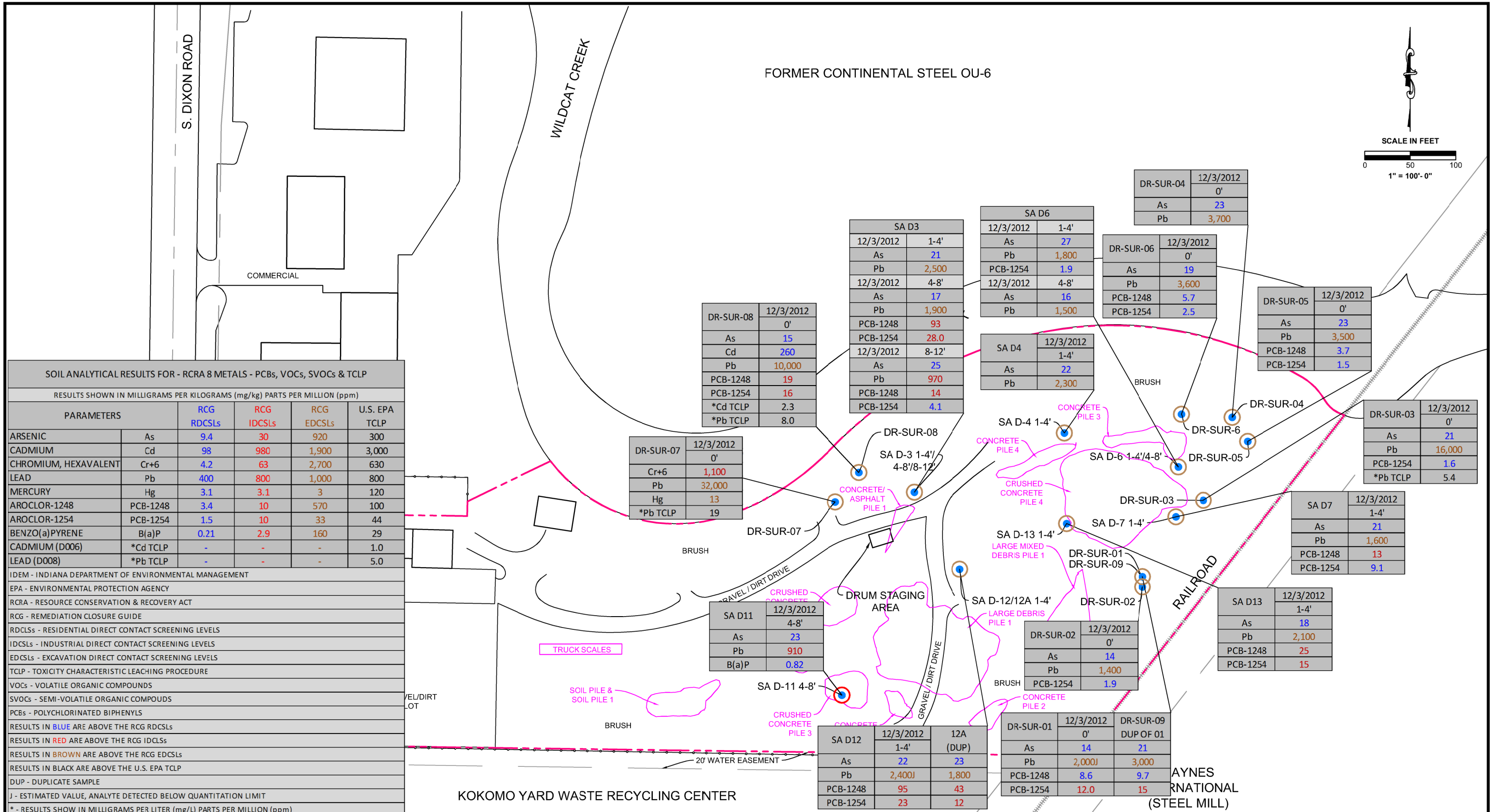


DR-SUR-08	12/3/2012
	0'
As	15
Cd	260
Pb	10,000
PCB-1248	19
PCB-1254	16
*Cd TCLP	2.3
*Pb TCLP	8.0

SA D3	
12/3/2012	1-4'
As	21
Pb	2,500
12/3/2012	4-8'
As	17
Pb	1,900
PCB-1248	93
PCB-1254	28.0
12/3/2012	8-12'
As	25
Pb	970
PCB-1248	14
PCB-1254	4.1

SA D6	
12/3/2012	1-4'
As	27
Pb	1,800
PCB-1254	1.9
12/3/2012	4-8'
As	16
Pb	1,500

DR-SUR-04	12/3/2012
	0'
As	23
Pb	3,700

DR-SUR-06	12/3/2012
	0'
As	19
Pb	3,600
PCB-1248	5.7
PCB-1254	2.5

DR-SUR-05	12/3/2012
	0'
As	23
Pb	3,500
PCB-1248	3.7
PCB-1254	1.5

SA D4	12/3/2012
	1-4'
As	22
Pb	2,300

DR-SUR-03	12/3/2012
	0'
As	21
Pb	16,000
PCB-1254	1.6
*Pb TCLP	5.4

DR-SUR-07	12/3/2012
	0'
Cr+6	1,100
Pb	32,000
Hg	13
*Pb TCLP	19

SA D7	12/3/2012
	1-4'
As	21
Pb	1,600
PCB-1248	13
PCB-1254	9.1

SA D13	12/3/2012
	1-4'
As	18
Pb	2,100
PCB-1248	25
PCB-1254	15

SA D11	12/3/2012
	4-8'
As	23
Pb	910
B(a)P	0.82

DR-SUR-02	12/3/2012
	0'
As	14
Pb	1,400
PCB-1254	1.9

SA D12	12/3/2012	12A
	1-4'	(DUP)
As	22	23
Pb	2,400J	1,800
PCB-1248	95	43
PCB-1254	23	12

DR-SUR-01	12/3/2012	DR-SUR-09
	0'	DUP OF 01
As	14	21
Pb	2,000J	3,000
PCB-1248	8.6	9.7
PCB-1254	12.0	15

SOIL ANALYTICAL RESULTS FOR - RCRA 8 METALS - PCBs, VOCs, SVOCs & TCLP					
RESULTS SHOWN IN MILLIGRAMS PER KILOGRAMS (mg/kg) PARTS PER MILLION (ppm)					
PARAMETERS		RCG RDCSLs	RCG IDCSLs	RCG EDCSLs	U.S. EPA TCLP
ARSENIC	As	9.4	30	920	300
CADMIUM	Cd	98	980	1,900	3,000
CHROMIUM, HEXAVALENT	Cr+6	4.2	63	2,700	630
LEAD	Pb	400	800	1,000	800
MERCURY	Hg	3.1	3.1	3	120
AROCLOR-1248	PCB-1248	3.4	10	570	100
AROCLOR-1254	PCB-1254	1.5	10	33	44
BENZO(a)PYRENE	B(a)P	0.21	2.9	160	29
CADMIUM (D006)	*Cd TCLP	-	-	-	1.0
LEAD (D008)	*Pb TCLP	-	-	-	5.0

IDEM - INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
EPA - ENVIRONMENTAL PROTECTION AGENCY
RCRA - RESOURCE CONSERVATION & RECOVERY ACT
RCG - REMEDIATION CLOSURE GUIDE
RDCLSs - RESIDENTIAL DIRECT CONTACT SCREENING LEVELS
IDCSLs - INDUSTRIAL DIRECT CONTACT SCREENING LEVELS
EDCSLs - EXCAVATION DIRECT CONTACT SCREENING LEVELS
TCLP - TOXICITY CHARACTERISTIC LEACHING PROCEDURE
VOCs - VOLATILE ORGANIC COMPOUNDS
SVOCs - SEMI-VOLATILE ORGANIC COMPOUDS
PCBs - POLYCHLORINATED BIPHENYLS
RESULTS IN BLUE ARE ABOVE THE RCG RDCSLs
RESULTS IN RED ARE ABOVE THE RCG IDCSLs
RESULTS IN BROWN ARE ABOVE THE RCG EDCSLs
RESULTS IN BLACK ARE ABOVE THE U.S. EPA TCLP
DUP - DUPLICATE SAMPLE
J - ESTIMATED VALUE, ANALYTE DETECTED BELOW QUANTITATION LIMIT
* - RESULTS SHOW IN MILLIGRAMS PER LITER (mg/L) PARTS PER MILLION (ppm)

SESCO group
ENVIRONMENTAL SOLUTIONS

LEGEND

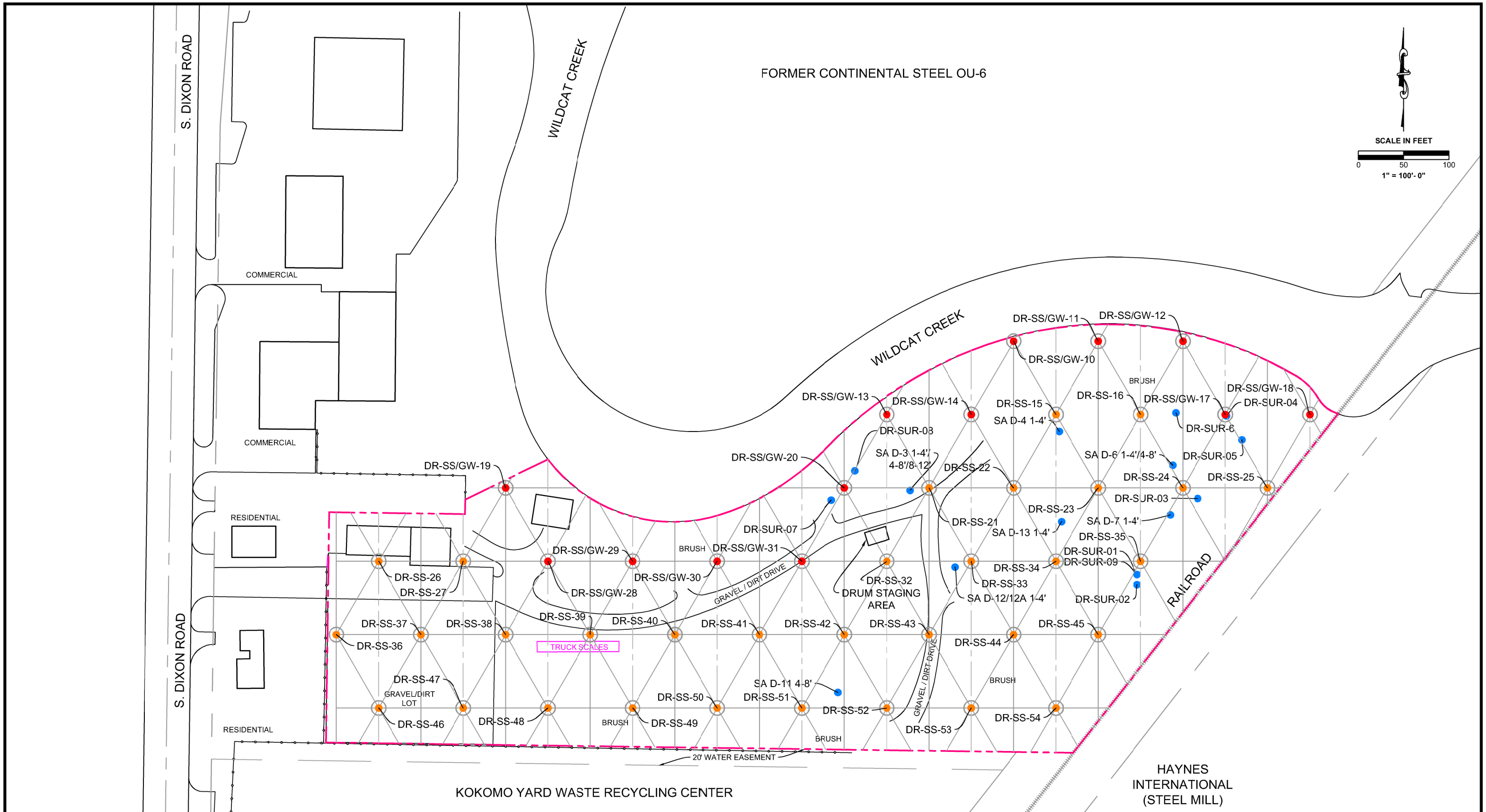
- SOIL BORING - OTIE
- DESIGNATED AREA OF INTEREST
- FENCE
- RAILROAD
- RIGHT OF WAY
- RESULTS BELOW RCG RDCSLs
- RESULTS ABOVE RCG RDCSLs
- RESULTS ABOVE RCG IDCSLs
- RESULTS ABOVE RCG EDCSLs

SOIL ANALYTICAL MAP

DIXON ROAD SITE
1110 ½ - 1112 and 1114 SOUTH DIXON ROAD
KOKOMO, INDIANA 46901

PROJECT # 4276 | FIGURE # 3

O:\Consulting\@SESCO Technical Docs\#4276 Dixon Rd Site - Kokomo\Reports\Work Plan\FIGURES\SOIL MAP.dwg, 4/22/2015 3:13:22 PM



SESCO group
ENVIRONMENTAL SOLUTIONS

LEGEND

- SOIL BORING - OTIE
- SURFACE & SUB-SURFACE SAMPLE
- SURFACE, SUB-SURFACE & GROUNDWATER SAMPLE
- DESIGNATED AREA OF INTEREST
- FENCE
- RAILROAD
- RIGHT OF WAY

PROPOSED SOIL BORING LOCATIONS

DIXON ROAD SITE
1110 ½ - 1112 and 1114 SOUTH DIXON ROAD
KOKOMO, INDIANA 46901

PROJECT # 4276 | FIGURE # 4

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LIST OF TABLES

Table 1
Summary of RCRA 8 Metals - Surface & Subsurface Soil Sample Analytical Results
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Boring /Sample ID	Date Sampled	Sample Depth (feet)	Units in mg/kg (ppm)								
			Arsenic	Barium	Cadmium	Chromium, Total	Chromium, Hexavalent	Lead	Mercury	Selenium	Silver
IDEM RCG Excavation Direct Contact Screening Levels			**920**	**100,000**	**1,900**	**NE**	**2,700**	**1,000**	**3.1**	**9,800**	**9,800**
IDEM RCG Industrial Direct Contact Screening Levels			**30**	**100,000**	**980**	**NE**	**63**	**800**	**3.1**	**5,800**	**5,800**
RCG Residential Direct Contact Screening Levels			**9.4**	**21,000**	**98**	**NE**	**4.2**	**400**	**3.1**	**550**	**550**
U.S. EPA RMLs for Industrial Soil			**300**	**650,000**	**3,000**	**NE**	**630**	**800**	**120**	**18,000**	**18,000**
DR-SUR-01	12/3/2012	0	**14**	610	35	210	<0.63	**2,000J**	0.97	1.5J	5.9
DR-SUR-02	12/3/2012	0	**14**	530	41	420	<0.59	**1,400**	0.81	1.5	6.0
DR-SUR-03	12/3/2012	0	**21**	650	26	160	<0.54	**16,000**	0.44	1.4J	3.7
DR-SUR-04	12/3/2012	0	**23**	1,400	37	380	0.78	**3,700**	0.047	1.2J	7.8
DR-SUR-05	12/3/2012	0	**23**	1,500	39	450	4.0	**3,500**	0.087	1.4J	13
DR-SUR-06	12/3/2012	0	**19**	470	36	210	<0.62	**3,600**	0.42	1.3J	7.7
DR-SUR-07	12/3/2012	0	1.1J	16,000	1.7	5,500	**1,100**	**32,000**	**13**	0.33J	0.4J
DR-SUR-08	12/3/2012	0	**15**	480	**260**	370	<0.62	**10,000**	0.74	0.90J	20
DR-SUR-09 (Duplicate of DR-SUR-01)	12/3/2012	0	**21**	730	96	140	5.6J	**3,000**	0.87	1.9J	9.6
SA D3 (1-4')	12/3/2012	1-4	**21**	700	46	150	<0.70	**2,500**	0.41	1.3J	5.9
SA D3 (4-8')	12/3/2012	4-8	**17**	460	92	230	<0.61	**1,900**	1.6	1.2J	27
SA D3 (8-12')	12/3/2012	8-12	**25**	440	23	280	<0.65	**970**	0.31	0.90J	20
SA D4 (1-4')	12/3/2012	1-4	**22**	910	30	73	<0.60	**2,300**	0.36	1.3J	11
SA D6 (1-4')	12/3/2012	1-4	**27**	600	25	140	<0.60	**1,800**	0.27	1.6J	8.0
SA D6 (4-8')	12/3/2012	4-8	**16**	730	23	64	<0.61	**1,500**	0.15	1.2J	4.0
SA D7 (1-4')	12/3/2012	1-4	**21**	570	30	170	<0.60	**1,600**	0.49	1.3J	5.7
SA D11 (4-8')	12/3/2012	4-8	**23**	270	6.6	56	<0.55	**910**	**4.2**	2.1	0.75J
SA D12 (1-4')	12/3/2012	1-4	**22**	520	71	210	<0.58	**2,400J**	0.61	1.4J	16J
SA D12A (1-4') dup	12/3/2012	1-4	**23**	460	75	220	<0.58	**1,800**	0.99	1.4J	18
SA D13 (1-4')	12/3/2012	1-4	**18**	640	34	170	<0.63	**2,100**	0.80	1.4J	6.6

IDEM RCG = Indiana Department of Environmental Management Remediation Closure Guide (RCG), 2015 Screening Levels
U.S. EPA RML = United States Environmental Protection Agency Removal Management Levels (2015)
RCRA = Resource Conservation & Recovery Act
mg/kg = milligrams per kilogram = parts per million (ppm)
NE = Screening level is not established
<# = Constituent not detected above laboratory detection limit
Results in bold **Red** exceed the RCG Industrial Direct Contact Screening Levels
Results in bold **Blue** exceed the RCG Residential Direct Contact Screening Levels
Results in bold **Brown** exceed the RCG Excavation Direct Contact Screening Levels
J = Estimated value, analyte detected below quantitation limit

Table 2
Summary of TCLP Analysis for RCRA 8 Metals
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Boring /Sample ID	Date Sampled	Sample Depth (feet)	Units in mg/L (ppm)							
			Arsenic (D004)	Barium (D005)	Cadmium (D006)	Chromium, Total (D007)	Lead (D008)	Mercury (D009)	Selenium (D010)	Silver (D011)
U.S. EPA TCLP Regulatory Limit			**5.0**	**100**	**1.0**	**5.0**	**5.0**	**0.2**	**1.0**	**5.0**
DR-SUR-01	12/3/2012	0	<0.010	0.81	0.33	0.0081J	0.55	<0.0020	0.0046J	0.00028J
DR-SUR-02	12/3/2012	0	<0.010	1.2	0.15	0.0049J	0.39	<0.0020	<0.020	<0.005
DR-SUR-03	12/3/2012	0	<0.010	0.27	0.12	0.0030J	**5.4**	<0.0020	0.0042J	<0.005
DR-SUR-04	12/3/2012	0	<0.010	1.2	0.08	0.0051J	3.3	<0.0020	<0.020	<0.005
DR-SUR-05	12/3/2012	0	<0.010	0.41	0.13	0.035	0.69	<0.0020	0.0050j	<0.005
DR-SUR-06	12/3/2012	0	<0.010	0.93	0.19	0.0038J	1.5	<0.0020	0.0047J	<0.005
DR-SUR-07	12/3/2012	0	<0.010	1.0	0.016	0.051	**19**	<0.0020	0.0048J	<0.005
DR-SUR-08	12/3/2012	0	<0.010	0.88	**2.3**	0.0037J	**8.0**	<0.0020	0.0042J	<0.005
DR-SUR-09 (Duplicate of DR-SUR-01)	12/3/2012	0	<0.010	1.0	0.20	0.0021J	4.5	<0.0020	0.0062J	<0.005
SA D3 (1-4')	12/3/2012	1-4	<0.010	0.87	0.12	0.0023J	0.47	<0.0020	<0.02	<0.005
SA D3 (4-8')	12/3/2012	4-8	<0.010	0.75	0.054	0.0018J	0.14	<0.0020	<0.02	<0.005
SA D3 (8-12')	12/3/2012	8-12	0.008J	1.0	<0.002	0.00098J	0.0082J	<0.0020	<0.02	<0.005
SA D4 (1-4')	12/3/2012	1-4	<0.010	1.1	0.099	0.001J	1.8	<0.0020	0.005J	<0.005
SA D6 (1-4')	12/3/2012	1-4	<0.010	0.54	0.49	0.0009J	0.34	<0.0020	0.0062J	<0.005
SA D6 (4-8')	12/3/2012	4-8	<0.010	0.51	0.19	0.003J	0.87	<0.0020	0.0057J	<0.005
SA D7 (1-4')	12/3/2012	1-4	<0.010	0.77	0.15	0.0032J	0.33	<0.0020	0.0063J	<0.005
SA D11 (4-8')	12/3/2012	4-8	<0.010	1.2	0.071	0.0032J	0.13	<0.0020	0.0056J	<0.005
SA D12 (1-4')	12/3/2012	1-4	<0.010	1.5	0.93	0.0019J	1.0	<0.0020	0.007J	<0.005
SA D12A (1-4') dup	12/3/2012	1-4	<0.010	1.0	2.2	0.0043J	1.2	<0.0020	0.0067J	0.00037J
SA D13 (1-4')	12/3/2012	1-4	<0.010	1.2	0.15	0.0066J	0.61	<0.0020	<0.02	<0.005

U.S. EPA TCLP = United States Environmental Protection Agency Toxicity Characteristic Leaching Procedure
RCRA = Resource Conservation & Recovery Act
mg/L = milligrams per liter = parts per million (ppm)
NA = Not Analyzed
D004 = Designated U.S. EPA Hazardous Waste Code Number
<# = Constituent not detected above laboratory detection limit
Bold and shaded cells exceed the TCLP limit, rendering the sample as a hazardous waste
J = Estimated value, analyte detected below quantitation limit

Table 3
Summary of Polychlorinated Biphenyls in Soil
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Sample ID	Date	Sample Depth (feet)	Units in mg/kg (ppm)							ng/kg
			PCBs							Dioxins
			Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	TCDD, 2,3,7,8
IDEM RCG Excavation Direct Contact Screening Levels			**120**	**470**	**73**	**570**	**570**	**33**	**570**	**1,300**
IDEM RCG Soil Direct Contact Industrial Screening Levels			**52**	**6.6**	**6.6**	**10**	**10**	**10**	**10**	**220**
IDEM RCG Soil Direct Contact Residential Screening Levels			**5.6**	**2.1**	**2.1**	**3.4**	**3.4**	**1.5**	**3.4**	**69**
U.S. EPA RMLs for Industrial Soil			**150**	**66**	**66**	**100**	**100**	**44**	**100**	**2,200**
DR-SUR-01	12/3/2012	0	<0.049	<0.049	<0.049	<0.049	**8.6**	**12.0**	<0.049	NA
DR-SUR-02	12/3/2012	0	<0.048	<0.048	<0.048	<0.048	2.1	**1.9**	<0.048	NA
DR-SUR-03	12/3/2012	0	<0.042	<0.042	<0.042	<0.042	2.3	**1.6**	<0.042	NA
DR-SUR-04	12/3/2012	0	<0.048	<0.048	<0.048	<0.048	1.6	0.6	<0.048	NA
DR-SUR-05	12/3/2012	0	<0.046	<0.046	<0.046	<0.046	**3.7**	**1.5**	<0.046	NA
DR-SUR-06	12/3/2012	0	<0.047	<0.047	<0.047	<0.047	**5.7**	**2.5**	<0.047	NA
DR-SUR-07	12/3/2012	0	<0.044	<0.044	<0.044	<0.044	0.22	0.099	<0.044	NA
DR-SUR-08	12/3/2012	0	<0.049	<0.049	<0.049	<0.049	**19**	**16**	<0.049	NA
DR-SUR-09 (Duplicate of DR-SUR-01)	12/3/2012	0	<0.050	<0.050	<0.050	<0.050	**9.7**	**15**	<0.050	NA
SA D3 (1-4')	12/3/2012	1-4	<0.053	<0.053	<0.053	<0.053	2.8	1.2	<0.053	NA
SA D3 (4-8')	12/3/2012	4-8	<0.050	<0.050	<0.050	<0.050	**93**	**28**	<0.050	NA
SA D3 (8-12')	12/3/2012	8-12	<0.049	<0.049	<0.049	<0.049	**14**	**4.1**	<0.049	NA
SA D4 (1-4')	12/3/2012	1-4	<0.047	<0.047	<0.047	<0.047	1.2	0.53	<0.047	NA
SA D6 (1-4')	12/3/2012	1-4	<0.048	<0.048	<0.048	<0.048	3.3	**1.9**	<0.048	NA
SA D6 (4-8')	12/3/2012	4-8	<0.047	<0.047	<0.047	<0.047	1.4	0.59	<0.047	NA
SA D7 (1-4')	12/3/2012	1-4	<0.046	<0.046	<0.046	<0.046	**13**	**9.1**	<0.046	NA
SA D11 (4-8')	12/3/2012	4-8	<0.044	<0.044	<0.044	<0.044	1.4	1.2	<0.044	NA
SA D12 (1-4')	12/3/2012	1-4	<0.045	<0.045	<0.045	<0.045	**95**	**23**	<0.045	NA
SA D12A (1-4') dup	12/3/2012	1-4	<0.045	<0.045	<0.045	<0.045	**43**	**12**	<0.045	NA
SA D13 (1-4')	12/3/2012	1-4	<0.046	<0.046	<0.046	<0.046	**25**	**15**	<0.046	NA

IDEM RCG = Indiana Department of Environmental Management Remediation Closure Guide (RCG), 2015 Screening Levels
U.S. EPA RMLs = United States Environmental Protection Agency Removal Management Levels (2015)
mg/kg = milligrams per kilogram = parts per million (ppm)
ng/kg = nanograms per kilogram
NA = Not Analyzed
NE = Screening level is not established
PCBs = Polychlorinated Biphenyls
<# = Constituent not detected above laboratory detection limit
Results in bold **Blue** exceed the RCG Residential Direct
Results in bold Red exceed the RCG Industrial Direct Contact Screening Levels
Results in bold **Brown** exceed the RCG Excavation Direct

Table 4
Summary of SVOCs in Soil
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Sample ID	Date	Sample Depth (feet)	Units in mg/kg (ppm)																			
			Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Butyl Benzyl Phthalate	Caprolactam	Chrysene	Dibenz(a,h,)anthracene	Dibenzofuran	Di-n-butyl Phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene
IDEM RCG Excavation Direct Contact Screening Levels			**100,000**	**100,000**	**1,600**	**160**	**1,600**	**16,000**	**34,000**	**100,000**	**100,000**	**100,000**	**160**	**1,900**	NE	**68,000**	**68,000**	**1,600**	**6,800**	**3,100**	NE	**51,000**
IDEM RCG Soil Direct Contact Industrial Screening			**45,000**	**100,000**	**29**	**2.9**	**29**	**290**	**1,600**	**12,000**	**100,000**	**2,900**	**2.9**	**1,000**	NE	**30,000**	**30,000**	**29**	**3,000**	**170**	NE	**23,000**
IDEM RCG Soil Direct Contact Residential Screening			**4,900**	**24,000**	**2.1**	**0.21**	**2.1**	**21**	**530**	**3,900**	**43,000**	**210**	**0.21**	**100**	NE	**3,200**	**3,200**	**2.1**	**320**	**53**	NE	**2,400**
U.S. EPA RMLs for Industrial Soil			**140,000**	**680,000**	**290**	**29**	**290**	**2,900**	**16,000**	**NE**	**1,200,000**	**29,000**	**29**	**3,100**	**NE**	**91,000**	**91,000**	**290**	**9,100**	**1,700**	**NE**	**68,000**
SA D3 (4-8')	12/3/2012	4-8	<0.730	<0.730	<0.730	<0.730	<0.730	<0.730	<8.0	<3.9	<8.0	<0.730	<0.730	<3.9	0.550J	<0.730	<0.730	<0.730	<1.9	<0.730	<0.730	0.410J
SA D11 (4-8')	12/3/2012	4-8	<0.340	<0.340	0.320J	**0.82**	0.51	0.56	<3.7	<1.8	0.370J	0.38	<0.340	0.240J	0.210J	0.51	<0.340	0.220J	0.280J	<0.340	0.47	0.38

IDEM RCG = Indiana Department of Environmental Management Remediation Closure Guide (RCG), 2015 Screening Levels
U.S. EPA RMLs = United States Environmental Protection Agency Removal Management Levels (2015)
mg/kg = milligrams per kilogram = parts per million (ppm)
NA = Not Analyzed
NE = Screening level is not established
SVOCs = Semi-Volatile Organic Compounds
<# = Constituent not detected above laboratory detection limit
Results in bold **Blue** exceed the RCG Residential Direct Contact Screening Levels
Results in bold Red exceed the RCG Industrial Direct Contact Screening Levels
Results in bold **Brown** exceed the RCG Excavation Direct Contact Screening Levels
J = Estimated value, analyte detected below quantitation limit

Table 5
Proposed Sampling Plan - Surface Soils
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Sample ID	Analytical Parameters					
	RCRA Metals (1)	VOCs (2)	SVOCs (3)	PCBs (4)	2,3,7,8-TCDD (5)	Hexavalent Chromium (6)
DR-SS-10	1	1	1	1	1	1
DR-SS-11	1	1	1	1	1	1
DR-SS-12	1	1	1	1	1	1
DR-SS-13	1	1	1	1	1	1
DR-SS-14	1	1	1	1	1	1
DR-SS-15	1	1	1	1	1	1
DR-SS-16	1	1	1	1	1	1
DR-SS-17	**	1	1	**	1	**
DR-SS-18	1	1	1	1	1	1
DR-SS-19	1	1	1	1	1	1
DR-SS-20	1	1	1	1	1	1
DR-SS-21	1	1	1	1	1	1
DR-SS-22	1	1	1	1	1	1
DR-SS-23	1	1	1	1	1	1
DR-SS-24	1	1	1	1	1	1
DR-SS-25	1	1	1	1	1	1
DR-SS-26	1	1	1	1	1	1
DR-SS-27	1	1	1	1	1	1
DR-SS-28	1	1	1	1	1	1
DR-SS-29	1	1	1	1	1	1
DR-SS-30	1	1	1	1	1	1
DR-SS-31	1	1	1	1	1	1
DR-SS-32	1	1	1	1	1	1
DR-SS-33	1	1	1	1	1	1
DR-SS-34	1	1	1	1	1	1
DR-SS-35	1	1	1	1	1	1
DR-SS-36	1	1	1	1	1	1
DR-SS-37	1	1	1	1	1	1
DR-SS-38	1	1	1	1	1	1
DR-SS-39	1	1	1	1	1	1
DR-SS-40	1	1	1	1	1	1
DR-SS-41	1	1	1	1	1	1
DR-SS-42	1	1	1	1	1	1
DR-SS-43	1	1	1	1	1	1
DR-SS-44	1	1	1	1	1	1
DR-SS-45	1	1	1	1	1	1
DR-SS-46	1	1	1	1	1	1
DR-SS-47	1	1	1	1	1	1
DR-SS-48	1	1	1	1	1	1
DR-SS-49	1	1	1	1	1	1
DR-SS-50	1	1	1	1	1	1
DR-SS-51	1	1	1	1	1	1

Table 5
Proposed Sampling Plan - Surface Soils
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Sample ID	Analytical Parameters					
	RCRA Metals (1)	VOCs (2)	SVOCs (3)	PCBs (4)	2,3,7,8-TCDD (5)	Hexavalent Chromium (6)
DR-SS-52	1	1	1	1	1	1
DR-SS-53	1	1	1	1	1	1
DR-SS-54	1	1	1	1	1	1
Number of Primary Samples	44	45	45	44	45	44
Duplicate Samples	5	5	5	5	5	5
MS/MSDs	3	3	3	3	3	3
Trip Blanks		10				
Equipment Blanks	5	5	5	5	5	5
Number of QA/QC Samples	13	23	13	13	13	13
Number of Laboratory Analyses	57	68	58	57	58	57

All surface soil samples will be collected from ground surface to a depth of 6-inches
(1) RCRA Metals and TCLP Metals to be analyzed via EPA Methods 6010 and 7471
(2) VOCs to be analyzed via EPA Method 8260
(3) SVOCs to be analyzed via EPA Method 8270
(4) PCBs to be analyzed via EPA Method 8082
(5) 2,3,7,8-TCDD to be analyzed via EPA Method 8290
(6) Hexavalent chromium to be analyzed via EPA Method 7196
** - A sample was previously collected from this location for the analytes indicated

Table 6
Proposed Sampling Plan - Subsurface Soils
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Sample ID	Analytical Parameters					
	RCRA Metals (1)	VOCs (2)	SVOCs (3)	PCBs (4)	2,3,7,8-TCDD (5)	Hexavalent Chromium (6)
DR-SS-10	2	2	2	2	2	2
DR-SS-11	2	2	2	2	2	2
DR-SS-12	2	2	2	2	2	2
DR-SS-13	2	2	2	2	2	2
DR-SS-14	2	2	2	2	2	2
DR-SS-15	2	2	2	2	2	2
DR-SS-16	2	2	2	2	2	2
DR-SS-17	2	2	2	2	2	2
DR-SS-18	2	2	2	2	2	2
DR-SS-19	2	2	2	2	2	2
DR-SS-20	2	2	2	2	2	2
DR-SS-21	2	2	2	2	2	2
DR-SS-22	2	2	2	2	2	2
DR-SS-23	2	2	2	2	2	2
DR-SS-24	2	2	2	2	2	2
DR-SS-25	2	2	2	2	2	2
DR-SS-26	2	2	2	2	2	2
DR-SS-27	2	2	2	2	2	2
DR-SS-28	2	2	2	2	2	2
DR-SS-29	2	2	2	2	2	2
DR-SS-30	2	2	2	2	2	2
DR-SS-31	2	2	2	2	2	2
DR-SS-32	2	2	2	2	2	2
DR-SS-33	2	2	2	2	2	2
DR-SS-34	2	2	2	2	2	2
DR-SS-35	2	2	2	2	2	2
DR-SS-36	2	2	2	2	2	2
DR-SS-37	2	2	2	2	2	2
DR-SS-38	2	2	2	2	2	2
DR-SS-39	2	2	2	2	2	2
DR-SS-40	2	2	2	2	2	2
DR-SS-41	2	2	2	2	2	2
DR-SS-42	2	2	2	2	2	2
DR-SS-43	2	2	2	2	2	2
DR-SS-44	2	2	2	2	2	2
DR-SS-45	2	2	2	2	2	2
DR-SS-46	2	2	2	2	2	2
DR-SS-47	2	2	2	2	2	2
DR-SS-48	2	2	2	2	2	2
DR-SS-49	2	2	2	2	2	2
DR-SS-50	2	2	2	2	2	2
DR-SS-51	2	2	2	2	2	2

Table 6
Proposed Sampling Plan - Subsurface Soils
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Sample ID	Analytical Parameters					
	RCRA Metals (1)	VOCs (2)	SVOCs (3)	PCBs (4)	2,3,7,8-TCDD (5)	Hexavalent Chromium (6)
DR-SS-52	2	2	2	2	2	2
DR-SS-53	2	2	2	2	2	2
DR-SS-54	2	2	2	2	2	2
Number of Primary Samples	90	90	90	90	90	90
Duplicate Samples	9	9	9	9	9	9
MS/MSDs	5	5	5	5	5	5
Trip Blanks		10				
Equipment Blanks	9	9	9	9	9	9
Number of QA/QC Samples	23	33	23	23	23	23
Number of Laboratory Analyses	113	123	113	113	113	113

(1) RCRA Metals and TCLP Metals to be analyzed via EPA Methods 6010 and 7471
(2) VOCs to be analyzed via EPA Method 8260
(3) SVOCs to be analyzed via EPA Method 8270
(4) PCBs to be analyzed via EPA Method 8082
(5) 2,3,7,8-TCDD to be analyzed via EPA Method 8290
(6) Hexavalent chromium to be analyzed via EPA Method 7196

Table 7
Proposed Sampling Plan - Groundwater Ecological Screening
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Sample ID	Analytical Parameters					
	RCRA Metals (1)	VOCs (2)	SVOCs (3)	PCBs (4)	2,3,7,8-TCDD (5)	Hexavalent Chromium (6)
DR-SS-10	1	1	1	1	1	1
DR-SS-11	1	1	1	1	1	1
DR-SS-12	1	1	1	1	1	1
DR-SS-13	1	1	1	1	1	1
DR-SS-14	1	1	1	1	1	1
DR-SS-17	1	1	1	1	1	1
DR-SS-18	1	1	1	1	1	1
DR-SS-19	1	1	1	1	1	1
DR-SS-28	1	1	1	1	1	1
DR-SS-29	1	1	1	1	1	1
DR-SS-30	1	1	1	1	1	1
DR-SS-31	1	1	1	1	1	1
Number of Primary Samples	12	12	12	12	12	12
Duplicate Samples	2	2	2	2	2	2
MS/MSDs	1	1	1	1	1	1
Trip Blanks		3				
Equipment Blanks	2	2	2	2	2	2
Number of QA/QC Samples	5	8	5	5	5	5
Number of Laboratory Analyses	17	20	17	17	17	17

(1) RCRA Metals to be analyzed via EPA Methods 6010 and 7471
(2) VOCs to be analyzed via EPA Method 8260
(3) SVOCs to be analyzed via EPA Method 8270
(4) PCBs to be analyzed via EPA Method 8082
(5) 2,3,7,8-TCDD to be analyzed via EPA Method 8290
(6) Hexavalent chromium to be analyzed via EPA Method 218.6

LIST OF APPENDICES

APPENDIX A

Administrative Settlement Agreement and Order on Consent for Removal Action Docket Number V-W-15•C-021, Dated April 2, 2015, and EPA Correspondence Dated April 16, 2015

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 02 2015

S-6J

REPLY TO THE ATTENTION OF:

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

City of Kokomo, Indiana
c/o David L. Guevara, Ph.D. / Partner
Taft Stettinius & Hollister LLP
One Indiana Square, Suite 3500
Indianapolis, Indiana 46204-2023

Vernon L. Graves Revocable Living Trust
c/o John D. Moriarty/ Partner
Plews Shadley Racher & Braun, LLP
1346 North Delaware Street
Indianapolis, Indiana 46202-2415

Re: Dixon Road Site
1114 and 1110 ½ -1112 South Dixon Road, Kokomo, Howard County Indiana
Site Spill Identification Number: C5M5
Administrative Settlement Agreement and Order on Consent

Dear Sirs:

Enclosed please find an executed copy of the Administrative Settlement Agreement and Order on Consent issued for this Site pursuant to Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622. Thank you for your work and cooperation in this matter.

If you have any questions regarding this Order, please do not hesitate to contact me at (312)886-6630, or gonzalez.maria@epa.gov, or to have technical questions directed to Shelly Lam, On-Scene Coordinator, at 317-308-3073, or lam.shelly@epa.gov.

Sincerely yours,

Maria Gonzalez
Associate Regional Counsel

Enclosure

cc: Shelly Lam
Rex Osborn, IDEM
Beth Admire, IDEM
John Davis, IDNR

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:

Dixon Road Site
Kokomo, Howard County, Indiana

Respondents:

Vernon L. Graves Revocable Living Trust
City of Kokomo, Indiana

ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT FOR REMOVAL ACTION

Docket No. V-W-15-C-021

Proceeding Under Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622

I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent (Settlement Agreement) is entered into voluntarily by the United States Environmental Protection Agency (U.S. EPA) and Respondents. This Settlement Agreement provides for the performance of removal actions by Respondents and the payment of certain response costs incurred by the United States at or in connection with the Dixon Road Site (Site) located at 1114 South Dixon Road (Parcel No. 34-09-02-101-009.000-002) and 1110 ½ -1112 South Dixon Road (Parcel No. 34-09-02-101-004.000-002) in Kokomo, Howard County, Indiana.

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622. This authority has been delegated to the Administrator of the U.S. EPA by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, and further delegated to the Regional Administrators by U.S. EPA Delegation Nos. 14-14-A, 14-14-C and 14-14-D, and to the Director, Superfund Division, Region 5, by Regional Delegation Nos. 14-14-A, 14-14-C and 14-14-D.

3. U.S. EPA has notified the State of Indiana (the State) of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

4. U.S. EPA and Respondents recognize that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondents in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondents do not admit, and retain the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of facts, conclusions of law, and determinations in Sections IV (Findings of Fact) and V (Conclusions of Law and Determinations) of this Settlement Agreement. Respondents agree to comply with and be bound by the terms of this Settlement Agreement and further agree that they will not contest the basis or validity of this Settlement Agreement or its terms.

II. PARTIES BOUND

5. This Settlement Agreement applies to and is binding upon U.S. EPA and upon Respondents and their heirs, successors and assigns. Any change in ownership or corporate status of a Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter such Respondent's responsibilities under this Settlement Agreement.

6. Respondents are jointly and severally liable for carrying out all activities required by this Settlement Agreement. In the event of the insolvency or other failure of any one or more Respondents to implement the requirements of this Settlement Agreement, the remaining Respondents shall complete all such requirements.

7. Respondents shall ensure that their contractors, subcontractors, and representatives comply with this Settlement Agreement. Respondents shall be responsible for any noncompliance with this Settlement Agreement.

III. DEFINITIONS

8. Unless otherwise expressly provided in this Settlement Agreement, terms used in this Settlement Agreement that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601-9675.

"Day" shall mean a calendar day unless otherwise specified. In computing any period of time under this Settlement Agreement, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

"Effective Date" shall be the effective date of this Settlement Agreement as provided in Section XXX (Effective Date).

"Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, in overseeing implementation of the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement on or after the Effective Date. Future Response Costs shall also include, but not be limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Paragraph 25 (including, but not limited to, costs and attorneys fees and any monies paid to secure access, including, but not limited to, the amount of just compensation), and Paragraph 35 (emergency response). Future Response Costs shall also include all costs, including, but not limited to, direct and indirect costs, incurred prior to the Effective Date, but paid after that date. Future Response Costs shall also include all "Interim Response Costs," and all Interest on those Past Response Costs Respondents have agreed to pay under this Settlement Agreement that has accrued pursuant to 42 U.S.C. § 9607(a) during the period from April 1, 2014 to the Effective Date.

"Interest" shall mean interest at the rate specified for interest on investments of the U.S. EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

"Interim Response Costs" shall mean all costs, including direct and indirect costs, (a) paid by the United States in connection with the Site between April 1, 2014 and the Effective Date, or (b) incurred prior to the Effective Date, but paid after that date.

"Municipal solid waste" or "MSW" shall mean waste material: (a) generated by a household (including a single or multifamily residence); or (b) generated by a commercial, industrial, or institutional entity, to the extent that the waste material (i) is essentially the same as waste normally generated by a household; (ii) is collected and disposed of with other municipal solid waste as part of normal municipal solid waste collection services; and (iii) contains a relative quantity of hazardous

substances no greater than the relative quantity of hazardous substances contained in waste material generated by a typical single-family household.

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

"Paragraph" shall mean a portion of this Settlement Agreement identified by an Arabic numeral or an upper or lower case letter.

"Parties" shall mean EPA and Respondents.

"Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States paid at or in connection with the Site through March 31, 2014, plus Interest on all such costs through such date.

"RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 - 6992k, (also known as the Resource Conservation and Recovery Act).

"Respondents" shall mean the Vernon L. Graves Revocable Living Trust and the City of Kokomo, Indiana.

"Section" shall mean a portion of this Settlement Agreement identified by a Roman numeral.

"Settlement Agreement" shall mean this Administrative Settlement Agreement and Order on Consent and all appendices attached hereto (listed in Section XXIX. (Severability/Integration/Attachments)). In the event of conflict between this Settlement Agreement and any appendix, this Settlement Agreement shall control.

"Site" shall mean the Dixon Road Superfund Site, encompassing approximately 9.76 acres, located at 1114 South Dixon Road (Parcel No. 34-09-02-101-009.000-002) and 1110 ½ -1112 South Dixon Road (Parcel No. 34-09-02-101-004.000-002) in Kokomo, Howard County, Indiana, and depicted generally on the map attached as Attachment A.

"State" shall mean the State of Indiana.

"United States" shall mean the United States of America and each department, agency, and instrumentality of the United States, including U.S. EPA.

"U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

"Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and 4) any

"hazardous material" and "hazardous waste" under Ind. Code Ann. § 13-22-2-3, Ind. Admin. Code tit. 329, r. 3.1-4-1, and 40 C.F.R. Part 261.

"Work" shall mean all activities Respondents are required to perform under this Settlement Agreement, except those required by Section XI (Record Retention).

IV. FINDINGS OF FACT

9. Based on available information, including the Administrative Record in this matter, U.S. EPA hereby finds that:

a. The Vernon L. Graves Revocable Living Trust has owned the Site property since 2007.

b. Vernon L. Graves is the trustee of the Vernon L. Graves Revocable Living Trust.

c. Edward and Melba Graves obtained 29.14 acres that included the Site in 1951.

d. On April 12, 1976, Edward and Melba Graves conveyed the Site to Vernon and Shirley Graves.

e. Vernon L. and Shirley F. Graves, conveyed the Site property to the Vernon L. Graves Revocable Living Trust on December 20, 2007, through a Quit-Claim deed recorded on October 2, 2009.

f. The Graves family operated a dump and automobile salvage yard at the Site.

g. The City of Kokomo, Indiana (the City) has deposited Waste Material at the Site. It arranged for disposal or treatment, or arranged with a transporter for disposal or treatment of hazardous substances at the Site.

h. Graves Westside Auto Parts, Inc., fka Westside Salvage, Inc., operated an automobile salvage yard and/or an auto parts facility at the Site between at least August 2, 1961, and at least July 28, 1977.

i. Since at least August 2, 1976, Vernon L. Graves Sr. has served as the President and Shirley Graves as the Secretary-Treasurer of Graves Westside Auto Parts, Inc.

j. Various other auto parts, towing and salvage operations have also operated at the Site, including: Dillon's Westside Auto & Wrecker, Inc., from about 1986 to 1998; Marvin's Body Shop; Johnson's Towing & Recovery LLC, from about 2002 - 2005; First Choice Auto Repairs, from about 2007- 2008; and Sutton's Truck and Repair, Inc., from about 2008 - 2012. The most recent tenant was Going Green Recycling.

k. In 2003, a fire occurred that destroyed a building at the Site. The Fire Marshall's report indicates that the 1500 square foot metal building contained a wrecker and possibly two other vehicles along with cutting torches and Oxygen and Acetylene tanks.

l. On April 20, 2011, IDEM conducted an inspection at the Site that found waste tires piled in at least six separate locations, and several piles of automotive debris, demolition/construction debris and salvageable metals scattered across the Site property.

m. The April 20, 2011 IDEM inspection also found evidence of an incinerator at the Site.

n. Edward Graves died in 1988 and Melba Graves died in 2010.

o. Wildcat Creek lies along the northern border of the Site. It flows west towards the Wabash River in Lafayette, Indiana.

p. In April 2011, IDEM observed drums and waste piles on the Site. Drums were exposed on the banks of Wildcat Creek at the Site property. The drums were old and in poor condition. Some of the drums at the Site were leaking their contents onto the banks of Wildcat Creek.

q. On April 6, 2011, IDEM verbally requested assistance from EPA with regard to the Site. IDEM requested further assistance at the Site in an email dated January 4, 2013.

r. The EPA On-Scene Coordinator (OSC) and the Superfund Technical Assessment and Response Team (START) contractor conducted a Site Assessment at the Site on December 3, 2012. Site assessment activities included sampling surface soil, subsurface soil, waste piles, and buried waste.

s. Surface soil and surface waste pile samples taken revealed: the polychlorinated biphenyls (PCBs) Aroclor 1248 and Aroclor 1254 at concentrations ranging from 0.099 milligrams per kilogram (mg/kg) to 19 mg/kg, with three samples exceeding the IDEM commercial/industrial direct contact soil screening level of 7.4 mg/kg for both Aroclors; total lead concentrations ranging from 1,400 to 32,000 mg/kg, exceeding EPA's June 2014 Removal Management Level (RML) and IDEM screening level of 800 mg/kg; one sample of mercury at a concentration of 13 mg/kg, exceeding the IDEM screening level of 3.1 mg/kg; hexavalent chromium (chromium VI) at a concentration of 1,100 mg/kg, exceeding the RML of 630 mg/kg and IDEM screening level of 56 mg/kg; three surface soil samples containing lead at concentrations ranging from 5.4 to 19 milligrams per liter (mg/L) exceeding the toxicity characteristic level for lead of 5 mg/L set forth at 40 C.F.R. § 261.24; one surface soil sample exceeded the toxicity characteristic level for cadmium of 1 mg/L set forth at 40 C.F.R. § 261.24, at a concentration of 2.3 mg/L.

t. Subsurface soil and buried waste samples taken revealed: six samples containing Aroclor 1248 above IDEM's screening level of 7.4 mg/kg, at depths up to 12 feet at a maximum concentration of 95 mg/kg; Aroclor 1254 above that IDEM screening level in five samples, at concentrations ranging from 9.1 to 28 mg/kg; arsenic exceeded IDEM's screening level of 24 mg/kg in two samples, at concentrations ranging from 25 to 27 mg/kg; lead exceeding the RML and IDEM screening level of 800 mg/kg in all 11 samples at concentrations ranging from 910 to 2,500 mg/kg; mercury above IDEM's screening level of 3.1 mg/kg in one sample, at a concentration of 4.2 mg/kg; and cadmium exceeded the toxicity characteristic level for cadmium at 40 C.F.R. § 261.24 of 1 mg/L in one sample, at a concentration of 2.2 mg/L.

u. Aroclors 1248 and 1254 (as well as Aroclors and PCBs generally), arsenic, chromium, lead, mercury, and cadmium are hazardous substances within the meaning of Section 101 (14)(B) of CERCLA, 42 U.S.C. § 9601(14)(B). They are "listed hazardous substances" as that term is defined at 40 CFR § 302.4, and are included in Table 302.4 as hazardous substances designated under Section 102(a) of CERCLA, 42 U.S.C. § 9602(a).

v. Solid Wastes that exhibit the characteristic of toxicity at 40 C.F.R. § 261.24 are RCRA hazardous wastes, which fall within the definition of hazardous substances at Section 101 (14)(C) of CERCLA, 42 U.S.C. § 9601(14)(C). Characteristic hazardous waste cadmium has the Hazardous Waste Number D006. Characteristic hazardous waste lead has the Hazardous Waste Number D008.

w. There is a potential for contamination at the Site to migrate to the groundwater and Wildcat Creek.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

10. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, U.S. EPA has determined that:

a. The Dixon Road Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at the Site, as identified in the Findings of Fact above, includes "hazardous substance(s)" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. Each Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. Each Respondent is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is jointly and severally liable for performance of response actions and for response costs incurred and to be incurred at the Site.

i. Respondent the Vernon L. Graves Revocable Living Trust is the "owner" and/or "operator" of the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1).

ii. Respondent the City of Kokomo, Indiana, arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment of hazardous substances at the facility, within the meaning of Section 107(a)(3) of CERCLA, 42 U.S.C. § 9607(a)(3).

e. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility into the "environment" as defined by Sections 101(22) and 101(8) of CERCLA, 42 U.S.C.§§ 9601(22) and 9601(8).

f. The conditions present at the Site constitute a threat to public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the National Oil and Hazardous

Substances Pollution Contingency Plan, as amended (NCP), 40 CFR § 300.415(b)(2). These factors include, but are not limited to, the following:

i. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants; this factor is present at the Site due to the presence of lead, arsenic, chromium, mercury, cadmium and PCBs.

ii. Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release; this factor is present at the Site due to the existence of hazardous substances leaking from drums at the Site. The drums were exposed in the bank of Wildcat Creek and lying on the ground surface. Contents of several drums were leaking and pose a threat of release.

iii. High levels of hazardous substances or pollutants or contaminants in soils, largely at or near the surface, that may migrate; this factor is present at the Site due to the existence of high levels of hazardous substances in surface soil, as high as 32,000 mg/kg for lead. Additionally, sample results from subsurface soils showed that PCBs, arsenic, lead, mercury and cadmium were present in deeper soils.

iv. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; this factor is present at the Site due to the existence of high winds that could cause dispersion of surface soil and particulate matter leaking from drums. Additionally, heavy rains could cause flooding that could reach the level of drums exposed in the bank of Wildcat Creek, causing migration through surface water and sediment.

v. The unavailability of other appropriate federal or state response mechanisms to respond to the release; this factor supports the actions required by this Settlement Agreement at the Site because IDEM requested assistance from EPA. IDEM does not have the resources to mitigate the threat of release.

g. The removal action required by this Settlement Agreement is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Settlement Agreement, will be consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

VI. SETTLEMENT AGREEMENT AND ORDER

11. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, it is hereby Ordered and Agreed that Respondents shall comply with all provisions of this Settlement Agreement, including, but not limited to, all attachments to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATOR, AND ON-SCENE COORDINATOR

12. Respondents shall retain one contractor to perform the Work and shall notify U.S. EPA of the name and qualifications of such contractor within 5 business days of the Effective Date.

Respondents shall also notify U.S. EPA of the name(s) and qualification(s) of any subcontractor(s) retained to perform the Work at least 5 business days prior to commencement of such Work. U.S. EPA retains the right to disapprove of any or all of the contractors and/or subcontractors retained by Respondents. If U.S. EPA disapproves of a selected contractor, Respondents shall retain a different contractor and shall notify U.S. EPA of that contractor's name and qualifications within 3 business days of U.S. EPA's disapproval. The contractor must demonstrate compliance with ANSI/ASQC E-4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan (QMP). The QMP should be prepared consistent with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01/002), or equivalent documentation as required by U.S. EPA. Any decision not to require submission of the contractor's QMP should be documented in a memorandum from the OSC and Regional quality assurance personnel to the Site file.

13. Within 5 business days after the Effective Date, Respondents shall designate a Project Coordinator who shall be responsible for administration of all actions by Respondent as required by this Settlement Agreement and shall submit to U.S. EPA the designated Project Coordinator's name, address, telephone number, and qualifications. To the greatest extent possible, the Project Coordinator shall be present on Site or readily available during Site work. U.S. EPA retains the right to disapprove of the designated Project Coordinator. If U.S. EPA disapproves of the designated Project Coordinator, Respondents shall retain a different Project Coordinator and shall notify U.S. EPA of that person's name, address, telephone number, and qualifications within 4 business days following U.S. EPA's disapproval. Receipt by Respondents' Project Coordinator of any notice or communication from U.S. EPA relating to this Settlement Agreement shall constitute receipt by Respondents.

14. U.S. EPA has designated Shelly Lam of the Emergency Response Branch #1, Region 5, as its OSC. Except as otherwise provided in this Settlement Agreement, Respondents shall direct all submissions required by this Settlement Agreement to the OSC at 2525 North Shadeland Avenue, Suite 100, Indianapolis, Indiana, 46219. Respondents are encouraged to make its submissions to U.S. EPA electronically or on recycled paper (which includes significant post consumer waste paper content where possible) and using two-sided copies.

15. U.S. EPA and Respondents shall have the right, subject to Paragraph 13, to change their respective designated OSC or Project Coordinator. U.S. EPA shall notify the Respondents, and Respondents shall notify U.S. EPA, as early as possible before such a change is made, but in no case less than 24 hours before such a change. The initial notification may be made orally but shall be promptly followed by a written notice.

VIII. WORK TO BE PERFORMED

16. Respondents shall perform, at a minimum, the following removal activities:

a. Develop and implement Site plans including a Site-specific Health and Safety Plan, a Quality Assurance Project Plan, a Site Emergency Contingency Plan, and a Work Plan;

b. Establish Site security;

c. Conduct a comprehensive site assessment and engineering evaluation to determine the extent of buried drums and contamination in soil; and evaluate potential control and/or removal options to control, contain, and/or remove drums, waste, and contaminated soil.

d. Implement the selected control and/or removal action as approved by EPA.

e. Perform sampling and analysis to determine disposal options. Provide EPA with notice of sampling events 5 business days in advance of the sampling so that EPA can conduct oversight and split samples.

f. Consolidate and package hazardous substances, pollutants and contaminants for transportation and off-site disposal in accordance with the EPA Off-Site Rule, 40 C.F.R. § 300.440.

17. Work Plan and Implementation.

a. Within 30 calendar days after the Effective Date, Respondents shall submit to U.S. EPA for approval a draft Work Plan for performing the removal action generally described in Paragraph 16 above. The draft Work Plan shall provide a description of, and an expeditious schedule for, the actions required by this Settlement Agreement. The Work Plan shall include a Quality Assurance Project Plan (QAPP). The following documents shall be used for the development of QAPPs for Region 5 Superfund sites:

- The Uniform Federal Policy for Quality Assurance Projects Plans (UFP-QAPP), OSWER Directive 9272.0-17; the QAPP format can be found at **http://www.epa.gov/fedfac/documents/qualityassurance.htm;**
- EPA Requirements for Quality Assurance Project Plans QA/R-5 (EPA/240/B-01/003), March 2001, Reissued May 2006.

The following guidance may be used in conjunction with the requirements above:

- EPA Guidance for the Quality Assurance Project Plans QA/G-5 (EPA/240/R-02/009), December 2002.
- Guidance on Choosing a Sampling Design for Environmental Data Collection EPA QA/G-5S, December 2002.

b. U.S. EPA may approve, disapprove, require revisions to, or modify the draft Work Plan in whole or in part. If U.S. EPA requires revisions, Respondents shall submit a revised draft Work Plan within 7 business days of receipt of U.S. EPA's notification of the required revisions. Respondents shall implement the Work Plan as approved in writing by U.S. EPA in accordance with the schedule approved by U.S. EPA. Once approved, or approved with modifications, the Work Plan, the schedule, and any subsequent modifications shall be incorporated into and become fully enforceable under this Settlement Agreement.

c. Respondents shall not commence any Work except in conformance with the terms of this Settlement Agreement. Respondents shall not commence implementation of the Work Plan developed hereunder until receiving written U.S. EPA approval pursuant to Paragraph 17(b).

18. Health and Safety Plan. Within 30 calendar days after the Effective Date, Respondents shall submit for U.S. EPA review and comment a plan that ensures the protection of the public health and safety during performance of on-site work under this Settlement Agreement. This plan shall be prepared consistent with U.S. EPA's Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992). In addition, the plan shall comply with all currently applicable Occupational Safety and Health Administration (OSHA) regulations found at 29 C.F.R. Part 1910. If U.S. EPA determines that it is appropriate, the plan shall also include contingency planning. Respondents shall incorporate all changes to the plan recommended by U.S. EPA and shall implement the plan during the pendency of the removal action.

19. Quality Assurance and Sampling.

a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to U.S. EPA direction, approval, and guidance regarding sampling, quality assurance/quality control (QA/QC), data validation, and chain of custody procedures. Respondents shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate U.S. EPA guidance. Respondents shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondents shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001, Reissued May 2006)," or equivalent documentation as determined by U.S. EPA. U.S. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program (NELAP) as meeting the Quality System requirements.

b. Upon request by U.S. EPA, Respondents shall have such a laboratory analyze samples submitted by U.S. EPA for QA monitoring. Respondents shall provide to U.S. EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

c. Upon request by U.S. EPA, Respondents shall allow U.S. EPA or its authorized representatives to take split and/or duplicate samples. Respondents shall notify U.S. EPA not less than 5 business days in advance of any sample collection activity, unless shorter notice is agreed to by U.S. EPA. U.S. EPA shall have the right to take any additional samples that U.S. EPA deems necessary. Upon request, U.S. EPA shall allow Respondents to take split or duplicate samples of any samples it takes as part of its oversight of Respondents' implementation of the Work.

20. Post-Removal Site Control. In accordance with the Work Plan schedule, or as otherwise directed by U.S. EPA, Respondents shall submit a proposal for post-removal site control consistent with Section 300.415(*l*) of the NCP and OSWER Directive No. 9360.2-02. Upon U.S. EPA approval,

Respondents shall implement such controls and shall provide U.S. EPA with documentation of all post-removal site control arrangements.

21. Reporting.

a. Respondents shall submit a written progress report to U.S. EPA concerning actions undertaken pursuant to this Settlement Agreement every 30th day after the date of receipt of U.S. EPA's approval of the Work Plan until termination of this Settlement Agreement, unless otherwise directed in writing by the OSC. These reports shall describe all significant developments during the preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

b. Respondents shall submit 3 copies of all plans, reports or other submissions required by this Settlement Agreement, or any approved work plan. Upon request by U.S. EPA, Respondents shall submit such documents in electronic form.

c. Respondents who own or control property at the Site shall at least 30 days prior to the conveyance of any interest in real property at the Site, give written notice to the transferee that the property is subject to this Settlement Agreement and written notice to U.S. EPA and the State of the proposed conveyance, including the name and address of the transferee. Respondents who own or control property at the Site also agree to require that their successors comply with the immediately preceding sentence and Sections IX (Site Access) and X (Access to Information).

22. Final Report. Within 60 days after completion of all Work required by Section VIII (Work To Be Performed) of this Settlement Agreement, Respondents shall submit for U.S. EPA review and approval a final report summarizing the actions taken to comply with this Settlement Agreement. The final report shall conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports" and with the guidance set forth in "Superfund Removal Procedures Removal Response Reporting: POLREPS and OSC Reports" (OSWER Directive No. 9360.3-03, June 1, 1994). The final report shall include a good faith estimate of total costs or a statement of actual costs incurred in complying with the Settlement Agreement, a listing of quantities and types of materials removed off-site or handled on-site, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the removal action (*e.g.*, manifests, invoices, bills, contracts, and permits). The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

> "Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

23. Off-Site Shipments.

a. Respondents may ship hazardous substances, pollutants and contaminants from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440; and provide written notification to the OSC. Respondents will be deemed to be in compliance with CERCLA Section 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if Respondents obtain a prior determination from EPA that the proposed receiving facility for such shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b). Respondents may ship Investigation Derived Waste (IDW) from the Site to an off-Site facility only if Respondents comply with EPA's "Guide to Management of Investigation Derived Waste," OSWER 9345.3-03FS (Jan. 1992).

b. Respondents may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, they provide written notice to the appropriate state environmental official in the receiving facility's state and to the OSC. This written notice requirement shall not apply to any off-site shipments when the total quantity of all such shipments will not exceed ten cubic yards. The written notice must include the following information, if available: (1) the name and location of the receiving facility; (2) the type and quantity of Waste Material to be shipped; (3) the schedule for the shipment; and (4) the method of transportation. Respondents also shall notify the state environmental official referenced above and the OSC of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. Respondents shall provide the written notice after the award of the contract for the removal action and before the Waste Material is shipped.

IX. SITE ACCESS

24. If the Site, or any other property where access is needed to implement this Settlement Agreement, is owned or controlled by any of the Respondents, such Respondent shall, commencing on the Effective Date, provide U.S. EPA, the State, and their representatives, including contractors, with access at all reasonable times to the Site, or such other property, for the purpose of conducting any activity related to this Settlement Agreement.

25. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondents, Respondents shall use its best efforts to obtain all necessary access agreements within 10 business days after the Effective Date, or as otherwise specified in writing by the OSC. Respondents shall immediately notify U.S. EPA if after using its best efforts it is unable to obtain such agreements. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access. Respondents shall describe in writing its efforts to obtain access. U.S. EPA may then assist Respondents in gaining access, to the extent necessary to effectuate the response actions described in this Settlement Agreement, using such means as U.S. EPA deems appropriate. Respondents shall reimburse U.S. EPA for all costs and attorney's fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XV (Payment of Response Costs).

26. Notwithstanding any provision of this Settlement Agreement, U.S. EPA and the State retain all of their access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

X. ACCESS TO INFORMATION

27. Respondents shall provide to U.S. EPA, upon request, copies of all documents and information within its possession or control or that of its contractors or agents relating to activities at the Site or to the implementation of this Settlement Agreement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondents shall also make available to U.S. EPA, for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

28. Respondents may assert business confidentiality claims covering part or all of the documents or information submitted to U.S. EPA under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by U.S. EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to U.S. EPA, or if U.S. EPA has notified Respondents that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such documents or information without further notice to Respondents.

29. Respondents may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Respondents assert such a privilege in lieu of providing documents, they shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the contents of the document, record, or information; and 6) the privilege asserted by Respondents. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged or confidential.

30. No claim of privilege or confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

XI. RECORD RETENTION

31. Until 6 years after Respondents' receipt of U.S. EPA's notification pursuant to Section XXVI (Notice of Completion of Work), each Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Site, regardless of any corporate retention policy to the contrary. Until 6 years after Respondents' receipt of

U.S. EPA's notification pursuant to Section XXVI (Notice of Completion of Work), Respondents shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to performance of the Work.

32. At the conclusion of this document retention period, Respondents shall notify U.S. EPA at least 60 days prior to the destruction of any such records or documents, and, upon request by U.S. EPA, Respondents shall deliver any such records or documents to U.S. EPA. Respondents may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondents assert such a privilege, they shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by Respondents. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged or confidential.

33. Each Respondent hereby certifies individually that to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information (other than identical copies) relating to its potential liability regarding the Site since the earlier of notification of potential liability by U.S. EPA or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all U.S. EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XII. COMPLIANCE WITH OTHER LAWS

34. Respondents shall perform all actions required pursuant to this Settlement Agreement in accordance with all applicable local, state, and federal laws and regulations except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 6921(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-Site actions required pursuant to this Settlement Agreement shall, to the extent practicable, as determined by U.S. EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal environmental or state environmental or facility siting laws. Respondents shall identify ARARs in the Work Plan subject to U.S. EPA approval.

XIII. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

35. In the event of any action or occurrence during performance of the Work that causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondents shall immediately take all appropriate action. Respondents shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondents shall also immediately notify the OSC or, in the event of his/her unavailability, the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318, of the incident or Site conditions. In the event that Respondents fail to take appropriate response action as required by this

Paragraph, and U.S. EPA takes such action instead, Respondents shall reimburse U.S. EPA all costs of the response action not inconsistent with the NCP pursuant to Section XV (Payment of Response Costs).

36. In addition, in the event of any release of a hazardous substance from the Site, Respondents shall immediately notify the OSC or, in the event of his/her unavailability, the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318; and the National Response Center at (800) 424-8802. Respondents shall submit a written report to U.S. EPA within 7 business days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the recurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, *et seq.*

XIV. AUTHORITY OF ON-SCENE COORDINATOR

37. The OSC shall be responsible for overseeing Respondents' implementation of this Settlement Agreement. The OSC shall have the authority vested in an OSC by the NCP, including the authority to halt, conduct, or direct any Work required by this Settlement Agreement, or to direct any other removal action undertaken at the Site. Absence of the OSC from the Site shall not be cause for stoppage of work unless specifically directed by the OSC.

XV. PAYMENT OF RESPONSE COSTS

38. Payment for Past Response Costs.

a. Within 30 days after the Effective Date, Respondents shall pay to U.S. EPA $59,940.35 for Past Response Costs. Payment shall be made to U.S. EPA by Fedwire Electronic Funds Transfer (EFT) to:

Federal Reserve Bank of New York,
ABA # 021030004
Account = 68010727
SWIFT address = FRNYUS33
33 Liberty Street
New York, NY 10045
Field Tag 4200 of the Fedwire message; should read "D 68010727 Environmental Protection Agency"

and shall reference Site/Spill ID Number C5M5 and the EPA docket number for this action.

b. At the time of payment, Respondent shall send notice that such payment has been made to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Boulevard., Chicago, Illinois, 60604-3590 and to Maria Gonzalez, Associate Regional Counsel, 77 West Jackson Blvd., C-14J, Chicago, Illinois, 60604-3590, and to the EPA Cincinnati Finance Office by email at cinwd_acctsreceivable@epa.gov , or by mail to: Cincinnati Finance Office, 26 W. Martin Luther King

Drive, Cincinnati, Ohio 45268. Such notice shall reference Site/Spill ID Number C5M5 and the EPA docket number for this action.

c. The total amount to be paid by Respondents pursuant to Paragraph 38(a) shall be deposited by U.S. EPA in the Dixon Road Site Special Account to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by U.S. EPA to the U.S. EPA Hazardous Substance Superfund.

39. Payments for Future Response Costs.

a. Respondents shall pay U.S. EPA all Future Response Costs not inconsistent with the NCP. On a periodic basis, U.S. EPA will send Respondents a bill requiring payment that consists of an Itemized Cost Summary. Respondents shall make all payments within 30 days of receipt of each bill requiring payment, except as otherwise provided in Paragraph 41 of this Settlement Agreement according to the following procedures:

i. Respondents shall make all payments required by this Paragraph to U.S. EPA by Fedwire EFT to:

Federal Reserve Bank of New York
ABA # 021030004
Account = 68010727
SWIFT address = FRNYUS33
33 Liberty Street
New York, NY 10045
Field Tag 4200 of the Fedwire message; should read "D 68010727 Environmental Protection Agency"

and shall reference Site/Spill ID Number C5M5 and the EPA docket number for this action.

ii. If the amount demanded in the bill is $10,000 or less, Respondents may, in lieu of the procedures in subparagraph 39.a.i., make all payments required by this Paragraph by official bank check made payable to "U.S. EPA Hazardous Substance Superfund." Each check, or a letter accompanying each check, shall identify the name and address of the party(ies) making payment, the Site name, U.S. EPA Region 5, the Site/Spill ID Number C5M5, and, if any, the U.S. EPA docket number for this action, and shall be sent to:

U.S. Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
P.O. Box 979076
St. Louis, MO 63197-9000

b. At the time of payment, Respondents shall send notice that payment has been made to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Blvd., Chicago, Illinois, 60604-

3590 and to Maria Gonzalez, Associate Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 60604-3590, and to the EPA Cincinnati Finance Office by email at cinwd_acctsreceivable@epa.gov , or by mail to: Cincinnati Finance Office, 26 W. Martin Luther King Drive, Cincinnati, Ohio 45268. Such notice shall reference Site/Spill ID Number C5M5 and the EPA docket number for this action.

c. The total amount to be paid by Respondents pursuant to Paragraph 39.a. shall be deposited in the Dixon Road Site Special Account within the U.S. EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by U.S. EPA to the U.S. EPA Hazardous Substance Superfund.

40. In the event that the payment for Past Response Costs is not made within 30 days of the Effective Date, or the payments for Future Response Costs are not made within 30 days of Respondents' receipt of a bill, Respondents shall pay Interest on the unpaid balance. The Interest on Past Response Costs shall begin to accrue on the Effective Date and shall continue to accrue until the date of payment. The Interest on Future Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondents' failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XVIII (Stipulated Penalties).

41. Respondents may contest payment of any Future Response Costs billed under Paragraph 39 if they determine that U.S. EPA has made a mathematical error, or included a cost item that is not within the definition of Future Response Costs, or if they believe U.S. EPA incurred excess costs as a direct result of a U.S. EPA action that was inconsistent with a specific provision or provisions of the NCP. Such objection shall be made in writing within 30 days of receipt of the bill and must be sent to the OSC. Any such objection shall specifically identify the contested Future Response Costs and the basis for objection. In the event of an objection, Respondents shall within the 30-day period pay all uncontested Future Response Costs to U.S. EPA in the manner described in Paragraph 39. Simultaneously, Respondents shall establish, in a duly chartered bank or trust company, an interest-bearing escrow account that is insured by the Federal Deposit Insurance Corporation (FDIC), and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. Respondents shall send to the U.S. EPA OSC a copy of the transmittal letter and check paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account, Respondents shall initiate the Dispute Resolution procedures in Section XVI (Dispute Resolution). If U.S. EPA prevails in the dispute, within 5 days of the resolution of the dispute, Respondents shall pay the sums due (with accrued interest) to U.S. EPA in the manner described in Paragraph 39. If Respondents prevail concerning any aspect of the contested costs, Respondents shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to U.S. EPA in the manner described in Paragraph 39. Respondents shall be disbursed any balance of the escrow account. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XVI (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding Respondents' obligation to reimburse U.S. EPA for its Future Response Costs.

XVI. DISPUTE RESOLUTION

42. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

43. If Respondents object to any U.S. EPA action taken pursuant to this Settlement Agreement, including billings for Future Response Costs, they shall notify U.S. EPA in writing of their objection(s) within 10 days of such action, unless the objection(s) has/have been resolved informally. This written notice shall include a statement of the issues in dispute, the relevant facts upon which the dispute is based, all factual data, analysis or opinion supporting Respondents' position, and all supporting documentation on which such party relies. U.S. EPA and Respondents shall have 10 days from U.S. EPA's receipt of Respondents' written objection(s) to resolve the dispute through formal negotiations. The period for formal negotiations may be extended at the sole discretion of U.S. EPA. If the parties are unable to reach a written agreement by the conclusion of the formal negotiation period, U.S. EPA shall provide its Statement of Position, including supporting documentation, no later than 10 days after the formal negotiation period concludes. In the event that these 10-day time periods for exchange of written documents may cause a delay in the work, they shall be shortened upon, and in accordance with, notice by U.S. EPA. An administrative record of any dispute under this Section shall be maintained by U.S. EPA. The record shall include the written notification of such dispute, and the Statement of Position served pursuant to the preceding Paragraph. Upon review of the administrative record, the Director of the Superfund Division, U.S. EPA Region 5, shall resolve the dispute consistent with the NCP and the terms of this Settlement Agreement. U.S. EPA's decision shall be incorporated into and become an enforceable part of this Settlement Agreement.

44. Respondents' obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondents shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with U.S. EPA's decision, whichever occurs.

XVII. FORCE MAJEURE

45. Respondents agree to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a *force majeure*. For purposes of this Settlement Agreement, a *force majeure* is defined as any event arising from causes beyond the control of Respondents, or of any entity controlled by Respondents, including but not limited to their contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondents' best efforts to fulfill the obligation. *Force majeure* does not include financial inability to complete the Work or increased cost of performance.

46. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a *force majeure* event, Respondents shall notify U.S. EPA orally within 24 hours of when Respondents first knew that the event might cause a delay.

Within 7 days thereafter, Respondents shall provide to U.S. EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondents' rationale for attributing such delay to a *force majeure* event if they intend to assert such a claim; and a statement as to whether, in the opinion of Respondents, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall be grounds for U.S. EPA to deny Respondents an extension of time for performance. Respondents shall have the burden of demonstrating by a preponderance of the evidence that the event is a *force majeure*, that the delay is warranted under the circumstances, and that best efforts were exercised to avoid and mitigate the effects of the delay.

47. If U.S. EPA agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this Settlement Agreement that are affected by the *force majeure* event will be extended by U.S. EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the *force majeure* event shall not, of itself, extend the time for performance of any other obligation. If U.S. EPA does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, U.S. EPA will notify Respondents in writing of its decision. If U.S. EPA agrees that the delay is attributable to a *force majeure* event, U.S. EPA will notify Respondents in writing of the length of the extension, if any, for performance of the obligations affected by the *force majeure* event.

XVIII. STIPULATED PENALTIES

48. Respondents shall be liable to U.S. EPA for stipulated penalties in the amounts set forth in Paragraphs 49 and 50 for failure to comply with the requirements of this Settlement Agreement specified below, unless excused under Section XVII (Force Majeure). "Compliance" by Respondents shall include completion of the activities under this Settlement Agreement or any work plan or other plan approved under this Settlement Agreement identified below in accordance with all applicable requirements of law, this Settlement Agreement, and any plans or other documents approved by U.S. EPA pursuant to this Settlement Agreement within the specified time schedules established by and approved under this Settlement Agreement.

49. Stipulated Penalty Amounts – Work (Including Payments).

a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Paragraph 49(b):

Penalty Per Violation Per Day	Period of Noncompliance
$1,500	1st through 14th day
$2,500	15th through 30th day
$5,000	31st day and beyond

b. Compliance Milestones

Designation of Respondents' Contractor
Designation of Respondents' Project Coordinator
Submission of Health and Safety Plan
Submission of Emergency Contingency Plan
Submission of QAPP
Submission of Work Plan(s)
Submission of Site Assessment and Engineering Evaluation Report
Initiation of Work
Completion of Post-Removal Site Controls
Payment of Past Response Costs pursuant to Paragraph 38
Payment of Future Response costs pursuant to Paragraph 39
Provision of Financial Assurance pursuant to Section XXVII
Provision of Insurance pursuant to Section XVIII

50. Stipulated Penalty Amounts - Reports. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports or other written documents pursuant to Paragraphs 21 and 22:

Penalty Per Violation Per Day	Period of Noncompliance
$500	1st through 14th day
$1,500	15th through 30th day
$3,500	31st day and beyond

51. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: 1) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 31st day after U.S. EPA's receipt of such submission until the date that U.S. EPA notifies Respondents of any deficiency; and 2) with respect to a decision by the Director of the Superfund Division, Region 5, under Paragraph 43 of Section XVI (Dispute Resolution), during the period, if any, beginning on the 21st day after U.S. EPA submits its written statement of position until the date that the Director of the Superfund Division issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement Agreement.

52. Following U.S. EPA's determination that Respondents have failed to comply with a requirement of this Settlement Agreement, U.S. EPA may give Respondents written notification of the failure and describe the noncompliance. U.S. EPA may send Respondents a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether U.S. EPA has notified Respondents of a violation.

53. All penalties accruing under this Section shall be due and payable to U.S. EPA within 30 days of Respondents' receipt from U.S. EPA of a demand for payment of the penalties, unless Respondents invoke the dispute resolution procedures under Section XVI (Dispute Resolution).

Respondents shall make all payments required by this Section by official bank check made payable to "U.S. EPA Hazardous Substance Superfund". Each check, or a letter accompanying each check, shall identify the name and address of the party making payment, the Site name, U.S. EPA Region 5, the Site/Spill ID Number C5M5, and, if any, the U.S. EPA docket number for this action, and shall be sent to:

U.S. Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
P.O. Box 979076
St. Louis, MO 63197-9000

and shall indicate that the payment is for stipulated penalties, and shall reference the name and address of the party(ies) making payment. At the time of payment, copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to U.S. EPA as provided in Paragraph 39(b).

54. The payment of penalties shall not alter in any way Respondents' obligation to complete performance of the Work required under this Settlement Agreement.

55. Penalties shall continue to accrue during any dispute resolution period, but need not be paid until 20 days after the dispute is resolved by agreement or by receipt of U.S. EPA's decision.

56. If Respondents fail to pay stipulated penalties when due, U.S. EPA may institute proceedings to collect the penalties, as well as Interest. Respondents shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 52. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of U.S. EPA to seek any other remedies or sanctions available by virtue of Respondents' violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(*l*) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(*l*), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that U.S. EPA shall not seek civil penalties pursuant to Section 106(b) or 122(*l*) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided in this Section, except in the case of a willful violation of this Settlement Agreement. Should Respondents violate this Settlement Agreement or any portion hereof, U.S. EPA may carry out the required actions unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, and/or may seek judicial enforcement of this Settlement Agreement pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606. Notwithstanding any other provision of this Section, U.S. EPA may, in its unreviewable discretion, waive in writing any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XIX. COVENANTS BY U.S. EPA

57. In consideration of the actions that will be performed and the payments that will be made by Respondents under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, U.S. EPA covenants not to sue or to take administrative action against

Respondents pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for the Work, Past Response Costs, and Future Response Costs. These covenants shall take effect upon the Effective Date. These covenants are conditioned upon the complete and satisfactory performance by Respondents of all obligations under this Settlement Agreement, including, but not limited to, payment of Future Response Costs pursuant to Paragraph 39 (Payment for Future Response Costs). These covenants extend only to Respondents and do not extend to any other person.

XX. RESERVATIONS OF RIGHTS BY U.S. EPA

58. Except as specifically provided in this Settlement Agreement, nothing in this Settlement Agreement shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing in this Settlement Agreement shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement, from taking other legal or equitable action as it deems appropriate and necessary, or from requiring the Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law.

59. The covenants set forth in Section XIX (Covenants by U.S. EPA) above do not pertain to any matters other than those expressly identified therein. U.S. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondents with respect to all other matters, including, but not limited to:

a. claims based on a failure by Respondents to meet a requirement of this Settlement Agreement;

b. liability for costs not included within the definitions of Past Response Costs or Future Response Costs;

c. liability for performance of response action other than the Work;

d. criminal liability;

e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site; and

g. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related to the Site.

XXI. COVENANTS BY RESPONDENTS

60. Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Past Response Costs, Future Response Costs, or this Settlement Agreement, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Indiana Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or

c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Work, Past Response Costs, or Future Response Costs.

Except as provided in Paragraphs 62 (Claims Against De Micromis Parties) and 63 (Claims Against MSW Generators and Transporters), below, these covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to any of the reservations set forth in Section XX (Reservation of Rights by U.S. EPA, other than in Paragraphs 59.a. (liability for failure to meet a requirement of the Settlement Agreement) or 59.d. (criminal liability), but only to the extent that Respondents' claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

61. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

62. Respondents agree not to assert any claims and to waive all claims or causes of action (including but not limited to claims or causes of action under Sections 107(a) and 113 of CERCLA) that they may have for all matters relating to the Site, against any person where the person's liability to Respondents with respect to the Site is based solely on having arranged for disposal or treatment, or for transport for disposal or treatment, of hazardous substances at the Site, or having accepted for transport for disposal or treatment of hazardous substances at the Site, if all or part of the disposal, treatment, or transport occurred before April 1, 2001, and the total amount of material containing hazardous substances contributed by such person to the Site was less than 110 gallons of liquid materials or 200 pounds of solid materials.

63. Respondents agree not to assert any claims and to waive all claims or causes of action (including but not limited to claims or causes of action under Sections 107(a) and 113 of CERCLA) that they may have for all matters relating to the Site against any person where the person's liability to Respondents with respect to the Site is based solely on having arranged for disposal or treatment, or for transport for disposal or treatment, of MSW at the Site, if the volume of MSW disposed, treated, or transported by such person to the Site did not exceed 0.2 percent of the total volume of waste at the Site.

64. The waivers under Paragraphs 62 and 63 shall not apply to any claim or cause of action against any person meeting the above criteria if such person asserts a claim or cause of action relating to the Site against such Respondent. These waivers also shall not apply to any claim or cause of action against any person meeting the above criteria if U.S. EPA determines: (1) that the materials contributed to the Site by such person have contributed significantly or could contribute significantly, either individually or in the aggregate, to the costs of response or natural resource restoration at the Site; or (2) such person has failed to comply with any EPA requests for information or administrative subpoenas issued pursuant to Section 104(e) or 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) or 9622(e), or Section 3007 of RCRA, 42 U.S.C. § 6972, or has impeded or is impeding, through action or inaction, the performance of a response action or natural resource restoration with respect to the Site, or has been convicted of a criminal violation for the conduct to which this waiver would apply and that conviction has not been vitiated on appeal or otherwise.

XXII. OTHER CLAIMS

65. By issuance of this Settlement Agreement, the United States and U.S. EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondents. The United States or U.S. EPA shall not be deemed a party to any contract entered into by Respondents or their directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement Agreement.

66. Except as expressly provided in Section XXI (Covenant Not to Sue by Respondents), Paragraphs 62 (Claims Against De Micromis Parties) and 63 (Claims Against MSW Generators and Transporters) and Section XIX (Covenants by U.S. EPA), nothing in this Settlement Agreement constitutes a satisfaction of or release from any claim or cause of action against Respondents or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

67. No action or decision by U.S. EPA pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXIII. EFFECT OF SETTLEMENT/CONTRIBUTION

68. Except as provided in Paragraph 62 (Claims Against De Micromis Parties), and Paragraph 63 (Claims Against MSW Generators and Transporters), nothing in this Settlement Agreement shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Settlement Agreement. Except as provided in Section XXI (Covenants by Respondents), each of the Parties expressly reserves any and all rights (including, but not limited to, pursuant to Section 113 of CERCLA, 42 U.S.C. § 9613), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto. Nothing in this Settlement Agreement diminishes the right of the United States, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2)-(3), to pursue any such persons to obtain additional response costs or response action and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2).

69.a. The Parties agree that this Settlement Agreement constitutes an administrative settlement pursuant to which each Respondent has, as of the Effective Date, resolved liability to the United States within the meaning of Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), and is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, or as may otherwise be provided by law, for the "matters addressed" in this Settlement Agreement. The "matters addressed" in this Settlement Agreement are the Work, Past Response Costs, and Future Response Costs.

b. The Parties further agree that this Settlement Agreement constitutes an administrative settlement pursuant to which each Respondent has, as of the Effective Date, resolved liability to the United States within the meaning of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B).

70. Each Respondent shall, with respect to any suit or claim brought by it for matters related to this Settlement Agreement, notify U.S. EPA in writing no later than 60 days prior to the initiation of such suit or claim. Each Respondent also shall, with respect to any suit or claim brought against it for matters related to this Settlement Agreement, notify U.S. EPA in writing within 10 days of service of the complaint or claim upon it. In addition, each Respondent shall notify U.S. EPA within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial, for matters related to this Settlement Agreement.

71. In any subsequent administrative or judicial proceeding initiated by U.S. EPA, or by the United States on behalf of U.S. EPA, for injunctive relief, recovery of response costs, or other relief relating to the Site, Respondents shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, *res judicata*, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenant by U.S. EPA set forth in Section XIX.

72. Effective upon signature of this Settlement Agreement by a Respondent, such Respondent agrees that the time period after the date of its signature shall not be included in computing the running of any statute of limitations potentially applicable to any action brought by the United States related to the "matters addressed" as defined in Paragraph 69.a. and that, in any action brought by the United States related to the "matters addressed," such Respondent will not assert, and may not maintain, any defense or claim based upon principles of statute of limitations, waiver, laches, estoppel, or other defense based on the passage of time after its signature of this Settlement Agreement. If U.S. EPA gives notice to Respondents that it will not make this Settlement Agreement effective, the statute of limitations shall begin to run again commencing 90 days after the date such notice is sent by U.S. EPA.

XXIV. INDEMNIFICATION

73. Respondents shall indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondents agree to pay the United States all costs incurred by the United States, including but not limited to attorney's fees and other expenses of litigation and

settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement Agreement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondents in carrying out activities pursuant to this Settlement Agreement. Neither Respondents nor any such contractor shall be considered an agent of the United States. The Federal Tort Claims Act (28 U.S.C. §§ 2671, 2680) provides coverage for injury or loss of property, or injury or death caused by the negligent or wrongful act or omission of an employee of U.S. EPA while acting within the scope of his or her employment, under circumstances where U.S. EPA, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred.

74. The United States shall give Respondents notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondents prior to settling such claim.

75. Respondents waive all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Respondents shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

XXV. MODIFICATIONS

76. The OSC may make modifications to any plan or schedule in writing or by oral direction. Any oral modification will be memorialized in writing by U.S. EPA promptly, but shall have as its effective date the date of the OSC's oral direction. Any other requirements of this Settlement Agreement may be modified in writing by mutual agreement of the parties.

77. If Respondents seek permission to deviate from any approved work plan or schedule, Respondents' Project Coordinator shall submit a written request to U.S. EPA for approval outlining the proposed modification and its basis. Respondents may not proceed with the requested deviation until receiving oral or written approval from the OSC pursuant to Paragraph 76.

78. No informal advice, guidance, suggestion, or comment by the OSC or other U.S. EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondents shall relieve Respondents of their obligation to obtain any formal approval required by this Settlement Agreement, or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

XXVI. NOTICE OF COMPLETION OF WORK

79. When U.S. EPA determines, after U.S. EPA's review of the Final Report, that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including, *e.g.*, post-removal site controls, payment of Future Response Costs, and record retention, U.S. EPA will provide written notice to Respondents. If U.S. EPA determines that such Work has not been completed in accordance with this Settlement Agreement, U.S. EPA will notify Respondents, provide a list of the deficiencies, and require that Respondents modify the Work Plan if appropriate in order to correct such deficiencies. Respondents shall implement the modified and approved Work Plan and shall submit a modified Final Report in accordance with the U.S. EPA notice. Failure by Respondents to implement the approved modified Work Plan shall be a violation of this Settlement Agreement.

XXVII. FINANCIAL ASSURANCE

80. Within 30 days of the Effective Date, Respondents shall establish and maintain financial security, initially in the amount of $6,000,000 in one or more of the following forms, in order to secure the full and final completion of Work by Respondents:

a. A surety bond unconditionally guaranteeing payment and/or performance of the Work;

b. One or more irrevocable letters of credit equaling the total estimated cost of the Work, payable to or at the direction of U.S. EPA, issued by one or more financial institution(s) acceptable in all respects to EPA;

c. A trust fund administered by a trustee acceptable in all respects to U.S. EPA;

d. A policy of insurance issued by an insurance carrier acceptable in all respects to U.S. EPA, which ensures the payment and/or performance of the Work;

e. A written guarantee to fund or perform the Work provided by one or more parent corporations of Respondents, or by one or more unrelated corporations that have a substantial business relationship with at least one of Respondents, including a demonstration that any such guarantor company satisfies the requirements of 40 C.F.R. § 264.143(f) with respect to the Estimated Cost of the Work (plus the amount(s) of any other federal or state environmental obligations financially assured through the use of a financial test or guarantee) that it proposes to guarantee hereunder; or

f. A demonstration of sufficient financial resources to pay for the Work made by one or more Respondents, which shall consist of a demonstration that any such Respondent satisfies the requirements of 40 C.F.R. § 264.143(f). {NOTE: For these purposes, references in 40 C.F.R. § 264.143(f) to the "sum of current closure and post-closure costs estimates and the current plugging and abandonment costs estimates" shall mean the amount of financial security specified above. If any Respondents who seek to provide a demonstration under 40 C.F.R. § 264.143(f) and have provided a similar demonstration at other RCRA or CERCLA sites, the amount for which they are providing financial assurance at those other sites should generally be added to the estimated costs of the Work for this Paragraph.}

81. Any and all financial assurance instruments provided pursuant to this Section shall be in form and substance satisfactory to U.S. EPA, determined in U.S. EPA's sole discretion. Within 30 days of the Effective Date, Respondents shall submit copies of all executed and/or otherwise finalized instruments or other documents required in order to make the selected performance guarantee(s) legally binding to U.S. EPA. In the event that U.S. EPA determines at any time that the financial assurances provided pursuant to this Section (including, without limitation, the mechanism(s) evidencing such assurances) are inadequate, Respondents shall, within 30 days of receipt of notice of U.S. EPA's determination, obtain and present to U.S. EPA for approval one of the other forms of financial assurance listed in Paragraph 80, above. In addition, if at any time U.S. EPA notifies Respondents that the anticipated cost of completing the Work has increased, then, within 30 days of such notification, Respondents shall obtain and present to U.S. EPA for approval a revised form of financial assurance (otherwise acceptable under this Section) that reflects such cost increase. Respondents' inability to demonstrate financial ability to complete the Work shall in no way excuse performance of any activities required under this Settlement Agreement.

82. If Respondents seek to demonstrate the ability to complete the Work through a guarantee or demonstration by a third party pursuant to Paragraph 80(e) or (f) of this Section, Respondents' guarantor shall (a) demonstrate to U.S. EPA's satisfaction that the guarantor satisfies the requirements of 40 C.F.R. § 264.143(f); and (b) resubmit sworn statements conveying the information required by 40 C.F.R. § 264.143(f) annually thereafter within 90 days of the end of the guarantor's fiscal year or such other date as agreed by U.S. EPA, to U.S. EPA. For the purposes of this Settlement Agreement, wherever 40 C.F.R. § 264.143(f) references "sum of current closure and post-closure costs estimates and the current plugging and abandonment costs estimates," the dollar amount to be used in the relevant financial test calculations shall be the current cost estimate of $6,000,000 for the Work at the Site plus any other RCRA, CERCLA, the Toxic Substances Control Act (TSCA), or other federal environmental obligations financially assured by the relevant Respondent or guarantor to EPA by means of passing a financial test.

83. If, after the Effective Date, Respondents can show that the estimated cost to complete the remaining Work has diminished below the amount set forth in Paragraph 80 of this Section, Respondents may, on any anniversary date of the Effective Date, or at any other time agreed to by the Parties, reduce the amount of the financial security provided under this Section to the estimated cost of the remaining Work to be performed. Respondents shall submit a proposal for such reduction to U.S. EPA, in accordance with the requirements of this Section, and may reduce the amount of the security upon approval by U.S. EPA. In the event of a dispute, Respondents may seek dispute resolution pursuant to Section XVI (Dispute Resolution) and may reduce the amount of the security in accordance with the written decision resolving the dispute.

84. Respondents may change the form of financial assurance provided under this Section at any time, upon notice to and approval by U.S. EPA, provided that the new form of assurance meets the requirements of this Section. In the event of a dispute, Respondents may seek dispute resolution pursuant to Section XVI (Dispute Resolution), and may change the form of the financial assurance only in accordance with the written decision resolving the dispute.

85. Respondents may not release, cancel, or discontinue any performance guarantee provided pursuant to this Section except as provided in this Paragraph. If Respondents receive written notice

from U.S. EPA in accordance with Paragraph 79 that the Work has been fully completed in accordance with the terms of this Settlement Agreement, Respondents may thereafter release, cancel, or discontinue the performance guarantee provided pursuant to this Section. In the event of a dispute, Respondents may seek dispute resolution pursuant to Section XVI (Dispute Resolution), and may release, cancel, or discontinue the performance guarantee required hereunder only in accordance with the written decision resolving the dispute.

XVIII. INSURANCE

86. At least 7 days prior to commencing any on-Site work under this Settlement Agreement, Respondents shall secure, and shall maintain for the duration of this Settlement Agreement, comprehensive general liability insurance and automobile insurance with limits of 2 million dollars, combined single limit. Within the same time period, Respondents shall provide U.S. EPA with certificates of such insurance and a copy of each insurance policy. In addition, for the duration of the Settlement Agreement, Respondents shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Respondents in furtherance of this Settlement Agreement. If Respondents demonstrate by evidence satisfactory to U.S. EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in an equal or lesser amount, then Respondents need provide only that portion of the insurance described above which is not maintained by such contractor or subcontractor.

XXIX. SEVERABILITY/INTEGRATION/ATTACHMENTS

87. If a court issues an order that invalidates any provision of this Settlement Agreement or finds that Respondents have sufficient cause not to comply with one or more provisions of this Settlement Agreement, Respondents shall remain bound to comply with all provisions of this Settlement Agreement not invalidated or determined to be subject to a sufficient cause defense by the court's order.

88. This Settlement Agreement and its attachments constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement Agreement. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following attachments are incorporated into this Settlement Agreement:

ATTACHMENT A: Map of Site Location

XXX. EFFECTIVE DATE

89. This Settlement Agreement shall be effective 5 days after the Settlement Agreement is signed by the Director, Superfund Division, U.S. EPA Region 5.

IN THE MATTER OF:

DIXON ROAD SITE
KOKOMO, INDIANA

The undersigned representative of Respondents each certify that he is fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the party he represents to this document.

Agreed this 17 day of Feb, 2015.

For Respondent the Vernon L. Graves Revocable Living Trust

By Vernon L. Graves

Title Trustee; Vernon L. Graves Revocable Living Trust

IN THE MATTER OF:

DIXON ROAD SITE
KOKOMO, INDIANA

The undersigned representative of Respondents each certify that he is fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the party he represents to this document.

Agreed this 26th day of February, 2015.

For Respondent the City of Kokomo, Indiana

By Beth A. Harrison

Title Corporation Counsel

IN THE MATTER OF:

DIXON ROAD SITE
KOKOMO, INDIANA

It is so ORDERED and Agreed this 2 day of APRIL, 2015.

BY: Richard C Karl

Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5

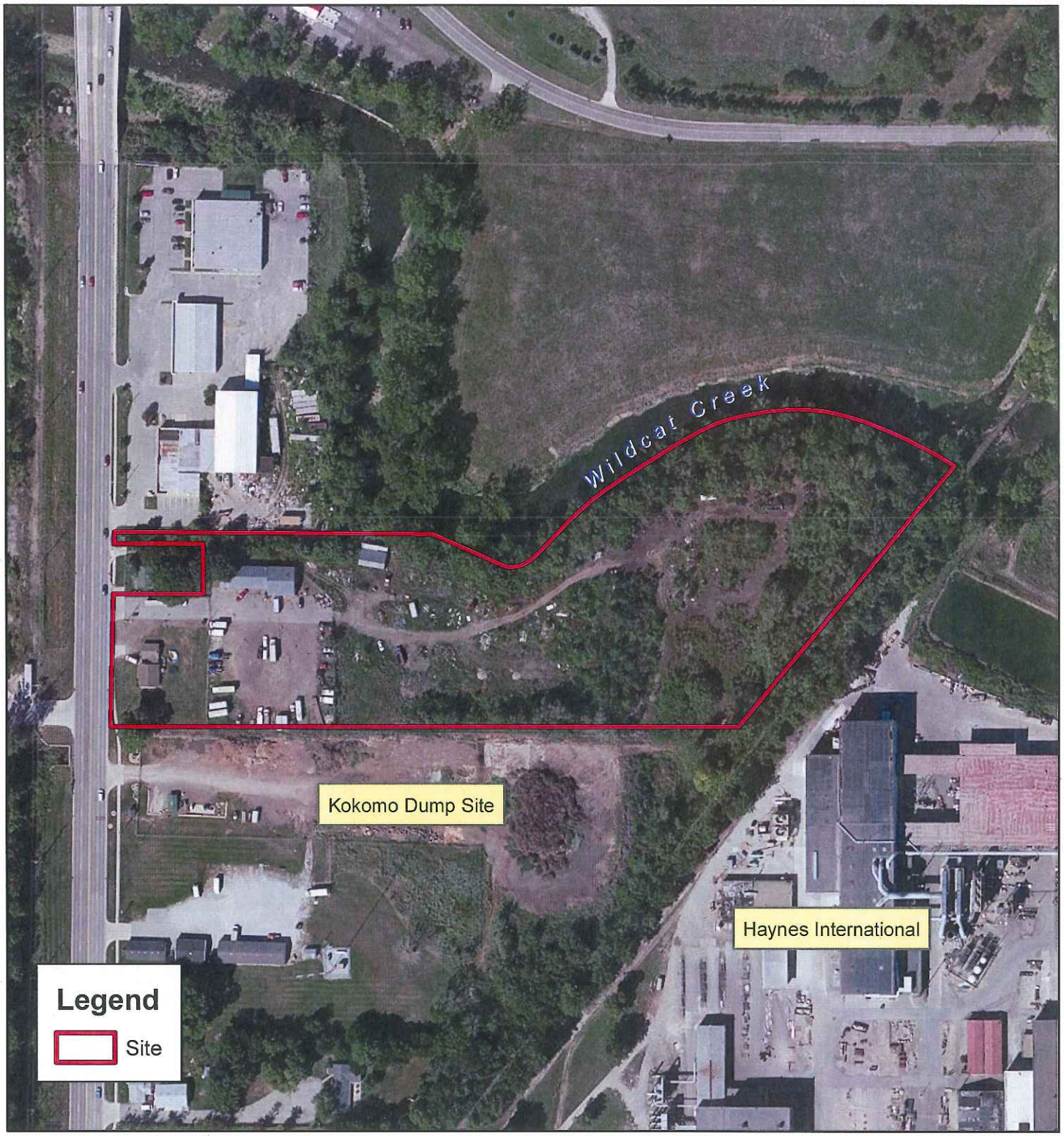


FIGURE 2
SITE LAYOUT MAP
DIXON ROAD SITE
1114 S. DIXON ROAD
KOKOMO, HOWARD COUNTY, INDIANA

Samples locations were determined
using EPA's Visual Sample Plan.

1:2,500
0 100 200
Feet

Bill Pickard

From: Lam, Shelly <lam.shelly@epa.gov>
Sent: Thursday, April 16, 2015 2:32 PM
To: Bill Pickard; Brad Adams; Brent Graves
Cc: Lam, Shelly
Subject: Dixon Road Site

During recent conversations, SESCO inquired whether EPA would require groundwater investigation at the Dixon Road Site. As I mentioned to you previously, the Superfund Removal Program takes actions for contaminated groundwater in two situations – 1) if there are receptors actually or potentially impacted by contaminated groundwater, and 2) if there are constituents that could pose a vapor intrusion threat.

The Action Memorandum outlines threats posed by the site as including actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants; and high levels of hazardous substances or pollutants or contaminants in soils, largely at or near the surface, that may migrate.

Release mechanisms from this site include overland flow to Wildcat Creek and leaching of surface and buried waste to deeper soils, groundwater, or Wildcat Creek. Possible exposure routes include direct contact with potentially impacted surface water or sediment in Wildcat Creek. Potential human receptors include recreational users of Wildcat Creek. Although not mentioned specifically in the action memo, there are potential ecological receptors in Wildcat Creek.

As part of the conceptual site model, EPA requests that SESCO evaluate the groundwater pathway to determine if surface water receptors are threatened by the release of contaminated groundwater.

I have discussed screening levels for groundwater with one of our toxicologists. In consultation with our ecological and hydrogeological support staff, he determined that, due to the proximity of the site to Wildcat Creek, groundwater and surface water screening criteria would be the same as there is expected to be little to no attenuation. He recommended the use of Region 5's Ecological Screening Levels (ESL) as they are most protective of potential receptors within Wildcat Creek. The ESLs can be found at http://epa.gov/region5/waste/cars/pdfs/ecological-screening-levels-200308.pdf.

Please let me know if you have any questions or would like to discuss further.

Shelly Lam, LPG
Federal On-Scene Coordinator
U.S. Environmental Protection Agency
2525 N. Shadeland Avenue, Suite 100
Indianapolis, IN 46219
Office: 317-308-3073
Cell: 317-417-0980

APPENDIX B

US Fish and Wildlife Service National Wetlands Inventory Map

U.S. Fish and Wildlife Service

National Wetlands Inventory

Dixon Road Site

Mar 23, 2015

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Riparian

- Herbaceous
- Forested/Shrub

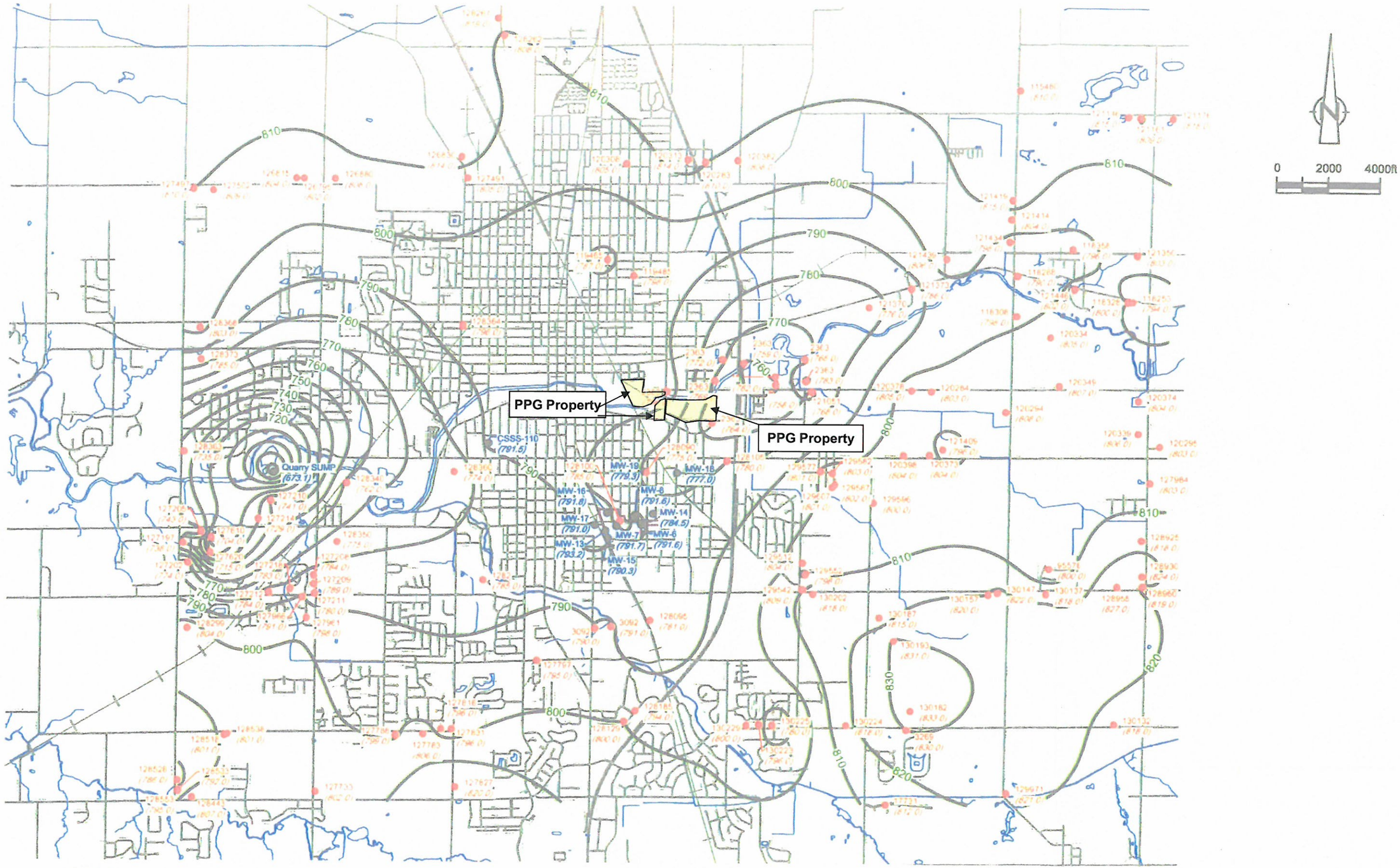
Riparian Status

- Digital Data

User Remarks:

APPENDIX C

Bedrock Groundwater Elevation Map



LEGEND

- MONITORING WELL WITH GROUNDWATER ELEVATION FROM PANTERRA (1999)
- MW-14 (784.5) MONITORING WELL WITH GROUNDWATER ELEVATION DURING APRIL 2006 HYDRAULIC STUDY
- 800 REGIONAL BEDROCK GROUNDWATER CONTOUR (FT. AMSL)
- SITE BOUNDARY

figure 8.1

REGIONAL BEDROCK GROUNDWATER ELEVATIONS
BEDROCK CHARACTERIZATION REPORT
DELPHI DELCO FORMER ELECTRONICS & SAFETY DIVISION
PLANT 1 PROPERTY
Kokomo, Indiana

13477-31(029)GN-DE074 MAR 28/2007

APPENDIX D

Health & Safety Plan

SITE HEALTH AND SAFETY PLAN

DIXON ROAD SITE
$1110^{1/2}$ – 1112 and 1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number: C5M5
Administrative Settlement Agreement and Order on Consent for
Removal Action Docket Number V-W-15•C-021

Prepared For:
Environmental Protection Agency (U.S. EPA), Region 5
Ralph Metcalfe Federal Building
77 West Jackson Blvd
Chicago, IL 60604-3590

Prepared By:
SESCO Group
1426 West 29th Street
Indianapolis, IN 46208
Telephone (317) 347-9590
Facsimile (317) 347-9591

June 16, 2015

SITE HEALTH AND SAFETY PLAN

Dixon Road Site – Kokomo, IN

I hereby certify that the enclosed Site Health and Safety Plan, shown and marked in this submittal, has been prepared in accordance with OSHA 29 CFR 1910 and is proposed to be incorporated with Administrative Settlement Agreement and Order on Consent for Removal Action Docket No. V-W-15•C-021. This Site Health and Safety Plan is submitted for Government review and acceptance.

Plan Preparer:

Heidi Meyer 6-16-15 317-696-3734

Heidi Meyer — Date — Phone Number
Response Manager
SESCO

Plan Approval:

Bill Pickard 6/16/2015 317-554-9247

Bill Pickard — Date — Phone Number
Senior Project Manager
SESCO

Accepted as a submittal:

Shelly Lam — Date — Phone Number
On Scene Coordinator
USEPA Region 5

Table of Contents

List of Attachments

GLOSSARY OF ACRONYMS

AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
COC	contaminant of concern
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPR	Cardiopulmonary Resuscitation
CRZ	Contamination Reduction Zone
CSP	Certified Safety Professional
dBA	decibel A-weighted
DEET	N, N-diethyl-m-toluamide
EMR	experience modification rate
EMT	emergency medical technician
ERRS	Emergency and Rapid Response Services
USEPA	United States Environmental Protection Agency
EZ	Exclusion Zone
HASP	Site Health and Safety Plan
HAZWOPER	Hazardous Waste Operation and Emergency Response
HIPO	high loss potential
HMIS	Hazardous Materials Identification System
HTRW	hazardous, toxic and radioactive waste
IDLH	immediately dangerous to life and health
kV	Kilovolt
MCL	Maximum Contaminant Level
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic meter
NFPA	National Fire Prevention Association
NIOSH	National Institute of Occupational, Safety and Health
NPL	National Priority List
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PM	Project Manager
POL	petroleum, oils, and lubricants
PPE	personal protective equipment
ppm	parts per million
RIR	recordable incident rate
SCBA	self-contained breathing apparatus
SDS	Safety Data Sheet
SOP	Standard Operating Procedure
SOW	Scope of Work
SHSO	Site Health and Safety Officer
WNV	West Nile Virus

1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed for the Dixon Road Site, to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements will be revised when new information is received or conditions change. A written amendment will document all changes made to the plan. Any amendments to this plan will be included in Attachment A. Where appropriate, specific OSHA standards or other guidance will be cited and applied.

All work practices and procedures implemented on site must be designated to minimize worker contact with hazardous materials and to reduce the possibility of physical injury. All work will be performed in accordance with applicable Federal 29 CFR 1910 and 1926 health and safety regulations, including the Federal 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response regulation.

1.1 Daily Safety Meetings

Daily safety meetings will be held at the start of each shift to ensure that all personnel understand site conditions and operating procedures, to ensure that personal protective equipment is being used correctly and to address worker health and safety concerns.

1.2 Site Specific Training and Acknowledgement

The Response Manager shall be responsible for informing all individuals assigned to this project of the contents of this plan and ensuring that each person signs the Site Specific Training Record in Attachment E. By signing the Site Specific Training Record, individuals acknowledge receipt of this training and that they recognize the potential hazards present on-site and the policies and procedures required minimizing exposure or adverse effects of these hazards.

1.3 Key Personnel

Project/Task Order: Site	
Key Personnel	
Names and Titles	**Contact Information**
Shelly Lam – USEPA Region 5, OSC	Office – 317-308-3073; cell – 317-417-0980
Heidi Meyer - Response Manager	Office – 317-347-9590 ext 22; cell 317-696-3734
Nick Michailides - SHSO	Office – 708-333-9915; cell – 219-286-5359
Brad Adams - Project Coordinator/Manager	Office – 317-347-9590 ext 31; cell – 317-847-9973
Subcontractors	
Company	**Scope of Services**
Environmental Restoration LLC (ER)	Health and Safety; removal/restoration actions
Midway Services	Drilling
American Industrial Services (AIS)	Waste Disposal

Accutek Radar Imaging	Utility Locating
Miller Surveying	Professional Surveyors
Prism GeoImaging	Geophysical Survey

2.0 ROLES AND RESPONSIBILITIES

2.1 Response Manager (RM): Heidi Meyer

The Response Manager, as the field representative for SESCO and its subcontractors, has the responsibility for implementing the Site Health and Safety Plan (HASP). The RM shall manage the project and ensure all health and safety requirements are met. The RM will work in conjunction with the Site Health and Safety Officer for this project.

2.2 Site Health and Safety Officer (SHSO): Nick Michailides

The Site Health and Safety Officer (ER representative) is assigned to the site on a full-time basis with functional responsibility for implementing the HASP.

Specific Duties Include:

a. Assist RM in providing a safe and healthful work environment.
b. Supervise confined space entries (when applicable)
c. Assist RM in reporting and investigating all incidents.
d. Ensure proper decontamination of personnel and equipment is accomplished.
e. Ensure that air monitoring equipment is calibrated and operational.
f. Conduct personal air monitoring as required.
g. Perform respirator fit tests, as necessary.
h. Inventory and inspect personal protective equipment (PPE) prior to personnel entries into exclusion zone.
i. Prepare summary letter of personal air sampling results.
j. Ensure proper personal protective equipment is being utilized.
k. Assist RM in obtaining required personnel training and medical records.
l. Inspect first aid kits and fire extinguishers.
m. Satisfy OSHA's 1926 Subpart P Competent Person role during site trenching / excavation.

2.3 Other:

Any persons who observe a health and safety hazard should immediately report observations/concerns to appropriate key personnel listed in Section 2.1 or 2.2 above.

2.4 U.S. EPA On-Scene Coordinator (OSC): Shelly Lam

The OSC has overall project authority and directs the project manager regarding the tasks required to meet project objectives. The OSC has the authority to stop work and initiate corrective actions should there be a reason to do so.

3.0 SITE BACKGROUND AND SCOPE OF WORK

3.1 Site Background

The Site historically operated as a landfill, auto parts sales, towing service, and a metal recycling facility. Reportedly, ash from the adjacent Kokomo Dump Site was disposed at the Site. The contaminants of concern (COCs) associated with the Site are volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs) and dioxins. Leaking drums were discovered by the Indiana Department of Environmental Management (IDEM) in April 2011 exposed in a creek bank at the adjacent Kokomo Dump Site. IDEM documented that drums and waste piles extended onto the Dixon Road Site. The EPA, IDEM, and the Superfund Technical Assessment and Response Team (START) contractor conducted a Site Assessment on December 3, 2012. During the assessment, EPA documented numerous drums and waste piles and waste extending down the bank of Wildcat Creek. Site Assessment activities included sampling surface soil, subsurface soil, waste piles, and buried waste. Results of the USEPA investigation indicated exceedances of IDEM Direct Contact Industrial Screening Levels (DCISLs) for PCB Aroclors 1248 and 1254, lead, mercury, and hexavalent chromium in surface soil samples. Subsurface samples indicated levels of PCB Aroclors 1248 and 1254, arsenic, lead, and mercury above DCISLs. Additionally, lead and cadmium were encountered above the Toxicity Characteristic Leaching Procedure (TCLP) limit in a surface sample, and cadmium was encountered above the TCLP limit in one subsurface sample.

3.2 Scope of Work (SOW)

SESCO has been tasked by the EPA to perform the following:

- Develop and implement Site plans including a Site-specific Health and Safety Plan (HASP), a Quality Assurance Project Plan (QAPP), a Site Emergency Contingency Plan, and a Work Plan;
- Establish Site security;
- Conduct a comprehensive site assessment and engineering evaluation to determine the extent of buried drums and contamination in soil; and evaluate potential control and/or removal option to control, contain, and/or remove drums, waste, and contaminated soil;
- Implement selected control and/or removal action as approved by EPA;
- Perform sampling and analysis to determine disposal options; and,
- Consolidate and package hazardous substances, pollutants, and contaminants for transportation and off-Site disposal in accordance with the U.S. EPA Off-Site Rule, 40 Code of Federal Regulations (CFR) §300.440.

It should be noted that the work described in this Work Plan will be completed in a phased approach. Due to the nature of the Site, the extent of contamination will be determined in a series of steps and not during one (1) mobilization to the Site. It is expected that Site work will be completed in a span of five (5) to six (6) months following Work Plan approval, dependent upon turn-around times for the U.S. EPA to review required documents. The tasks listed below will be completed during this phase of the project:

- Develop and implement Site plans including a Site-specific HASP, a QAPP, a Site Emergency Contingency Plan, and a Work Plan;
- Site boundary survey;
- Geophysical survey;
- Surface and subsurface soil sampling (soil borings);
- Test pits based on results of geophysical survey; and
- Development of a Summary Report detailing the work performed and recommendations for additional work.

Below is a list of action items that will be completed to fulfill the above tasks. These action items represent the greatest potential for health and safety related risks and thus are the focus of this HASP:

- Prepare a secure staging area for drums and excavated potentially contaminated soils/materials
- Remove and overpack drums and stage on pallets with appropriate access paths
- Properly characterize the contents of the drums
- Bulk/segregate similar waste streams
- Excavate contaminated soils and treat on site or load out contaminated soils for disposal.
- Backfill excavations
- Transport and dispose of all hazardous materials at an EPA approved disposal facility, in accordance with U.S. EPA's Off-Site Rule
- Follow Applicable or Relevant and Appropriate Requirements (ARARs) issued for this site by IDEM.

4.0 HAZARD ASSESSMENT

This section is to be addressed in the daily tool box safety meeting as each task is to be initiated. Each Activity Hazard Analysis (AHA) is designed to develop awareness of chemical and physical hazards specific to each task. It would be impractical to repeat in complete detail each control measure and Standard Operating Procedure (SOP) for each job task. Sources, hazards and control measures will be addressed for each job task.

Specific work tasks with unique hazards and/or PPE requirements must be evaluated or reevaluated prior to beginning work. This task review will be led by the Project Health and Safety Manager and the SHSO, and will include knowledgeable individuals such as the worker(s) and the supervisor. PPE requirements, based on this assessment, will be included in Section 6 of the HASP or in the AHA for the specific task. All workers must be trained in the requirements of the HASP and the applicable AHAs prior to beginning work. The required PPE may be changed by the SHSO, based on the results of additional air monitoring, or on task-specific needs. Downgrades will require the approval of the Project Health and Safety Manager unless otherwise permissible by the HASP.

The following section outlines the AHAs, Referenced SOPs and Chemical Hazards associated with this project. Applicable SOPs are available from SESCO or ER's Health and Safety Database. The AHAs should be revised for site-specific activities and reviewed with the work crew before commencing any activity.

The following table lists SESCO and ER health and safety SOPs that are applicable to this project. All site personnel will receive Site Specific Training per this HASP which includes the following SOPs PRIOR to commencement of intrusive work.

Referenced SOPs:	
SESCO SOPs applicable to this project:	
HASP-01 Public Utility Locating HASP-02 Private Utility Locating HASP-03 Tailgate Safety Meeting	
ER SOPs applicable to this project or task order:	
HS-01 Air Monitoring and Sampling HS-02 Blood Borne Pathogens Exposure Control Plan HS-04 Flammable Liquids Transfer (Bonding and Grounding) HS-05 Cold Stress HS-08 Decontamination Measures HS-10 Motor Vehicle Operations HS-11 Drum Handling HS-12 Electrical Safety - General HS-15 Hazard Communication HS-16 Hearing Conservation HS-17 Heat Stress Safety HS-13 Excavation and Trenching HS-18 Heavy Equipment Operation HS-24 Personal Protective Equipment HS-26 Respiratory Protection Program HS-28 Pressure Washing HS-32 Mercury Safety HS-35 Hazard Categorization and Inventory HS-36 Proper Lifting Techniques HS-38 Fire Prevention Protection	HS-39 Benzene Safety HS-47 Cadmium Safety HS-46 Hexavalent Chromium Safety HS-48 Lead Safety HS-49 Tool Safety and Inspection HS-50 First Aid HS-51 Incident Reporting and Investigation HS-52 General Waste Management HS-53 Spill Prevention Response HS-55 Short Service Employee HS-56 Stop Work Authority HS-57 Hazard Identification / Risk Assessment HS-58 Fatigue Management
UXO known or suspected to present? Yes ❑ No X	UXO support and plans provided Yes ❑ No X
Lifts Yes X No ❑	
Items to be lifted: Drums (via all terrain forklift or applicable heavy equipment)	Critical ❑ Ordinary ❑
Excavations Yes X No ❑	

4.1 Chemical Hazards

Site Contaminants/Chemicals of Concern					
Chemical	**Media**	**PEL**	**ACTION LEVEL**	**Route of Entry**	**Symptoms Acute/Chronic**
PCB (54% Chlorine)	Liquid or solid (soil)	0.5 mg/m3 {skin}	0.25 mg/m3	Inhalation Ingestion Contact Absorption	Irritation eyes, liver damage, reproductive effects, chloracne
VOC (Benzene)	Vapor or liquid (soil)	1 ppm PEL 5 ppm STEL	0.5 ppm	Inhalation Ingestion Absorption	Irritation eyes, skin, resp system; dizziness; HA; staggered gait. CHRONIC (leukemia)
Lead	Solid/Dust	0.05 mg/m^3	0.030 mg/m^3	Inhalation Ingestion Contact	Lassitude, insomnia; facial pallor; anorexia, low-wgt, malnutrition; constipation , abdominal pain, colic; anemia; tremor; kidney disease
Mercury	Liquid/Vapor	C 0.1 mg/m^3{skin}	0.05 mg/m^3	Inhalation Absorption Ingestion Contact	Irrit eyes, skin; cough, chest pain, dysp, bron, pneu; tremor, insom, indecision, head, lass, GI dist
Barium Compounds (except Barium Sulfate)	Solid / Dust	0.5 mg/m^3	0.25 mg/m^3	Inhalation Ingestion	Irrit eyes, skin, upper resp; gastroenteritis; musc spasm; hypolykemia
Barium Sulfate (found in paint pigments)	Solid / Dust	15 mg/m^{3}TOTAL 5 mg/m^{3}RESP	7.5 mg/m^{3}TOTAL 2.5 mg/m^{3}RESP	Inhalation Ingestion Contact	Irrit eyes, nose, upper resp; baritosis
Cadmium dust	Solid	.005 mg/m^3	.0025 mg/m^{3}Resp	Inhalation Ingestion	Pulm edema, dysp, cough, chest tight, head; chills, musc aches; nau, vomit, diarr
Chromium(III)	Liquid or solid (drum)	0.5 mg/m^3	0.25 mg/m^3	Inhalation Ingestion Contact	Irrit eyes, sens derm
Chromium VI	Solid / Dust	.005 mg/m^3	.0025 mg/m^3	Inhalation Ingestion	URT irr, cancer (ling)
Silver	Solid / Dust	0.01 mg/m^3	0.005 mg/m^3	Inhalation Ingestion Contact	Blue-grey eyes, nasal septum, throat, skin; irrit, ulceration skin
Selenium	Solid / Dust	0.2 mg/m^3	0.1 mg/m^3	Inhalation Ingestion Contact	Irrit eyes, skin, nose, throat; chills, fever; metallic tase / garlic breath; GI dist; derm; eye, skin burns.
Arsenic (inorganic)	Solid/Dust	0.010 mg/m^3	.005 mg/m^3	Inhalation Absorption Ingestion Contact	Ulceration of nasal septum, Derm, GI disturbances, resp irrit, carc

The above listing should not be taken as a complete assessment of the hazards posed by materials at the Kokomo Dump Site. The known and unknown mixed chemical hazards at this site prevent a clear determination of the specific effects of discrete compounds. Therefore, personnel must be alert for symptoms of possible exposure such as unusual smells, stinging, burning eyes, nose and throat, skin irritation, as well as feeling extremely well, depressed, sleepy or tired. Symptoms must be immediately reported to the site supervisor. For additional information on potential COCs see the NIOSH Pocket Guide to Chemical Hazards September 2005 edition or www.cdc.gov/niosh. ER will perform personal exposure monitoring to evaluate potential exposure to metals listed above. ER will also utilize real time gas detection to quantify potential exposure(s) to VOCs and real time dust monitoring to quantify potential exposure(s) to particulates as listed in table above. Action levels are set at ½ the OSHA PEL unless specified otherwise by OSHA.

4.2 Task Specific Hazards and Controls

This section is to be addressed in the daily tool box safety meeting as each task is to be attempted. Each AHA is designed to develop awareness to chemical and physical hazards specific to each task. It would be impractical to repeat in complete detail each control measure and SOP for each job task. Sources, Hazards and Control Measures will be addressed for each job task.

Activity Hazard Analysis		
JOB TASK:	**MOBILIZATION and SITE SETUP**	
PERSONAL PROTECTIVE EQUIPMENT:	**LEVEL D / MOD D**	
Hazard	**Sources**	**Control Measures**
Corrosive/toxic liquids/sludge/solids	Open drums, containers, dirt	- Do not move or handle open containers - Do not move or excavate any soil or brush piles
Traffic related injury	Driving motor vehicles	- Follow HS-10 Motor Vehicle Operation - Adjust controls/mirrors prior to operation - Utilized defensive driving techniques.
Struck by/caught between	Vehicle & Equipment Operation	- Follow HS-18 Heavy Equipment Operation - HS-10 Motor Vehicle Operation - - Ensure outriggers are properly positioned for wheeled excavator/equipment - Only qualified drivers permitted to operate vehicles - Wear ANSI Type 2 high-visibility safety vest - Wear seat belts while in operation - Back up alarms functional and loud enough to hear over surroundings - Ground personnel are not allowed within swing radius of equipment while in operation - Personnel must establish eye contact with operator and operator must disengage and remove hands from controls prior to entering the swing radius
Ergonomics	Lifting and bending	- Follow HS-36 Proper lifting techniques - Use Buddy system - No individual lifting over 40 lbs. - Use mechanical means when feasible
Heat/Cold Stress	Seasonal Temperatures/ Work in protective garments	- Cool/Warm break areas - Follow ER SOP HS-17 - Follow ER SOP HS-5 - Plenty of Fluids & breaks
Noise	Heavy equipment/Hand tools	- Hearing protection required at all times when working with tools generating sound above 85db - Hearing protection required when operation open-cab equipment - If you have to shout to be heard, use hearing protection
Fire	Electrical devices/service	- Fire extinguishers with at least a 3A:40B:C rating shall be placed in when working
Electrocution	Power tools/equipment	- Inspect all power cords prior to use - Use GFCI on all connections - De-energize all circuits in building except for overhead lights and limited 110v receptacles. - Protect/elevate temporary power cords
Cuts/Punctures	Sharp Objects – Sheet Metal/ Nails/screws	- Beware of sharp objects - Wear cut resistant gloves - Use safety utility knife - Always cut away from body
Slip/Trip/Fall	Poor condition of building Insufficient lighting Uneven terrain/debris	- Keep area organized - Identify/mark hazards - Remove debris from walking/ working surfaces

Activity Hazard Analysis		
JOB TASK: EXCAVATION AND SAMPLING / MIXING (IF NEEDED) OF CONTAMINATED SOILS / BRUSH		
PERSONAL PROTECTIVE EQUIPMENT: LEVEL D / MOD D/UPGRADE TO LEVEL C OR B BASED ON AIR MONITORING RESULTS		
Hazard	**Sources**	**Control Measures**
Toxic Chemicals	Soil / Dusts	Maintain dust suppression with water spray/mist as needed. Control work area to authorized personnel only Utilize PPE per Section 6 of this HASP Minimize contact with contaminated soils
Cuts/Punctures	Sharp Objects	Beware of sharp objects Wear leather gloves
Ergonomics	Lifting and Bending	Proper lifting techniques Buddy system
Heat/Cold Stress	Seasonal Temperatures/ Work in protective garments	- Cool/Warm break areas - Follow ER SOP HS-17 - Follow ER SOP HS-5 Plenty of Fluids & breaks
Noise	Equipment/vehicles Hand tools	Hearing protection for levels > 85 dBs;
Slips/Trips/Falls	Uneven Terrain Debris	Identify/mark hazards Remove debris from walking / working surfaces Maintain soil stockpiles a safe distance from edge of excavation
Electrocution/explosion/fire	Overhead/underground utilities	Locate and mark existing energized lines – Local locate company Disconnect/de-energize electrical lines if possible Use spotter at all time during operations near overhead lines Boot lines or use hot stick to move line out of reach of equipment
Struck by/caught between	Vehicle & Equipment Operation	- Follow HS-18 Heavy Equipment Operation - HS-10 Motor Vehicle Operation - - Ensure outriggers are properly positioned for wheeled excavator/equipment - Only qualified drivers permitted to operate vehicles - Wear ANSI Type 2 high-visibility safety vest - Wear seat belts while in operation - Back up alarms functional and loud enough to hear over surroundings - Ground personnel are not allowed within swing radius of equipment while in operation Personnel must establish eye contact with operator and operator must disengage and remove hands from controls prior to entering the swing radius

Activity Hazard Analysis		
JOB TASK: LOADING OF CONTAMINATED SOILS		
PERSONAL PROTECTIVE EQUIPMENT: LEVEL C		
Hazard	**Sources**	**Control Measures**
Toxic Chemicals	Soil	Maintain dust suppression with water spray/mist as needed. Control work area to authorized personnel only Utilize PPE per Section 6 of this HASP Minimize contact with contaminated soils
Cuts/Punctures	Sharp Objects	Beware of sharp objects Wear leather gloves
Ergonomics	Lifting and Bending	Proper lifting techniques Buddy system
Heat/Cold Stress	Seasonal Temperatures/ Work in protective garments	- Cool/Warm break areas - Follow ER SOP HS-17 - Follow ER SOP HS-5 Plenty of Fluids & breaks
Noise	Equipment/vehicles Hand tools	Hearing protection for levels > 85 dBs;
Slips/Trips/Falls	Uneven Terrain Debris	Identify/mark hazards Remove debris from walking / working surfaces
Struck by/caught between	Vehicle & Equipment Operation	- Follow HS-18 Heavy Equipment Operation - HS-10 Motor Vehicle Operation - - Ensure outriggers are properly positioned for wheeled excavator/equipment - Only qualified drivers permitted to operate vehicles - Wear ANSI Type 2 high-visibility safety vest - Wear seat belts while in operation - Back up alarms functional and loud enough to hear over surroundings - Ground personnel are not allowed within swing radius of equipment while in operation Personnel must establish eye contact with operator and operator must disengage and remove hands from controls prior to entering the swing radius

Activity Hazard Analysis		
JOB TASK: BACKFILLING OF EXCAVATIONS		
PERSONAL PROTECTIVE EQUIPMENT: LEVEL D		
Hazard	**Sources**	**Control Measures**
Cuts/Punctures	Sharp Objects	Beware of sharp objects Wear leather gloves
Ergonomics	Lifting and Bending	Proper lifting techniques Buddy system
Heat/Cold Stress	Seasonal Temperatures/ Work in protective garments	- Cool/Warm break areas - Follow ER SOP HS-17 - Follow ER SOP HS-5 Plenty of Fluids & breaks
Noise	Equipment/vehicles Hand tools	Hearing protection for levels > 85 dBs;
Slips/Trips/Falls	Uneven Terrain Debris	Identify/mark hazards Remove debris from walking / working surfaces
Struck by/caught between	Vehicle & Equipment Operation	- Follow HS-18 Heavy Equipment Operation - HS-10 Motor Vehicle Operation - - Ensure outriggers are properly positioned for wheeled excavator/equipment - Only qualified drivers permitted to operate vehicles - Wear ANSI Type 2 high-visibility safety vest - Wear seat belts while in operation - Back up alarms functional and loud enough to hear over surroundings - Ground personnel are not allowed within swing radius of equipment while in operation Personnel must establish eye contact with operator and operator must disengage and remove hands from controls prior to entering the swing radius

Activity Hazard Analysis		
JOB TASK: SURFACE AND SUBSURFACE SAMPLING OF CONTAMINATED SOILS		
PERSONAL PROTECTIVE EQUIPMENT: LEVEL D / MOD D/UPGRADE TO LEVEL C OR B BASED ON AIR MONITORING RESULTS		
Hazard	**Sources**	**Control Measures**
Toxic Chemicals	Soil	Control work area to authorized personnel only Utilize PPE per Section 6 of this HASP Minimize contact with contaminated soils
Cuts/Punctures	Sharp Objects	Beware of sharp objects Wear leather gloves
Ergonomics	Lifting and Bending	Proper lifting techniques Buddy system
Heat/Cold Stress	Seasonal Temperatures/ Work in protective garments	- Cool/Warm break areas - Follow ER SOP HS-17 - Follow ER SOP HS-5 Plenty of Fluids & breaks
Noise	Equipment/vehicles Hand tools	Hearing protection for levels > 85 dBs;
Slips/Trips/Falls	Uneven Terrain Debris	Identify/mark hazards Remove debris from walking / working surfaces Maintain soil stockpiles a safe distance from edge of excavation
Electrocution/explosion/fire	Overhead/underground utilities	Locate and mark existing energized lines – Local locate company Disconnect/de-energize electrical lines if possible Use spotter at all time during operations near overhead lines Boot lines or use hot stick to move line out of reach of equipment
Struck by/caught between	Vehicle & Equipment Operation	- Follow HS-18 Heavy Equipment Operation - HS-10 Motor Vehicle Operation - - Ensure outriggers are properly positioned for wheeled excavator/equipment - Only qualified drivers permitted to operate vehicles - Wear ANSI Type 2 high-visibility safety vest - Wear seat belts while in operation - Back up alarms functional and loud enough to hear over surroundings - Ground personnel are not allowed within swing radius of equipment while in operation Personnel must establish eye contact with operator and operator must disengage and remove hands from controls prior to entering the swing radius

Activity Hazard Analysis			
JOB TASK: CONDUCT WORK ZONE / PEM AIR MONITORING			
PERSONAL PROTECTIVE EQUIPMENT: Consistent with Task			
HAZARD	**SOURCES**	**CONTROL MEASURES**	
Corrosive/toxic liquids/sludge	Dust, loose solids, liquids	Poly –coated Tyvek or equiv., nitrile gloves, supplied air respirator, use wetting dust suppression agents as necessary. Level B not anticipated.	
Noise	Equipment	Hearing protection at levels > 85 dBs.	
Struck by / Pinch Points	Bobcat, Forklift, Vehicles	Stay away from operating equipment, avoid walking between equipment and stationary objects, use hand signals	
Slips / Trips / Falls	Uneven terrain / Debris	Keep work area organized	
Heat/Cold Stress	Seasonal Temperatures/ Work in protective garments	- Cool/Warm break areas - Follow ER SOP HS-17 - Follow ER SOP HS-5 Plenty of Fluids & breaks	

Activity Hazard Analysis		
Job TASK:	**CHEMICAL CONTAINER SAMPLING / HANDLING / BULKING**	
PERSONAL PROTECTIVE EQUIPMENT:	**LEVEL B (Sampling Unknown)/LEVEL C(Handling/Bulking Known)**	
Hazard	**Sources**	**Control Measures**
Chemical Exposure	Chemicals in drums, totes, buckets, and small containers Chemicals in vats, tanks	- Follow HS-35 Hazard Categorization and Inventory SOP - Avoid contact - Prior to retrieval secure containers to prevent leakage or splash hazard - Use appropriate sampling techniques with drum thieves - Use proper field categorization techniques - Use proper bulking techniques based on sound field categorization results - Bulk only like materials based on field categorization - Splash prevention measures/ face shields- visqueen shield around drums - If possible have thermometer near for temperature changes - After drum is full leave container open for a period of time - Implement proper handling in accordance with HS-11 Drum Handling - Control work area to authorized personnel only - Utilize proper PPE per section 6.0 of this HASP - Perform air monitoring per section 8.0 of this HASP - Implement proper decontamination procedures per section 10.0 - Construct proper containment around storage area
Fire	Site chemical (Oxidizers, flammable liquids/solids) Electrical devices/service	- Minimize handling of containers - Properly segregate chemicals to prevent reaction - Store out of direct sunlight - Perform air monitoring per section 6.0 of this HASP - Fire extinguishers with at least a 3A:40B:C rating in when working
Ergonomics	Lifting and bending	- Buddy system/Proper lifting techniques - No individual lifting over 40 lbs.
Struck by/caught between	Vehicle & Equipment Operation	- Follow HS-18 Heavy Equipment Operation - HS-10 Motor Vehicle Operation - Ensure outriggers are properly positioned for wheeled excavator/equipment - Only qualified drivers permitted to operate vehicles - Wear ANSI Type 2 high-visibility safety vest - Wear seat belts while in operation - Back up alarms functional and loud enough to hear over surroundings - Ground personnel are not allowed within swing radius of equipment while in operation - Personnel must establish eye contact with operator and operator must disengage and remove hands from controls prior to entering the swing radius
Heat/Cold Stress	Seasonal Temperatures/ Work in protective garments	- Cool/Warm break areas - Follow ER SOP HS-17 - Follow ER SOP HS-5 - Plenty of Fluids & breaks - Follow H&S Procedures (ACGIH Guidelines)
Noise	Heavy Equipment, Diaphragm Pumps, Air compressor, Hand Tools	- Hearing protection required at all times when working near pumps, air compressors, hand tools and heavy equipment above 85db
Electrocution	Power tools/equipment	- Inspect all power cords prior to use - Use GFCI on all connections
Cuts/Punctures	Sharp Objects – Sheet Metal/ Nails/screws	- Beware of sharp objects - Wear cut resistant gloves - Use safety utility knife - Always cut away from body
Slip/Trip/Fall	Structure/roof trusses Uneven terrain/debris	- Keep area organized - Identify/mark hazards - Remove debris from walking/ working surfaces

Activity Hazard Analysis

JOB TASK:	**DECONTAMINATION OPERATIONS**	
PERSONAL PROTECTIVE EQUIPMENT:	**LEVEL C / MOD D BASED ON AIR MONITORING RESULTS**	
Hazard	**Sources**	**Control Measures**
Chemical Exposure	Chemicals in drums, totes, buckets, or small containers	- Avoid contact - Prior to retrieval secure containers to prevent leakage or splash hazard - Use appropriate sampling techniques with drum thieves - Use proper field categorization techniques - Use proper bulking techniques based on sound field categorization results - Bulk only like materials based on field categorization - Splash prevention measures/ face shields- visqueen shield around drums - If possible have thermometer near for temperature changes - After drum is full leave container open for a period of time - Implement proper handling in accordance with HS-11 Drum Handling - Control work area to authorized personnel only - Utilize proper PPE per section 6.0 of this HASP - Perform air monitoring per section 8.0 of this HASP - Implement proper decontamination procedures per section 10.0 - Construct proper containment around storage area
Burns/lacerations	Hot water pressure washer	- Operate pressure washer per manufactures instructions - Pressure washer must be equipped with safety shut-off - Inspect hose prior to each use - Do not point wand at other individuals - Wand must be at least 48" in length - Wear splash shield and safety glasses when not wearing respirator - Never use for personnel decontamination
Confined Space	Excavations / trenches	- Avoid entry if possible - Follow HS-06 Confined Space Entry
Fire	Site chemical (Oxidizers, flammable liquids/solids) Electrical devices/service	- Minimize handling of containers - Properly segregate chemicals to prevent reaction - Store out of direct sunlight - Perform air monitoring per section 6.0 of this HASP - Fire extinguishers with at least a 3A:40B:C rating in when working
Ergonomics	Lifting and bending	- Buddy system/Proper lifting techniques - No individual lifting over 40 lbs.
Struck by/caught between	Vehicle & Equipment Operation	- Follow HS-18 Heavy Equipment Operation - HS-10 Motor Vehicle Operation - Ensure outriggers are properly positioned for wheeled excavator/equipment - Only qualified drivers permitted to operate vehicles - Wear ANSI Type 2 high-visibility safety vest - Wear seat belts while in operation - Back up alarms functional and loud enough to hear over surroundings - Ground personnel are not allowed within swing radius of equipment while in operation - Personnel must establish eye contact with operator and operator must disengage and remove hands from controls prior to entering the swing radius
Heat/Cold Stress	Seasonal Temperatures/ Work in protective garments	- Cool/Warm break areas - Follow ER SOP HS-17 - Follow ER SOP HS-5 - Plenty of Fluids & breaks
Noise	Heavy Equipment, Diaphragm Pumps, Air compressor, Hand Tools	- Hearing protection required at all times when working near pumps, air compressors, hand tools and heavy equipment above 85db
Electrocution	Power tools/equipment	- Inspect all power cords prior to use - Use GFCI on all connections
Cuts/Punctures	Sharp Objects – Sheet Metal/ Nails/screws	- Beware of sharp objects - Wear cut resistant gloves - Use safety utility knife - Always cut away from body
Slip/Trip/Fall	Structure/roof trusses Uneven terrain/debris	- Keep area organized - Identify/mark hazards - Remove debris from walking/ working surfaces

4.3 Physical Hazards

Physical/Environmental Hazard Analysis		
Hazard	**Pre Planning to Control Hazard**	**Active Control Measures**
Electrical	1. Locate and mark existing energized lines. 2. De-energize lines if necessary to perform work safely. 3. All electrical circuits will be grounded. 4. All 120 volt single phase which are not a part of the permanent wiring will have a ground-fault interrupter in place. 5. Temporary wiring will be guarded, buried or isolated by elevation to prevent accidental contact by personnel or equipment. 6. Evaluate potential for high moisture/standing water areas and define special electrical wiring needs-typically requirement for low voltage lighting systems.	1. Utilize Qualified Electrical Contractor for any new or temporary electrical construction. 2. Ensure electrical equipment/material meet all local, state and federal code and specifications 3. Use GFCI for all power tool usage. 4. All electrical cords must be inspected for damage prior to each use
Ergonomic	1. All operations evaluated for ergonomic impact. 2. Procedures written to define limits of lifting, pulling, etc. 3. Procedures to define how personnel will utilize proper ergonomic concepts and utilize mechanical material handling equipment. 4. Necessary mechanical material handling equipment specified and ordered for project.	1. Proper body mechanics techniques stressed and enforced on a daily basis. 2. Mechanical handling equipment maintained and utilized. 3. Proper body mechanics stressed in scheduled safety meetings. 4. Injuries reported and medically treated if in doubt about severity. 5. Operations changed as necessary based on injury experience or potential. 6. Manual Lifting/Handling Heavy Objects Buddy system
Existing Site Topography	1. Survey site prior to layout. Identify areas unsafe for personnel or equipment due to physical conditions. 2. Identify/locate existing utilities. 3. Determine impact of site operations on surrounding properties, communities, etc. 4. Identify mechanized equipment routes both on site and onto and off the site. 5. Layout site into exclusion and contamination reduction zones based on initial site evaluation.	1. Awareness to work environment - regular inspection/audits to identify changing conditions. 2. Shut down operations when unknown conditions encountered.
Fires & Explosions	1. Evaluate all operations for fire and explosion potential. 2. Define specific procedures for unique operations presenting unusual hazard such as flammable tank demolition. 3. Ensure that properly trained personnel and specialized equipment is available. 4. Define requirements for handling and storage of flammable liquids on site, need for hot work permits and procedures to follow in the event of fire or explosion. 5. Define the type and quantity of fire suppression equipment needed on site. 6. Coordinate which local fire fighting agencies to discuss unique fire hazards, hazardous materials, etc. 7. Ensure site operations comply with 29CFR 1910.157(g).	1. Inspect fire suppression equipment on a regular basis. 2. Store flammables away from oxidizers and corrosives. 3. Follow proper Bonding and Grounding procedures for fueling of equipment from portable fuel tanks. 4. Utilize Hot Work Permit for all hot work on-site. 5. Follow any site specific procedures regarding work around flammables. 6. Review and practice contingency plans. 7. Discuss on regular basis at scheduled safety meetings.
Flammable Vapor and Gases	1. Evaluate site to determine sources of likely flammable gas or vapor generation. 2. Develop specific procedures to be followed in the event of exposure to flammables. 3. Specify specialized equipment needs for inerting flammable atmospheres, ventilating spaces and monitoring flammable vapor concentrations. 4. Define requirements for intrinsically safe equipment. 5. Develop contingency plan to follow in the event of fire or explosion.	1. Calibrated monitoring equipment available and utilized by trained personnel whenever working where flammable gas or vapor is present. 2. Monitoring performed at regular frequency and in all areas where vapor could generate or pool. 3. Equipment and operations shut down when threshold levels are exceeded. 4. Contingency plans reviewed regularly by all involved personnel. 5. Work areas are carefully inspected to look for possible ignition sources. Sources are removed. 6. Operations shut down if specific task procedures can't be followed to the letter. 7. Fire Extinguishers
Heavy Equipment Operation	1. Define equipment routes and traffic patterns for site. 2. Insure that operators are properly trained on equipment operation for all equipment required on project. 3. Define safety equipment requirements, including back up alarm and roll over, for all equipment on site.	1. Equipment inspected as required. 2. Equipment repaired or taken out of service. 3. Ground spotters are assigned to work with equipment operators. 4. Utilize standard hand signals and communication

Physical/Environmental Hazard Analysis		
Hazard	**Pre Planning to Control Hazard**	**Active Control Measures**
	4. Define equipment routes and traffic patterns for site. 5. Implement SOP of requiring operators to safety inspect equipment on a daily basis in accordance with manufacturer requirements. 6. Evaluate project requirements to ensure that equipment of adequate capacity is specified.	protocols. 5. Personnel wear the proper PPE; utilize hearing protection, gloves for handling rigging, etc. 6. Equipment safety procedures discussed at daily scheduled safety meetings. 7. Personnel do not exceed lifting capacities, load limits, etc. for equipment in question. 8. Personnel follow basic SOP's which prohibit passengers on equipment, activating brakes and grounding buckets, securing loads prior to movement, etc. 9. Heavy Equipment Operations ER SOP
Illumination	1. Evaluate all operations and work areas to determine lighting requirements. 2. Specify specialized lighting requirements including explosion proof, intrinsically safe, lighting needs. 3. Determine if nighttime outdoor operations are necessary. 4. Evaluate tasks to be performed and number of light plants necessary to allow operations. 5. Ascertain if outdoor lighting from nighttime operations will have an impact on surrounding communities.	1. Inspect specialized equipment and discard or replace as needed. 2. Add additional lighting to areas with lighting deficiencies. 3. Inspect drop cords and portable lights on regular basis. Replace or repair as necessary. 4. Illumination
Noise	1. Local community noise standards examined. 2. Expected loud operations evaluated to determine compliance with community standards. 3. Loud operations scheduled for approved time periods. 4. Noise level standards established for equipment brought onto site. 5. Hearing protection requirements defined for personnel expected to have excessive exposures.	1. Personnel receive annual audiogram. 2. Personnel required to wear hearing protection. 3. Routine noise level monitoring and dosimetry performed. 4. Defective equipment repaired as needed. 5. Ongoing hearing conservation education promoted at scheduled safety meetings. 6. Medical evaluation following noise (impact) exposure if symptoms present themselves. 7. Sec. 7.0 – Weston ECH&S Program Manual Occupational Noise & HC Program
Personal Injuries	1. Site operations will be evaluated for exposures with serious injury potential such as falling objects, pinch points, flying objects, falls from elevated surfaces, etc. 2. A written Fall Prevention Program will be developed if workers will be required to work at heights greater than 6 feet from unguarded work locations. 3. PPE requirements will be based on potential for injury.	1. Personnel will wear required PPE. 2. Specialized equipment such as rope grabs, winches, etc. will be inspected prior to each use. 3. Defective equipment will be immediately replaced. 4. All injury and near miss incidents will be reported to the SHSO. 5. First aid/CPR trained person on site at all times. 6. First aid on site. 7. Transport for medical care if necessary. 8. Bloodborne Pathogens Exposure Control Plan for First Aid Providers
Small Equipment Usage	1. Site operations will be evaluated to determine need for specialized intrinsically safe, explosion-proof and UL approved equipment and instruments. 2. Implement requirement for G.F.I., double insulated tool usage, or assured grounding program in all outdoor operations, will be utilized. 3. Specify equipment needs to ensure that equipment used only for the purpose for which it is designed and to prevent abuse or misuse of the equipment. 4. Specify requirements for the inspections and maintenance of specialized equipment. 5. Specify that all equipment utilized on the project meets all OSHA requirements.	1. Inspect each tool prior to each use. 2. Ensure all guards are in use and properly positioned. 3. Ensure item being worked on is properly braced if necessary. 4. Get help when appropriate to hold or brace item being worked on. 5. Wear leather or other appropriate gloves in addition to level C PPE. 6. FLD-38 Hand & Power Tool Usage
Weather Conditions	1. Evaluate prevailing weather conditions for the site. 2. Contingency plans developed for likely severe weather conditions such as tornado, and extreme thunderstorm. 3. Provide for daily weather forecast service in extreme weather areas. 4. Plan to weatherize safety systems, such as showers and eye washes that would be impacted by extreme cold weather. 5. Order necessary specialized cold weather clothing. 6. Grounding and bonding requirements defined for thunderstorm areas. 7. Sheltered air conditioned break areas provided for extreme hot and cold weather zones.	1. Employees trained in contingency plan for severe weather conditions. 2. Emergency water sources inspected regularly in cold areas. 3. Weather service contacted regularly during storm conditions. 4. Supervisory personnel cease operations during extreme storm conditions (i.e., thunderstorms). 5. Personnel evacuate to safe assembly area. 6. Inclement Weather Lighting strikes within 5 miles

Physical/Environmental Hazard Analysis		
Hazard	**Pre Planning to Control Hazard**	**Active Control Measures**
		of site require 30 minute suspension from every strike thereafter.
Heat Stress	1. Anticipate possible high temperatures (summer months). 2. Be aware of heat stress symptoms, quit sweating, pale, clammy skin, dizziness	1. Cool break area. 2. Drink water. 3. Buddy system/ awareness 4. First aid on site. 5. Medical care if symptoms persist. 6. Heat Stress Prevention/Monitoring
Cold Stress	1. Anticipate possible low temperatures (winter months). 2. Remember the temperature does not have to be below freezing to have a cold stress situation.	1. Warm break area. 2. Warm decaffeinated drinks. 3. Buddy system/ awareness. 4. First aid on site. 5. Medical care if symptoms persist 6. Cold Stress

Please see HS-35 for physical hazards regarding waste bulking if necessary.

5.0 TRAINING REQUIREMENTS

This section describes ER's project training requirements and site visitor policy. Training of all personnel shall be in accordance with OSHA 29 CFR 1910.120 and the National Fire Protection Association (NFPA) standards.

5.1 Project Training Requirements

The training listed in Table 5-1 will be provided to project participants as noted. All required training will be documented and this documentation maintained onsite.

Project Training Requirements:		
Topic	**Description**	**Personnel**
General Training		
Site Safety and Health Plan	Site-specific hazards and control requirements, before commencement of field work. Includes training in proper use and care of PPE.	All project personnel
Activity Hazard Analysis	Activity-specific hazards, controls and training requirements for a specific phase or activity, prior to commencement of activity	Workers, supervisors and oversight personnel engaged in the activity
Daily Safety Briefing	In addition to plan-of-the-day and daily hazard reminders, often used to cover a specific topic; provided refresher training on various issues; or changes in hazards, controls or procedures.	All field workers, supervisors and field oversight personnel
Emergency Action Plan	Roles, responsibilities, recognition of emergency conditions, reporting and notification, evacuation and other procedures.	All project personnel, with detailed information on procedures for workers with special responsibilities
OSHA 40-Hour Hazardous Waste Operation (HAZWOPER) Training	General hazards and controls for hazardous waste activities at remediation sites, prior to performing work in an exclusion zone.	General site workers, supervisors, oversight personnel on HAZWOPER sites
OSHA 8-Hour Supervisor	Managing HAZWOPER work activities	Supervisors and management support staff on HAZWOPER sites
OSHA 8-Hour Refresher	Current annual refresher for HAZWOPER sites.	Workers, supervisors and oversight personnel engaged in the activity
Hazard Communication	Requirements for SDS, labels; hazards of site materials and controls; location of and access to inventories and SDS.	All project personnel potentially exposed to hazardous materials
Fire Extinguisher	General education on selection, distribution, and proper use of fire extinguishers.	All project personnel

Project Training Requirements:		
Topic	**Description**	**Personnel**
Special Training		
First aid/ Cardiopulmonary Resuscitation (CPR)	Red Cross, National Safety Council or other authorized course, with current refresher	At least 2 project personnel
Fall Protection	Fall (from elevation) hazards, fall protection techniques, especially proper use of personal fall arrest systems and rescue procedures.	Task-specific, workers exposed to fall hazards.
Lockout/Tagout	Site-specific energy control and verification procedures.	Authorized personnel working on de-energized systems, and affected employees whose work may be impacted by a lockout/tagout situation.
Other Heavy Equipment operations	Qualified by Construction Manager, Superintendent or Equipment Supervisor as documented on ER Equipment Operator Qualifications Form	Equipment Operators
Power tools (e.g. chain saws, chippers, powder-actuated tools, compressed air systems)	Hazards and proper use and maintenance as described in operations manual. Power-operated tool users certified by manufacturer.	Tool users
Heavy Metals / VOCs	Proper training to the following OSHA Standards per 1926.62 / 1926.1118 / 1926.1126 / 1926.1127 / 1926.1128.	All project personnel

5.2 Visitor Indoctrination Policy

All site visitors will be required to review the daily tailgate safety issues and sign the visitor log. At a minimum, all visitors must be informed of the anticipated hazards and PPE requirements, designated work zones, escort procedures, and emergency procedures.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The following is a brief description of the personal protective equipment, which may be required during various phases of the project. The U.S. EPA terminology for protective equipment will be used; Levels A, B, C and D.

Respiratory protective equipment shall be NIOSH-approved and use shall conform to OSHA 29 CFR Part 1910.134 Requirements. Each employer shall maintain a written respirator program detailing selection, use, cleaning, maintenance and storage of respiratory protective equipment. The written Respirator Program will be maintained at the local and regional offices.

6.1 Level A Protection Shall Be Used When:

(NOT ANTICIPATED)

- The extremely hazardous substance requires the highest level of protection for skin, eyes and the respiratory system;
- Substances with a high degree of hazard to the skin are known or suspected;
- Chemical concentrations are known to be above Immediately Dangerous to Life and Health (IDLH) levels; or,
- Biological hazards requiring Level A are known or suspected.

6.2 Level B Protection Shall Be Used When:

- The substance(s) has been identified and requires a high level of respiratory protection but less skin protection;

- Concentrations of chemicals in the air are IDLH or above the maximum use limit of an APR with full-face mask;
- Oxygen deficient or potentially oxygen deficient atmospheres (<19.5%) are possible; and/or, Confined space entry may require Level B.
- Incomplete identification of gases and vapors, but not suspected to be harmful to skin or skin absorbable

Level B Protective Equipment at a Minimum Shall Consist of:

SCBA / Cascade System	Full Face
Chemical Resistant/Protective Coveralls (type)	Saranex / Acid Suits*
Inner Gloves (type)	Nitrile
Outer Chemical Gloves (type)	Nitrile
Outer Work Gloves (type)	Leather**
Safety Shoes/Boots (type)	Chemical resistant steel toed
Hard Hat	ANSI approved
Modifications:	* Acid suits will be used during liquid transfer activities. ** Cut resistant gloves will be used when handling metal and other sharp objects.

6.3 Level C Protection Shall Be Used When:

- The same level of skin protection as Level B, but a lower level of respiratory protection is required;
- The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove contaminants; or,
- The substance has adequate warning properties and all criteria for the use of APR respirators has been met

Level C Protective Equipment at a Minimum Shall Consist of:

Air Purifying Respirator	Full face
Cartridges	OV/P100
Chemical Resistant/Protective Coveralls	Saranex / Acid suits*
Inner Gloves	Nitrile
Outer Chemical Gloves	Nitrile
Outer Work Gloves	Leather**
Safety Shoes/Boots	Chemical protective boot covers
Hard Hat	ANSI approved
Reflective Safety Vests	ANSI Type 2 high-visibility
Modifications:	* Acid suits during liquid transfer and sludge handling. ** Cut resistant gloves will be used when handling metal and other sharp objects.

6.4 Modified Level D Protection Shall Be Used When:

- The atmosphere is demonstrated to be within OSHA permissible limits
- Work functions preclude splashes, immersion or the potential for unexpected inhalation of, or contact with, hazardous concentrations of harmful chemicals.

Mod Level D Protection Equipment at a Minimum Shall Consist of:

Chemical Resistant/Protective Coveralls	Breathable SMS or equivalent
Safety Shoes/Boots	Steel toed/shank
Boot Covers (booties)	Latex
Work Gloves	Cotton or Leather**
Hard Hat	ANSI approved
Face Shield***	As necessary
Reflective Safety Vests	ANSI Type 2 high-visibility
Safety Glasses	NIOSH approved
Modifications:	** Cut resistant gloves will be used when handling metal and other sharp objects.
*** face screen ear muffs and cut proof chaps During chainsaw operation	

6.5 Level D Protection Shall Be Used When:

- The atmosphere is demonstrated to be below OSHA permissible exposure limits
- Work functions preclude splashes, immersion or the potential for unexpected inhalation of, or contact with, hazardous concentrations of harmful chemicals.

Level D Protection Equipment at a Minimum Shall Consist of:

Standard Work Clothing	Long pants/sleeved shirt
Safety Shoes/Boots	Safety Toed/shank
Boot Covers (booties)	As Needed
Work Gloves	Leather or cut resistant
Hard Hat	ANSI approved
Face Shield	As Needed
Safety Glasses	ANSI approved
Reflective Safety Vest	ANSI Type 2 high-visibility
Modifications:	** Cut resistant gloves will be used when handling metal and other sharp objects.

6.6 Decisions to Upgrade/Downgrade PPE

All decisions to downgrade from Level B to C or D must be accompanied by air monitoring results. The Site Safety officers and ER H&S Managers must be advised of on-site decisions to downgrade. All decisions must be documented with an Addendum to the Plan.
The following conditions will necessitate reevaluation of PPE use.

- commencement of a new work not previously identified
- change of job tasks during a work phase
- change of season/weather
- contaminants other than those identified in Safety Plan
- change in ambient levels of contaminants (Real time and PEM)
- change in work which affects degree of chemical contact

6.7 Project Personal Protective Equipment Requirements

Project Personal Protective Equipment Requirements:**						
Activity	**Respiratory Protection**	**Body Protection**	**Hand Protection**	**Eye/Face Protection**	**Foot Protection**	**Hearing Protection**
Site Mobilization/staging & Backfilling (Level D)	None	None	Leather work gloves	ANSI-approved safety glasses	ANSI-approved safety boots	Plugs or muffs when >85 dBA
Waste / Drum Sampling / Handling / Equipment Decon (Level C Known Contaminants with justified air monitoring results)	Full-face Air-purifying respirator with P100/MG cartridges	Saranex or equivalent	Nitrile inner/outer gloves	Full-face Respirator	Chemical resistant boots	Plugs or muffs when >85 dBA
**Waste / Drum Sampling / Handling / Equipment Decon (Level B for Unknown)	SAR	Saranex or Equivalent	Nitrile inner/outer gloves	Full Face SAR respirator	Chemical resistant boots	Plugs or muffs when >85 dBA
Excavation/mixing Loading soil (Level C)	Full-face Air-purifying respirator with P100 / MG cartridges	Tyvek or equivalent	Nitrile inner/outer gloves	Full-face Respirator	Chemical resistant boots	Plugs or muffs when >85 dBA
Surface and Subsurface Soil Sampling (Level Mod D)	None	Long Sleeved Shirt	Leather or Nitrile gloves as based on activity	ANSI-approved safety glasses	ANSI-approved safety boots with covers	Plugs or muffs when >85 dBA
Work Zone Air Monitoring	Consistent with Task/ Activity	Consistent with Task/ Activity	Consistent with Task / Activity	Consistent with Task/ Activity	Consistent with Task/ Activity	Consistent with Task / Activity
Demobilization (Level D)	None	None	Leather work gloves	ANSI-approved safety glasses	ANSI-approved safety boots	Plugs or muffs when >85dBA

**** Level B PPE will be utilized for ALL Hazard Classification of UNKNOWN drums , if discovered on the Site. PPE upgrade during surface/subsurface soil sampling based on air monitoring results.**

Personal Protective Equipment Inspection and Care:

Inspection and care of PPE are covered in the ER Corporate SOP HS-24.

6.8 Respiratory Protection Program

SESCO shall implement the SESCO Respiratory Protection Program for its employees and subcontractors and train them on its contents. The program will be administered by the SHSO.

Respiratory protective equipment shall be NIOSH-approved and use shall conform to OSHA 29 CFR Part 1910.134 Requirements. SESCO and subcontractors shall maintain a written respirator program detailing selection, use, cleaning, maintenance and storage of respiratory protective equipment.

7.0 MEDICAL MONITORING REQUIREMENTS

7.1 Pre-Employment Medical Examination

a. Pre-employment medical examinations are required for persons working at hazardous waste sites.
b. All examinations must be completed and documented prior to assignment to this site.
c. All examinations will be conducted following parameters established by WorkCare™.

7.2 Site Specific Medical Examination

a. BLL / ZPP for site activities with potential exposure to lead >30 days in calendar year.
b. Cadmium BL
c. Arsenic Urine

Note: additional medical examination(s) may be required if indicated by PEM.

7.3 Annual Medical Examination

The medical examination must have been within a 6-month period prior to on-site activity and repeated annually.

7.4 Suspected Exposure Medical Examination

a. Following any suspected uncontrolled exposure to site contaminants, personnel should be scheduled for a special medical examination.
b. The medical examination will be specific for the contaminants and the associated target organs or physiological system.
c. Questions regarding the type of medical examination can be directed to ER's Vice President, Health and Safety.

7.5 Contractor Medical Examination Requirements

All subcontractors entering the contamination reduction or exclusion zone will have adequate medical surveillance satisfying 29 CFR 1910.120.10 (f).

8.0 HEALTH AND HAZARD MONITORING

According to 29 CFR 1910.120 (h) Air Monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on-site.

8.1 Routine Air Monitoring Requirements

- Upon initial entry to rule out IDLH conditions;
- When the possibility of an IDLH condition or flammable atmosphere has developed;
- When work begins on a different portion of the site;
- Contaminants other than those previously identified are being handled;
- A different type of operation is initiated;
- Employees are handling leaking drums or containers or working in areas with obvious liquid contamination; and,
- During confined space work.

Air monitoring will consist at a minimum of the criteria listed below. All air monitoring data will be documented and available in the command post site files for review by all interested persons. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications. Calibration and maintenance performed will be entered in the site log and/or instrument log book.

8.2 Site Specific Air Monitoring Requirements

Monitoring:					
Real Time (Air, noise, heat, radiation, light)					
Activity	**Target Analyte**	**Instrument**	**Frequency**	**Action Levels**	**Actions/Upgrade and Rationale**
1. Site Setup **2. Soil Excavation** **3. Soil Sampling / Loading**	Flammable atmosphere	Combustible Gas Indicator (MultiRAE Plus) (AreaRAE)	Initial and periodic Continuous during CSE	> 10% LEL Evacuate area/space	Evacuate area Ventilate
4. Drum Handling / Sampling 5. **Backfill** **6. Decontamination**	VOCs	Photo –ionization Detector (PID) (MultiRAE Plus) (AreaRAE)	Initial transfer and periodic Continuous during CSE	Background – < 25 ppm 25 ppm - 50 ppm Level C 50 ppm - <250ppm Level C or Level B based on constituent PEL >250 ppm	Level D Air-purifying respirator Supplied-air respiratory protection Evacuate area, until conditions subside

Monitoring:					
Real Time (Air, noise, heat, radiation, light)					
Activity	**Target Analyte**	**Instrument**	**Frequency**	**Action Levels**	**Actions/Upgrade and Rationale**
	Oxygen	O_2 Meter (MultiRAE Plus) (AreaRAE)	Initial Continuous during CSE	<19.5% and >23.5% O^2 Evacuate area/space	Evacuate area
During all site activities	Particulates	DataRam	Periodic / Daily(perimeter of the Site)	>2.5 mg/m³ (1/2 PEL RESP)	Apply dust suppression engineering controls
Site wide	Temperature Extremes Cold/Heat stress	N/A – Engineering controls in place	Periodic breaks w/ fluids	Variable depending on the individual and work activity	Participate in Cold / heat stress monitoring program, take breaks in the warmth / shade, drink fluids as allowed

* The reading must be sustained for at least one (1) minute in the breathing zone.

8.3 Integrated Personal Exposure Monitoring:

Integrated personal exposure monitoring is anticipated due to site contaminants. Refer to Attachment D.

9.0 SITE CONTROL AND GENERAL FIELD SAFETY RULES

9.1 Work Zones

The primary purpose for site controls is to establish the hazardous area perimeter, to reduce migration of contaminants into clean areas and to prevent access or exposure to hazardous materials by unauthorized persons.

At the end of each workday, the site should be secured or guarded, to prevent unauthorized entry. All areas of the site with access to the public will be closed by barricades.
Site work zones will include:

Clean Zone/Support Zone (SZ)

This uncontaminated support zone or clean zone will be the area outside the exclusion and decontamination zones and within the geographic perimeters of the site. This area is used for staging of materials, parking of vehicles, office and laboratory facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the exclusion zone. All personnel arriving in the support zone will upon arrival, report to the command post and sign the site entry/exit log. There will be one controlled entry/exit point from the clean zone to the decontamination zone.

Location of Clean Zone: See attached site map

Contamination Reduction Zone (CRZ)

The contamination reduction zone will provide a location for removal of contaminated personal protective equipment and final decontamination of personnel and equipment. All personnel and equipment should exit via the decontamination area. A separate CRZ area will be established for heavy equipment.

The CRZ is a buffer zone between contaminated and clean areas and will be identified by yellow banner guard or barricade fencing.
Decontamination line is located: Where appropriate depending on location of work within facility

Exclusion Zone/Hot Zone (EZ) : Inside the orange fence boundary line

The exclusion zone will be the "hot-zone" or contaminated area of the site. Entry to and exit from this zone will be made through a designated point and all personnel will be required to sign the hot zone entry/exit log located at the decon area. Appropriate warning signs to identify the EZ should be posted (i.e. "DANGER - AUTHORIZED PERSONNEL ONLY," "PROTECTIVE EQUIPMENT REQUIRED BEYOND THIS POINT," etc.) Exit from the EZ must be accompanied by personnel and equipment decontamination as described in Section 10.0.

Will be identified by red banner guard or signs.
General Safety Rules for EZ
wear the appropriate level of PPE defined in plan
do not remove any PPE
no smoking, eating or drinking
no horseplay
no matches or lighters
implement the communication and line of sight system

9.2 General Field Safety Rules

- Horseplay is not permitted at any time.
- All visitors must be sent to the command post.
- It is ER policy to practice administrative hazard control for all site areas by restricting entrance to exclusion zones to essential personnel and by using operational SOPs.
- Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do not kneel on the ground or set equipment on the ground. Stay away from any waste drums unless necessary. Protect equipment from contamination by bagging.
- Eating, drinking, or smoking is permitted only in designated areas in the support zone.
- Hands and face must be thoroughly washed upon leaving the decontamination area.
- Cell phone use is not allowed in EZ, unless authorized by Response Manager or SHSO.
- Cell phone use while operating equipment is not allowed.
- Cell phone use while operating motor vehicles must comply with applicable DOT regulations
- Beards or other facial hair that interferes with respirator fit will preclude wearing a respirator.
- All equipment must be decontaminated or discarded upon exit from the exclusion zone.

- All personnel exiting the exclusion zone must go through the decontamination procedures described in Section 10.0.
- Safety Equipment described in Section 6.0 will be required for all field personnel.
- Personnel will only travel in vehicles where individual seats for each occupant are provided.
- Seat belts will be worn as required.
- Fire extinguishers will be available on site and in all areas with increased fire danger such as the refueling area.
- A minimum of two personnel will always be on site whenever heavy equipment is operated.
- Only necessary personnel need to be on or around heavy equipment.
- Employees will not interfere with or tamper in any way with air monitoring equipment.
- Backhoes or other equipment with booms shall not be operated within 10 feet of any electrical conductor

Minimum Clearance from Energized Overhead Electric Lines

NOMINAL SYSTEM VOLTAGE	MINIMUM REQUIRED CLEARANCE
0-50 kV	10 feet
51-100 kV	12 feet
101-200 kV	15 feet
201-300 kV	20 feet
301-500 kV	25 feet
501-750 kV	35 feet
751-1000 kV	45 feet

- Visitor log will be maintained at the command post or with the security guard. All personnel coming on site will sign in and out on a daily basis.
- Security will be maintained at the site by closing all gates during normal work hours. Site will be locked up in the evening.
- If unauthorized members of the public are found on site, contact RM immediately and do not leave the individual unattended.
- Visitors are not allowed in the work areas without authorization. Visitors must sign in at the Command Post and receive authorization to enter the site.
- Buddy System
  - The buddy system is mandatory at anytime that personnel are working in the exclusion zone, remote areas, on tanks, or when conditions present a risk to personnel.
  - A buddy system requires at least two trained/experienced people who work as a team and maintain at a minimum audible and/or visual contact while operating in the exclusion zone.
- Communication Procedures
  - Radios will be used for onsite communications and Channel 4 will be the designated channel.

- The crews should remain in constant radio or visual contact while on site.
- The site evacuation signal will be 3 blasts on the air or vehicle horn.

10.0 DECONTAMINATION PROCEDURES

In general, everything that enters the EZ at this site must either be decontaminated or properly discarded upon exit from the EZ. All personnel, including any state and local officials must enter and exit the EZ through the CRZ. Prior to demobilization, contaminated equipment will be decontaminated and inspected before it is moved into the SZ. Any material that is generated by decontamination procedures will be stored in a designated area in the EZ until disposal arrangements are made.

NOTE: The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for this site is water. Decontamination solution will be changed daily (at a minimum) and collected and stored on-site until disposal arrangements are finalized.

10.1 Procedures for Equipment Decontamination

Following decontamination and prior to exit from the EZ, the RM shall be responsible for ensuring that the item has been sufficiently decontaminated. This inspection shall be included in the site log.

Equipment decontamination will consist of the following steps: Clean with soap and water solution.

10.2 Procedure for Personnel Decontamination

This decontamination procedure applies to personnel at this site wearing Level B and C protection. These are the minimum acceptable requirements:

Station 1: Equipment Drop
Deposit equipment used on-site (tools, sampling devices and monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the EZ.

Station 2: Outer Boot and Outer Glove Wash and Rinse
Scrub outer boots, outer gloves and/or splash suit with decontamination solution or detergent water. Rinse off using water.

Station 3: Outer Boot and Glove Removal
Remove outer boots and gloves. If outer boots are disposable, deposit in container with plastic liner. If not disposable, store in a clean dry place.

Station 4: Outer Garment Removal
If applicable, remove SCBA and remain on air as long as possible. Remove Chemical Resistant Outer Garments and deposit in container lined with plastic. Decontaminate or dispose of splash suits as necessary.

Station 5: Respiratory Protection Removal
Remove hard-hat, face-piece, and if applicable, deposit SCBA on a clean surface. APR cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respiratory gear in a clean, dry location.

Station 6: Inner Glove Removal
Remove inner gloves. Deposit in container for disposal.

Station 7: Field Wash
Thoroughly wash hands and face with soap and water. Shower as soon as possible.

Eating, drinking, chewing gum/tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and/or ingestion of materials is prohibited in any areas where the possibility of contamination exists and is permitted only in the designated break area.

Personnel will not wear or bring contaminated clothing into the break areas. Stations 1 / 2 / 3 / 7 (bolded above) shall be recognized for Level D and MOD level D Decontamination.

10.3 Disposition of Decontamination Wastes

1. All equipment and solvents used for decontamination shall be decontaminated or disposed of with the established waste streams.

2. Commercial laundries or cleaning establishments that decontaminate or are used to launder contaminated clothing shall be informed of the presence and potentially harmful effects of the contaminants.

11.0 HAZARD COMMUNICATION

Each contractor will be responsible for maintaining a copy of their Hazardous Communication Program and SDS' on site. The following items are specific to this job site:

11.1 Safety Data Sheets

[1] Safety Data Sheets will be maintained at the Command Post in the Health and Safety Binder or readily available electronically.
[2] SDS' will be available to all employees for review during the work shift.
[3] See Attachment C and/or the ER Health and Safety Binder or on computer.

11.2 Container Labeling

[1] All containers received on site will be inspected by the contractor using the material to ensure the following:
   a. all containers clearly labeled
   b. appropriate hazard warning
   c. name and address of the manufacturer

11.3 The following chemicals may be brought to the site:

[1] Gasoline
[2] Diesel Fuel
[3] Oil
[4] Antifreeze
[5] Lubricants
[6] Calibration Gas Cylinders
[7] Isopropyl Alcohol (equipment decon)
[8] Hydrochloric Acid (laboratory preservative)
[9] Nitric Acid (laboratory preservative)
[10] Methanol (laboratory preservative)
[11] Ammonium Sulfate (laboratory preservative)

11.4 Employee Training and Information

[1] Prior to starting work, each employee will attend a health and safety orientation and will receive information and training on the following:

a. an overview of the requirements contained in the Hazardous Communication Standard
b. hazardous chemicals present at the site
c. the location and availability of the written Haz Com Program
d. physical and health effects of the hazardous chemicals
e. methods of preventing or eliminating exposure
f. emergency procedures to follow if exposed
g. how to read labels and review SDS' to obtain information
h. location of SDS file and location of hazardous chemical list

See ER Health and Safety Binder for Hazard Communication Program and applicable SDS'.

12.0 EMERGENCIES/INCIDENTS/INJURIES

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate.

12.1 Emergency Contacts

Emergency Call List and Project Organization		
Service	**Name/Organization**	**Emergency Phone**
Fire/Police/Emergency Medical		911
Police		911
Sheriff		911
*Hospital – ER	Saint Joseph 1907 West Sycamore Street Kokomo, IN	765-868-1089
Client Representative	USEPA OSC/ Shelly Lam	317-417-0980
SESCO Response Manager	Heidi Meyer	317-696-3734
ER SHSO	Nick Michailides	219-286-5359
SESCO Project Manager	Brad Adams	317-847-9973

*Directions from Site to Hospital and Clinic: (See Map in Attachment B)

NOTE: Maps and directions to the hospital and clinic will be posted in the office and kept in site vehicles.

Distance from site to hospital is approximately 1.4 miles. Driving time is approximately 2-5 minutes.

The following individuals have been trained in CPR and First Aid: Heidi Meyer (SESCO); Nick Michailides (ER)

12.2 Additional Emergency Numbers

Poison Control Center	800-222-1222
National Response Center	800-424-8802 (24 hr)
Center for Disease Control	404-488-4100 (24 hr)
AT&F (Explosives Information)	800-424-9555
Chemtrec	800-424-9300
USEPA Region 5 ER Duty Officer	312-353-2318 (24 hr)
IDEM Spill Line	888-233-7745
WorkCare Incident Intervention	**888-449-7787 (24 hr)**

SESCO Corporate Contacts

Bill Pickard	317-554-9247
Brent Graves	317-908-4645
Darren Reese	765-517-1516

ER Corporate Contacts

ER Corporate 24 Hour Hotline	888-814-7477
ER Headquarters (St. Louis)	636-227-7477

12.3 Emergency Equipment Available On-Site

Communications Equipment	Location
Private Telephones	N/A
Mobile Telephones	RM – Heidi Meyer; SHSO – Nick Michailides
Two-Way Radios	None on site
Emergency Alarms/Horns	Vehicle Horns / Air Horn
Other:	

Medical Equipment	Location
First Aid Kits	Site Vehicles / Command Post Area
Stretcher/Backboard	N/A
Eye Wash Station: *(within 100 feet of hazard zone)*	CRZ/Command Post Area
Safety Shower	CRZ (if warranted)

Fire Fighting Equipment	Location
Fire Extinguishers	Site Vehicles / Command Post Area/CRZ / Spark operations / Heavy Equipment / Staged Fueling area if applicable
Other	Flammables storage area

Spill or Leak Equipment	Location
Absorbent Boom/Pads:	Support Zone/Trailer
Dry Absorbent:	Support Zone/Trailer

12.4 Incident Reporting/Investigations

- All incidents, including personal injury and property damage, must be reported to the RM, Supervisor, or SHSO within **20 minutes of incident.**
- The RM will contact SESCO Project manager by immediately upon notification. The SESCO Project manager will notify the EPA OSC ASAP of any potential medical emergencies / personal injury / property damage.
- The RM, SHSO, and effected employees will conduct an immediate investigation of the incident and document all results on the Incident and Investigation Report form (ER or equivalent).

- The RM will assign a supervisory individual to accompany all injured personnel to the clinic and follow guidelines outlined in the ER Return to Work Program (or equivalent for SESCO employees and Subcontractors other than ER).
- Copies of all Incident and Investigation Reports will be sent to the SESCO Project Manager.
- Copies of all II reports involving ER employees will be forwarded to ER VP of H&S.

13.0 EMERGENCY RESPONSE CONTINGENCY PLAN

13.1 Personnel Responsibilities

As the administrator of the project, the RM has primary responsibility for responding to and correcting emergency situations. The RM will:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, total evacuation and securing of the site or up-grading or down- grading the level of protective clothing and respiratory protection.
- Take appropriate measures to protect the public and the environment including isolating and securing the site, preventing run-off to surface waters and ending or controlling the emergency to the extent possible.
- Ensure that appropriate Federal, State and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted.
- Ensure that appropriate decon treatment or testing for exposed or injured personnel is obtained.
- Determine the cause of the incident and make recommendations to prevent the recurrence.
- Ensure that all required reports have been prepared and submitted.

13.2 Medical Emergencies:

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket.) First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to SESCO Project Manager.

<u>Onsite First Aid Support</u>

Onsite medical support during project execution will be available from two or more individuals who are trained in First Aid and Cardiopulmonary Resuscitation (CPR) and bloodborne pathogens. Onsite first aid kits shall be Type III, 16 unit kits, including one pocket mouthpiece or CPR barrier. Kits shall be checked prior to use, and at least weekly when work is in progress to ensure that contents are replaced as used.

Medical Transport of Employees and Case Management

For non-emergency injuries, a local clinic will be identified with the assistance of the Corporate Medical Consultant; WorkCare Incident Intervention (II) will be contacted immediately to establish a medical treatment plan prior to transporting the injured worker to the clinic. The WorkCare II consultant will attempt to contact the clinic ahead of the arrival of the patient to establish oversight of case management. Under no circumstances will an injured employee drive unescorted to a hospital, clinic, etc. An employee with minor injury may be transported by car after first aid treatment is given. The HSO or other project management personnel will transport the injured person to the facility. The employee who transports the injured person shall be trained in first aid and CPR whenever possible. When the injury is severe, or when in doubt concerning the severity of injury, the employee will be transported by ambulance.

Injured employees that require medical treatment or are taken to a doctor, hospital, clinic, etc., will not be allowed to resume work without a written return to work statement from the treating physician. This statement shall supply a medical diagnosis of the problem, the date of return to work, and work limitations. Should a return to work statement such as "light duty" be given, the treating physician will be contacted to determine the specific limitation. ER will make an assessment of work the employee normally performs whether or not the limitation interferes with the employee's normal work.

Whenever there are questions on the appropriateness of the diagnosis or prescribed course of treatment, WorkCare will be contacted to arrange for a second opinion. Copies of all Incident and Investigation Reports will be sent to the ER Corporate Health and Safety Manager.

13.3 Fire or Explosion:

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival the RM or designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on- site.

If it is safe to do so, site personnel may:

- Use firefighting equipment available on site.
- Remove or isolate flammable or other hazardous materials which may contribute to the fire.

13.4 Spills, Leaks or Releases:

In the event of a spill or a leak, site personnel will:

- Locate the source of the spillage and stop the flow if it can be done safely.
- Begin containment and recovery of the spilled materials.

13.5 Evacuation Routes and Resources:

- Evacuation routes have been established by work area locations for this site. All buildings and outside work areas have been provided with two designated exit points. Evacuation should be

conducted immediately, without regard for equipment under conditions of extreme emergency. See site map for evacuation routes.

- Evacuation notification will be three blasts on an air horn, vehicle horn, or by verbal communication via radio.
- Keep upwind of smoke, vapors or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the exclusion zone or in a safe place.
- The RM will conduct a head count to insure all personnel have been evacuated safely.
- In the event that emergency site evacuation is necessary, all personnel are to:
  1. Escape the emergency situation;
  2. Decontaminate to the maximum extent practical; and,
  3. Meet at the command post.

14.0 CONFINED SPACE

(Not Anticipated for this site)

A confined space is defined as a space or work area not designed or intended for normal human occupancy, having limited means of access and poor natural ventilation, and or any structure, including buildings or rooms which have limited means of egress. Examples include tanks, vats, and basements. Confined spaces identified at this site are listed below. If a confined space entry is conducted, it will be done in accordance with procedures presented in Attachment F.

Type of Confined Space	Location On-Site	Comments

15.0 EXCAVATIONS, TRENCHING, AND SHORING (IF NEEDED)

a. Walkways, runways, and sidewalks shall be kept clear of excavated material or other obstructions; No sidewalks shall be undermined unless shored to carry a minimum load of 125 pounds per square foot.

b. If planks are used for raised walkways, runways, or sidewalks, they shall be:

- laid parallel to the length of the walk and fastened together against displacement.
- uniform in thickness, and exposed ends provided with beveled cleats.
- provided with plank steps on strong stringers.
- provided with cleats when used in lieu of steps.

c. All employees shall be protected with PPE for the protection of the head, eyes, respiratory organs, hands, feet, and other parts of the body as set forth in *Section 4.2 of the HASP*.

d. Reflective warning vests shall be worn by employees whose work area is regularly exposed to vehicular traffic.

e. All excavations greater than 4 feet in depth shall be tested for hazardous atmospheres in accordance with 29 CFR 1926.651. This monitoring shall include oxygen levels, Lower Explosive Limit (LEL), and toxic substances. Employees subject to hazardous atmospheres shall then be equipped with proper respiratory protection as specified in 29 CFR 1926 Subpart D and/or the site HASP.

f. No person shall be permitted under loads handled by power shovels, derricks, or hoists.

g. Daily inspections of excavations shall be made by a competent person. If a hazard exists, work shall be stopped until the necessary precautions are taken.

h. In excavations greater than 4 feet in depth, a means of egress from the excavation shall be provided, as specified in 29 CFR 1926.651. This egress will include a stairway, ladder, ramp or other safe means of egress and must be located within the excavation so as to require no more than 25 feet of lateral travel for employees.

Specific Excavation Requirements

a. Prior to opening an excavation, underground installations that may be encountered shall be identified. Proper supports shall be provided when/if the installations are exposed. Utility companies should be contacted prior to the start of actual excavation if underground installations are expected.

b. Trees, boulders, and other surface encumbrances that create a hazard shall be removed or made safe before excavation is begun.

c. **Excavations shall be inspected daily or more often, as conditions warrant, by a competent person.**

d. The determination of the angle of repose and design of the supporting system shall be based on these factors: depth of cut; possible variation in water content of the material while the excavation is open; anticipated changes from exposure to air, sun, water, or freezing; loading imposed by structures, equipment, overlying material, or stored material; and vibration from equipment, blasting, traffic or other sources. The ultimate determination of the slope and configuration shall be determined in accordance with the conditions set forth in 29 CFR 1926.652, and Appendices A and B to Subpart P.

e. Supporting systems, i.e., piling, cribbing, shoring, etc., shall be designed by a qualified person and meet accepted engineering requirements.

f. All slopes should be excavated to at least the angle of repose except for solid rock areas. The angle of repose shall be flattened when an excavation has water conditions, silty materials, loose boulders, and areas where erosion, deep frost action, and slide planes appear.

g. Excavated or other materials shall be stored and retained at least 2 feet from the edge of the excavation unless barriers are utilized.

h. Excavations may be entered/exited by use of ladders or ramps. The use of buckets, forklifts, or any other machinery not designed for personnel transportation is prohibited.

i. Sides/slopes/faces of all excavations shall meet accepted engineering requirements. Special attention should be given to slopes which may be affected by weather or moisture content.

j. Support system shall be planned and designed by a qualified person when excavation is in excess of 20 feet in depth, adjacent to structures, or subject to vibration or groundwater.

k. Materials used for sheeting, sheet piling, cribbing, bracing, and underpinning shall be in good serviceable condition.

l. Special precautions shall be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation of fill.

m. Except in hard rock, excavations below the level of the base of the footing of any foundation or retaining wall shall not be permitted unless: the wall is underpinned and all other precautions taken to ensure the stability of the adjacent walls; the excavation is in stable rock; or a registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity.

n. Diversion ditches, dikes, or other suitable means shall be used to prevent water from entering an excavation and for drainage of the excavation.

o. The side of the excavation must be sheet-piled, shored, and braced as necessary to resist the extra pressure of any superimposed loads.

p. When mobile equipment is utilized or allowed adjacent to excavations, stop logs or barricades shall be installed. The grade should always be away from the excavation.

q. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc. shall be backfilled.

r. Dust conditions shall be kept to a minimum. Excavations containing hazardous soils shall be evaluated, and the proper precautions shall be taken. Wetting agents may be necessary.

s. In locations where oxygen deficiency or gaseous conditions are possible, air in the excavations shall be tested. Controls shall be established to ensure acceptable atmospheric conditions. If the situation lends itself, Confined Space Entry Procedures shall be followed. Emergency rescue equipment shall be readily available where adverse atmospheric conditions may exist or develop in an excavation.

t. Where ramps, walkways, or bridges are used for employees or equipment, they shall be designed and constructed by a qualified person in accordance with accepted engineering requirements. When personnel are requested to be in trenches 4 feet deep or more, an adequate means of exit, such as a ladder or steps, shall be provided.

u. All ladders used on excavation operations shall be in accordance with 29 CFR 1926.1053.

Specific Trenching Requirements

a. Expected hazardous ground movement areas and banks more than 5 feet high shall be shored, laid back to a stable slope, or equivalent.

b. Sides of trenches 5 feet or more in depth shall be shored, sheeted, braced, sloped, or equivalent in accordance with Appendices A and B to 29 CFR 1926.652.

c. Materials used for sheeting and sheet piling, bracing, shoring, and underpinning shall be in good serviceable condition. Care should be taken to not overstress the lumber being used at an excavation.

d. Additional precautions by way of shoring and bracing shall be taken to prevent slides or cave-ins when excavations of trenches are made in locations adjacent to backfilled excavations or where excavations are subjected to vibrations.

16.0 WORKING ON OR NEAR WATER

Employees working over or near water *(ER uses 10 foot from waters edge),* where the danger of drowning exists, shall be provided with U.S. Coast Guard-approved life jacket or buoyant work vests. Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects which would alter their strength or buoyancy. Defective units shall not be used. SESCO / ER shall develop an AHA for work on water / boating operations via the HASP amendment process if such work becomes required during site activities.

Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet.

At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water.

The local Marine Rescue Unit contact information shall be available to all personnel for use in an emergency. The City of Kokomo Fire Department has a water rescue team. Prior to Site mobilization the local Fire Department will be contacted and evaluation of their abilities regarding water rescue will be determined.

Any boats used will be inspected prior to use and contain safety equipment including fire extinguishers, signaling devices, and other required items.

Boat operations shall include radio communications with personnel on shore.

Weather forecasts and water conditions shall be evaluated prior to any boat operations.

ATTACHMENT A

SITE SAFETY PLAN AMENDMENTS

SITE SAFETY PLAN AMENDMENT	
Amendment No.:	
Site Name:	
Date of Issue:	
Type of Amendment:	
Reason for Amendment:	
Alternate Safeguard Procedures:	
Required Changes in PPE:	

USEPA On-Scene Coordinator (Date)

SESCO Response Manager (Date)

ER Site Health and Safety Officer (Date)

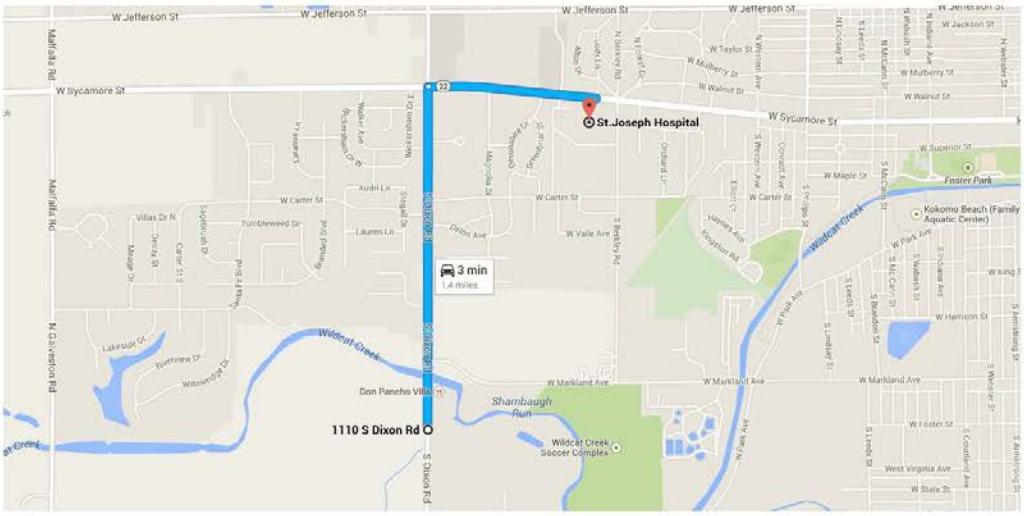
ATTACHMENT B

SITE MAPS

Google

Drive 1.4 miles, 3 min

Directions from **1110 S Dixon Rd** to **St.Joseph Hospital**



1110 S Dixon Rd
Kokomo, IN 46902

1. Head **north** on **S Dixon Rd** toward **W Markland Ave**

0.9 mi

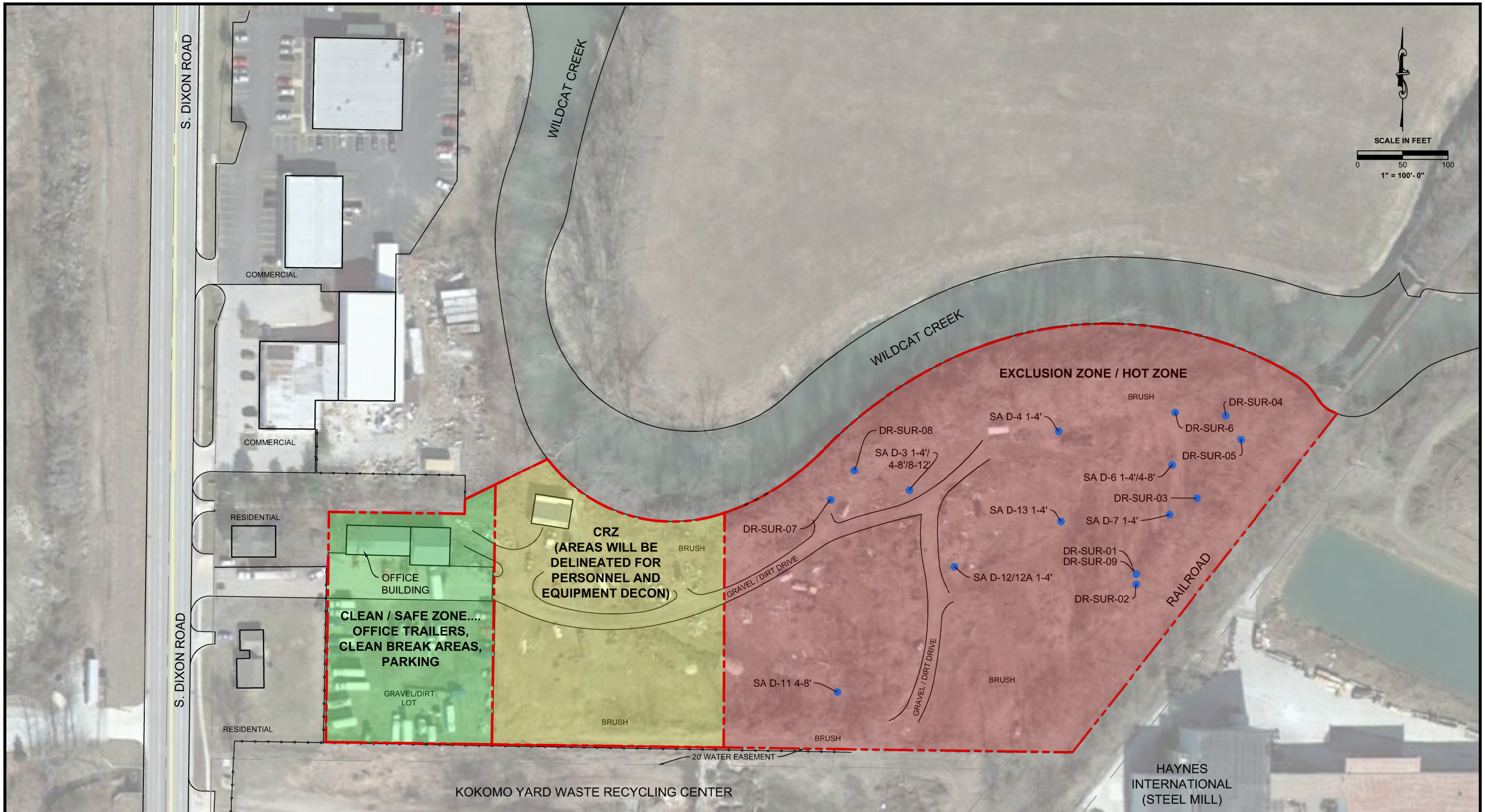
2. Turn **right** onto **W Sycamore St**

Destination will be on the right

0.4 mi

St.Joseph Hospital
1907 West Sycamore Street, Kokomo, IN 46901

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.



SESCO group
ENVIRONMENTAL SOLUTIONS

LEGEND

- SOIL BORING - OTIE
- PROPERTY BOUNDARY
- FENCE
- RAILROAD
- RIGHT OF WAY
- SITE WORK ZONE DESIGNATION AREA
- CLEAN / SAFE ZONE
- CRZ - CONTAMINANT REDUCTION ZONE
- EXCLUSION ZONE / HOT ZONE

SITE WORK ZONE MAP

DIXON ROAD SITE
1110 ½ - 1112 and 1114 SOUTH DIXON ROAD
KOKOMO, INDIANA 46901

PROJECT # 4276 | FIGURE # 1

O:\Consulting\@SESCO Technical Docs\#4276 Dixon Rd Site - Kokomo\Health & Safety\Figures\SITE WORK ZONE MAP.dwg, 4/15/2015 10:23:46 AM

ATTACHMENT C

CHEMICAL HAZARD INFORMATION

SIGMA-ALDRICH

Material Safety Data Sheet

Version 3.0
Revision Date 10/21/2009
Print Date 10/26/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1248 solution

Product Number : 47965-U
Brand : Supelco

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +18003255832
Fax : +18003255052
Emergency Phone # : (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
Distillates (petroleum), hydrotreated middle			
64742-46-7	265-148-2	649-221-00-X	99.995 %
Baseoil - unspecified			
64742-53-6	265-156-6	649-466-00-2	39.998 %
Aroclor 1248			
12672-29-6	-	-	0.005 %

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

HMIS Classification
Health hazard: 0
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 0
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful 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	May be harmful if swallowed.

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

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. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

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

5. FIRE-FIGHTING MEASURES

Flammable properties

Flash point	no data available
Ignition temperature	no data available

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods for cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) 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
For prolonged or repeated contact use protective gloves.

Eye protection
Safety glasses with side-shields conforming to EN166

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

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	liquid

Safety data

pH	no data available
Melting point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Water solubility	no data available

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Materials to avoid
Strong oxidizing agents

11. TOXICOLOGICAL INFORMATION

Acute toxicity

no data available

Irritation and corrosion

no data available

Sensitisation

no data available

Chronic exposure

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation	May be harmful 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	May be harmful if swallowed.

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

no data available

Ecotoxicity effects

no data available

Further information on ecology

no data available

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA

Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
No known OSHA hazards

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

	CAS-No.
Aroclor 1248	12672-29-6

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
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Baseoil - unspecified	64742-53-6	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Distillates (petroleum), hydrotreated middle	64742-46-7	
Baseoil - unspecified	64742-53-6	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Distillates (petroleum), hydrotreated middle	64742-46-7	
Baseoil - unspecified	64742-53-6	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

SIGMA-ALDRICH

Material Safety Data Sheet

Version 3.0
Revision Date 10/22/2009
Print Date 10/26/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1254 solution

Product Number : 44814
Brand : Supelco

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +18003255832
Fax : +18003255052
Emergency Phone # : (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
2,2,4-Trimethylpentane			
540-84-1	208-759-1	601-009-00-8	> 99.9 %
Aroclor 1254			
11097-69-1	-	-	< 0.01 %

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Target Organ Effect, Irritant

Target Organs

Liver, Kidney

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 3
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 3
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation. Vapours may cause

	drowsiness and dizziness.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.

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. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties

Flash point	-12 °C (10 °F) - closed cup
Ignition temperature	no data available

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

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

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

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 for cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

Handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) 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.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid

Safety data

pH	no data available
Melting point	-107 °C (-161 °F)
Boiling point	98 - 99 °C (208 - 210 °F) at 1,013 hPa (760 mmHg)
Flash point	-12 °C (10 °F) - closed cup
Ignition temperature	no data available
Lower explosion limit	1 %(V)
Upper explosion limit	6 %(V)
Vapour pressure	55 hPa (41 mmHg) at 21 °C (70 °F) 117 hPa (88 mmHg) at 37.8 °C (100.0 °F)
Density	0.690 g/cm3
Water solubility	insoluble
Solubility	

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Strong oxidizing agents

Hazardous reactions
Vapours may form explosive mixture with air.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

no data available

Irritation and corrosion

no data available

Sensitisation

no data available

Chronic exposure

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation. Vapours may cause drowsiness and dizziness.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.
Target Organs	Liver, Kidney,

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

no data available

Ecotoxicity effects

no data available

Further information on ecology

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

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1262 Class: 3 Packing group: II
Proper shipping name: Octanes
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1262 Class: 3 Packing group: II EMS-No: F-E, S-E
Proper shipping name: OCTANES
Marine pollutant: No

IATA
UN-Number: 1262 Class: 3 Packing group: II
Proper shipping name: Octanes

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Target Organ Effect, Irritant

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

	CAS-No.
Aroclor 1254	11097-69-1

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
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
2,2,4-Trimethylpentane	540-84-1	2007-03-01
Aroclor 1254	11097-69-1	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2,4-Trimethylpentane	540-84-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date

2,2,4-Trimethylpentane	540-84-1	2007-03-01

California Prop. 65 Components

WARNING! This product contains a chemical known in the State of California to cause cancer. Aroclor 1254	CAS-No. 11097-69-1	Revision Date 1990-06-30

California Prop. 65 Components

WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm. Aroclor 1254	CAS-No. 11097-69-1	Revision Date 1990-06-30

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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

SIGMA-ALDRICH

Material Safety Data Sheet

Version 3.0
Revision Date 01/02/2009
Print Date 10/29/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Arsenic

Product Number : 11303
Brand : Riedel

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +18003255832
Fax : +18003255052
Emergency Phone # : (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : As
Molecular Weight : 74.92 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Arsenic			
7440-38-2	231-148-6	033-001-00-X	-

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Target Organ Effect, Highly toxic by inhalation, Harmful by ingestion.

Target Organs

Skin, Lungs

HMIS Classification

Health Hazard: 4
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 Harmful if swallowed.

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. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

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

5. FIRE-FIGHTING MEASURES

Flammable properties
Flash point not applicable

Ignition temperature no data available

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

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 for cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis

Arsenic	7440-38-2	TWA	0.01 mg/m3	1993-06-30	US. Department of Labor - Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) 29 CFR 1910.1000 Air Contaminants.
		TWA	0.01 mg/m3	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A
Remarks	Sec. 1910.1018 Inorganic arsenic.				
		TWA	0.01 mg/m3	1994-09-01	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004:Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)
	Confirmed human carcinogen. Refers to Appendix A -- Carcinogens. Substance identified by other sources as a suspected or confirmed human carcinogen. Substances for which the TLV is higher than the OSHA Permissible Exposure Limit (PEL) and/or the NIOSH Recommended Exposure Limit (REL). See CFR 58(124) :36338-33351, June 30, 1993, for revised OSHA PEL. Substances for which there is a Biological Exposure Index or Indices.				

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator. Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (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.

Eye protection
Safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

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	solid
Colour	grey

Safety data

pH	no data available
Melting point	817 °C (1,503 °F)
Boiling point	no data available
Flash point	not applicable
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Density	5.727 g/cm3
Water solubility	no data available

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Conditions to avoid
Heat. Exposure to air may affect product quality.

Materials to avoid
Oxidizing agents, Halogens, Palladium undergoes a violent reaction with arsenic, Zinc, Platinum oxide, Nitrogen trichloride, Bromine azide

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Arsenic oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity

LD50 Oral - rat - 763 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

Irritation and corrosion

no data available

Sensitisation

no data available

Chronic exposure

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

IARC: Group 1 - Carcinogenic to humansRe-evaluation of arsenic, IARC Monograph (Vol. 84) (October 15, 2002) Some Drinking-water Disinfectants and Contaminants, including Arsenic (Arsenic)

NTP:	NTP known to be carcinogenic (Arsenic)
OSHA:	1910.1018 (Arsenic)

Signs and Symptoms of Exposure

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

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	Harmful if swallowed.
Target Organs	Skin, Lungs,

Additional Information
RTECS: CG0525000

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

no data available

Ecotoxicity effects

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 9.9 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 3.8 mg/l - 48 h

Further information on ecology

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

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. 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: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant: No

IATA
UN-Number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Highly toxic by inhalation, Harmful by ingestion.

DSL Status
All components of this product are on the Canadian DSL list.

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

	CAS-No.	Revision Date
Arsenic	7440-38-2	1991-07-01

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	1991-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	1991-07-01

New Jersey Right To Know Components

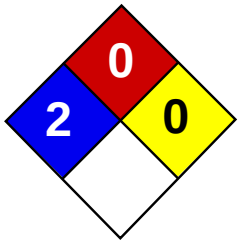
	CAS-No.	Revision Date
Arsenic	7440-38-2	1991-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.



Health	2
Fire	0
Reactivity	0
Personal Protection	

Material Safety Data Sheet
Barium AA Standard MSDS

Section 1: Chemical Product and Company Identification

Product Name: Barium AA Standard

Catalog Codes: SLB1582

CAS#: Mixture.

RTECS: Not applicable.

TSCA: TSCA 8(b) inventory: Barium; Nitric acid, 70%; Water

CI#: Not applicable.

Synonym:

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

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
Barium	7440-39-3	0.1
Water	7732-18-5	98.5
Nitric acid, fuming	7697-37-2	1.4

Toxicological Data on Ingredients: Barium LD50: Not available. LC50: Not available. Nitric acid, fuming LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death.

Potential Chronic Health Effects:
Hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Non-sensitizer for skin. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes.

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

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. Cold water may be used. 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. Cold water may be used.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 immediate medical attention.

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

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. Slightly explosive in presence of reducing materials, of combustible materials, of organic materials.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. 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 locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. 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 alkalis. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

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

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor 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:
Barium TWA: 0.5 from ACGIH (TLV) [United States] Nitric acid, fuming TWA: 2 CEIL: 4 TWA: 5 CEIL: 10 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: Not applicable.

Color: Clear Colorless.

pH (1% soln/water): Acidic.

Boiling Point: The lowest known value is 82.6 (180.7°F) (Nitric acid, fuming). Weighted average: 99.76°C (211.6°F)

Melting Point: May start to solidify at -41.6°C (-42.9°F) based on data for: Nitric acid, fuming.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1 (Water = 1)

Vapor Pressure: The highest known value is 6 kPa (@ 20°C) (Nitric acid, fuming). Weighted average: 2.35 kPa (@ 20°C)

Vapor Density: The highest known value is 0.62 (Air = 1) (Water).

Volatility: Not available.

Odor Threshold: The highest known value is 0.29 ppm (Nitric acid, fuming)

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:
Highly reactive with alkalis. Slightly reactive to reactive with reducing agents, combustible materials, organic materials, metals, acids.

Corrosivity:
Highly corrosive in presence of aluminum, of zinc, of copper. Corrosive in presence of steel. Slightly corrosive in presence of stainless steel(304), of stainless steel(316). Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

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

Chronic Effects on Humans: Not available.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

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 products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification:
: Corrosive liquid, acidic, inorganic, n.o.s (Nitric acid, solution; Barium Nitrate mixture) (Nitric acid, fuming) UNNA: UN3264 PG: II

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Nitric acid, 70% Massachusetts RTK: Nitric acid, 70% TSCA 8(b) inventory: Barium; Nitric acid, 70%; Water SARA 302/304/311/312 extremely hazardous substances: Nitric acid, 70% SARA 313 toxic chemical notification and release reporting: Nitric acid, 70% 2% CERCLA: Hazardous substances.: Nitric acid, 70%;

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R23- Toxic by inhalation. R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection:

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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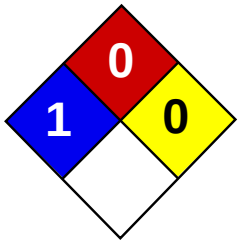
Last Updated: 05/21/2013 12:00 PM



Health	1
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Barium sulfate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Barium sulfate

Catalog Codes: SLB3148, SLB4648

CAS#: 7727-43-7

RTECS: CR0600000

TSCA: TSCA 8(b) inventory: Barium sulfate

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: BaSO4

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
Barium sulfate	7727-43-7	100

Toxicological Data on Ingredients: Barium sulfate LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. 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. Cold water may be used. WARM water MUST be used. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

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. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

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: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

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: No specific safety phrase has been found applicable for this product.

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: Safety glasses. 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: 10 from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 233.39 g/mole

Color: Not available.

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

Boiling Point: Decomposes.

Melting Point: 1580°C (2876°F)

Critical Temperature: Not available.

Specific Gravity: 4.5 (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: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Not available.

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

Chronic Effects on Humans: Causes damage to the following organs: lungs, mucous membranes.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

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 products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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:
Pennsylvania RTK: Barium sulfate Massachusetts RTK: Barium sulfate TSCA 8(b) inventory: Barium sulfate

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

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

DSCL (EEC):
This product is not classified according to the EU regulations.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

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

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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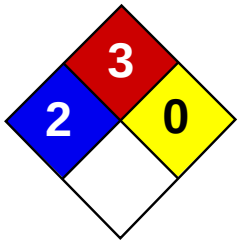
Last Updated: 05/21/2013 12:00 PM



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C6-H6

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
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. The substance is toxic to blood, bone marrow, central nervous system (CNS). The substance may be toxic to liver, Urinary System. 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. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

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 immediate medical attention.

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials. 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. Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas. Dioxygenyl tetrafluoroborate is as very powferful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition. Contact with sodium peroxide with benzene causes ignition. Benzene ignites in contact with powdered chromic anhydride. Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:
Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction

of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. 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 locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. 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.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

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

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor 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 STEL: 2.5 (ppm) from ACGIH (TLV) [United States] TWA: 1.6 STEL: 8 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.1 STEL: 1 from NIOSH TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States] TWA: 10 (ppm) from OSHA (PEL) [United States] TWA: 3 (ppm) [United Kingdom (UK)] TWA: 1.6 (mg/m3) [United Kingdom (UK)] TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m3) [Canada] TWA: 0.5 (ppm) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:
Aromatic. Gasoline-like, rather pleasant. (Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

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

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 930 mg/kg [Rat]. Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. Causes damage to the following organs: blood, bone marrow, central nervous system (CNS). May cause damage to the following organs: liver, Urinary System.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects. May affect genetic material (mutagenic). May cause cancer (tumorigenic, leukemia)) Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism,and urinary system. Eyes: Causes eye irritation. Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

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 products of degradation are less toxic than the product itself.

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: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value) California prop. 65: This product contains the following ingredients

for which the State of California has found to cause cancer which would require a warning under the statute: Benzene Connecticut carcinogen reporting list.: Benzene Connecticut hazardous material survey.: Benzene Illinois toxic substances disclosure to employee act: Benzene Illinois chemical safety act: Benzene New York release reporting list: Benzene Rhode Island RTK hazardous substances: Benzene Pennsylvania RTK: Benzene Minnesota: Benzene Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene New Jersey: Benzene New Jersey spill list: Benzene Louisiana spill reporting: Benzene California Director's list of Hazardous Substances: Benzene TSCA 8(b) inventory: Benzene SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 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):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer. R62- Possible risk of impaired fertility. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S46- If swallowed, seek medical advice immediately and show this container or label. S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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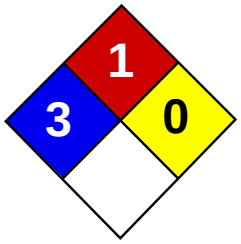

Health	3
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Cadmium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cadmium

Catalog Codes: SLC3484, SLC5272, SLC2482

CAS#: 7440-43-9

RTECS: EU9800000

TSCA: TSCA 8(b) inventory: Cadmium

CI#: Not applicable.

Synonym:

Chemical Name: Cadmium

Chemical Formula: Cd

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
Cadmium	7440-43-9	100

Toxicological Data on Ingredients: Cadmium: ORAL (LD50): Acute: 2330 mg/kg [Rat.]. 890 mg/kg [Mouse]. DUST (LC50): Acute: 50 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, liver. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: No known effect on eye contact, rinse with water for a few minutes.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: 570°C (1058°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Non-flammable in presence of open flames and sparks, of heat, of oxidizing materials, of reducing materials, of combustible materials, of moisture.

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:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. 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 locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. 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. Keep away from incompatibles such as oxidizing agents.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

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: Safety glasses. 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: 0.01 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

Odor: Not available.

Taste: Not available.

Molecular Weight: 112.4 g/mole

Color: Silvery.

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

Boiling Point: 765°C (1409°F)

Melting Point: 320.9°C (609.6°F)

Critical Temperature: Not available.

Specific Gravity: 8.64 (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, methanol, diethyl ether, n-octanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Reacts violently with potassium.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 890 mg/kg [Mouse]. Acute toxicity of the dust (LC50): 229.9 mg/m3 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP. The substance is toxic to kidneys, lungs, liver.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: An allergen. 0047 Animal: embryotoxic, passes through the placental barrier.

Special Remarks on other Toxic Effects on Humans: May cause allergic reactions, exzema and/or dehydration of the skin.

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 products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport:

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cadmium California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cadmium Pennsylvania RTK: Cadmium Massachusetts RTK: Cadmium TSCA 8(b) inventory: Cadmium SARA 313 toxic chemical notification and release reporting: Cadmium CERCLA: Hazardous substances.: Cadmium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R26- Very toxic by inhalation. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

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

Health: 3

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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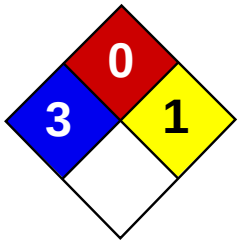

Health	3
Fire	0
Reactivity	0
Personal Protection	J

Material Safety Data Sheet
Chromium Trioxide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chromium Trioxide

Catalog Codes: SLC2068, SLC3859

CAS#: 1333-82-0

RTECS: GB6650000

TSCA: TSCA 8(b) inventory: Chromium Trioxide

CI#: Not available.

Synonym: Chromium (VI) Oxide; Chromic anhydride; Chromium (6+) Trioxide; Monochromium trioxide

Chemical Name: Chromium Trioxide

Chemical Formula: CrO3

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 Trioxide	1333-82-0	100

Toxicological Data on Ingredients: Chromium Trioxide: ORAL (LD50): Acute: 80 mg/kg [Rat]. 127 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive). Slightly hazardous in case of skin contact (sensitizer). The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant). CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to kidneys, liver, gastrointestinal tract, upper respiratory tract, skin, eyes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

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. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

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

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, 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 immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: of combustible materials of organic materials

Explosion Hazards in Presence of Various Substances:
Explosive in presence of open flames and sparks, of heat, of organic materials. Non-explosive in presence of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Arsenic reacts with Chromium trioxide with incandescence. A violent reaction or flaming is likely in the reaction of chromium oxide and aluminum powder. Benzene ignites on contact with chromium trioxide. Reacts with Sodium or Potassium with incandescence. A mixture of chromium trioxide, and sulfur ignites on warming. Ignites on contact with alcohols, acetic anhydride + tetrahydronaphthalene, acetone, butanol, chromium (II) sulfide, cyclohexanol, dimethyl formamide, ethanol, ethylene glycol, methanol, 2-propanol, pyridine. Contact with combustible or organic materials may cause fire.

Special Remarks on Explosion Hazards:
An explosion can occur when Chromium trioxide is mixed with potassium ferricyanide when dust is ignited by a spark. Chromium trioxide + potassium permanganate will explode. Can react explosively with acetic anhydride + heat, acetic acid + heat,, ethyl acetate, isoamyl alcohol, benzaldehyde, benzene, benzylthylaniline, butraldehyde, 1,3-dimethylhexahydropyrimidone, diethyl ether, ethyl acetate, isopropyl acetate, methyl dioxane, pelargonic acid, pentyl acetate, phosphorus + heat, propionaldehyde, and other organic materials or solvents.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Oxidizing material. Corrosive solid. Poisonous solid. Stop leak if without risk. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. 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 container dry. Keep away from heat. Keep away from sources of ignition. Keep away from combustible material.. Do not ingest. Do not breathe dust. Never add water to this product. 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 combustible materials, organic materials, metals, acids, alkalis.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Separate from acids, alkalies, reducing agents and combustibles. See NFPA 43A, Code for the Storage of Liquid and Solid Oxidizers.

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. Synthetic apron. Vapor and 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. Vapor and 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: 0.05 (mg(Cr)/m) from ACGIH (TLV) [United States] Inhalation CEIL: 0.1 (mg(Cr)/m) from OSHA (PEL) [United States] Inhalation TWA: 0.001 (mg(Cr)/m) from NIOSH [United States] Inhalation Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Flakes solid. Powdered solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 99.99 g/mole

Color: Red. (Dark.)

pH (1% soln/water): 1.1 [Acidic.]

Boiling Point: Decomposes.

Melting Point: 197°C (386.6°F)

Critical Temperature: Not available.

Specific Gravity: Density: 2.7 (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: See solubility in water, diethyl ether.

Solubility:
Easily soluble in cold water, hot water. Soluble in diethyl ether. Soluble in ethyl alcohol, nitric acid, acetic acid, acetone, and sulfuric acid. Solubility in water: 61.7 g/100 ml water @ 0 deg. C; 67.45 g/100 ml water @ 100 deg. C

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, dust generation, excess heat

Incompatibility with various substances: Reactive with combustible materials, organic materials, metals, acids, alkalis.

Corrosivity: Not available.

Special Remarks on Reactivity:
Hygroscopic. Incompatible with alcohol, spirit nitrous ether, almost every organic substance, bromides, chlorides, iodides, hypophosphites, sulfites, sulfides, methanol, furfuryl, ethylene glycol, glycerol, bromine pentafluoride, hydrogen sulfide, butanol, isobutanol, acetaldehyde, propionaldehyde, butylaldehyde, benzaldehyde, benzene, perlargonic acid, isopropyl acetate, pentyl acetate, methyldioxane, dimethyldioxane, acetone, benzylethlyaniline, oils, greases or any easily oxidizable material. Acetylene is oxidized violently. Reacts violently with diethyl ether. It will reactly violently with naphthalene, camphor, glycerol, or turpentine. It will ignite ethy alcohol. Selenium reacts violently with Chromium Trioxide. Can react violently with most metal powders, ammonia, ammonium salts, phosphorus, sulfur, acids, finely divided organic compounds, flammable liquids.

Special Remarks on Corrosivity:
Corrosive because of oxidizing potency. Corrosive to some metals

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 80 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, gastrointestinal tract, upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:
Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (irritant), of ingestion, . Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive). Slightly hazardous in case of skin contact (sensitizer).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose LDL [Rat] - Route: Skin; Dose: 55 mg/kg

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (effects on fertility: fetotoxicity or post-implantation mortality) and birth defects. May affect genetic material (mutagenic). May cause cancer (tumorigenic). Epidemiological studies indicate long term exposure to dusts and mists at levels above the current PEL in chrome processing is associated with increases in respiratory tract cancer in man.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation and possible burns. Contact with broken skin may lead to formation of firmly marginated "chrome sores." May cause allergic contact dermatitis. Dermal absorption of large amounts may affect behavior and may result in kidney failure Eyes: Causes eye irritation. May cause severe damage including burns and blindness. Inhalation: Causes irritation of the respiratory tract. May cause severe burns of the nasal septum and respiratory tract, perforation of the nasal septum, congestion, and pulmonary edema. Ingestion: Causes gastrointestinal tract irritation with violent epigrastic pain, nausea, vomiting and severe diarrhea. May cause tissue destruction resulting in hemorrhaging, circulatory collapse, unconciousness and possible death. May affect respiration (cyanosis), blood (anemia, thrombocytopenia) May cause kidney failure and liver damage. Chronic Potential Health Effects: Skin: Repeated or prolonged skin contact may cause "chrome sores" on skin (especially broken skin). Eyes: Repeated or prolonged eye contact may cause conjunctivitis. Inhalation: Repeated or prolonged inhalation may cause chronic respiratory tract irritation with chronic rhinitis, hyperemia, chronic catarrh, congestion of the larynx, inflammation of the larynx, polyps of the upper respiratory tract, chronic inflammation of the lungs, emphysema, tracheitis, chronic bronchitis, chronic pharyngitis, bronchopneumonia, ulceration and perforation of the nasal septum. Ingestion: Repeated or prolonged ingestion may cause nausea, vomiting, loss of appetite, kidney damage, inflammation of the liver or even hepatitis with jaundice, leukocytosis, leukopenia, monocytosis, and eosinophilia

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 products of degradation are less toxic than the product itself.

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:
CLASS 5.1: Oxidizing material. Class 8: Corrosive material

Identification: : Chromium Trioxide, Anhydrous UNNA: 1463 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Chromium Trioxide California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Chromium Trioxide Connecticut hazardous material survey.: Chromium Trioxide Rhode Island RTK hazardous substances: Chromium Trioxide Pennsylvania RTK: Chromium Trioxide Massachusetts RTK: Chromium Trioxide Massachusetts spill list: Chromium Trioxide New Jersey: Chromium Trioxide New Jersey spill list: Chromium Trioxide TSCA 8(b) inventory: Chromium Trioxide TSCA 6 final risk management: Chromium Trioxide TSCA 8(a) IUR: Chromium Trioxide TSCA 12(b) annual export notification: Chromium Trioxide

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):
CLASS C: Oxidizing material. CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive solid.

DSCL (EEC):
R8- Contact with combustible material may cause fire. R25- Toxic if swallowed. R35- Causes severe burns. R43- May cause sensitization by skin contact. R49- May cause cancer by inhalation. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. 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.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection: j

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

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 04:55 PM

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

Material Safety Data Sheet

Chromium(VI) oxide
MSDS# 95984

Section 1 - Chemical Product and Company Identification

MSDS Name:
Chromium(VI) oxide
Catalog Numbers:
19661-0000, 19661-0010, 19661-0250, 19661-2500, 21410-0000, 21410-0010, 21410-0050, 21410-1000, 40523-0000, 40523-0025, 40523-5000, C/5840/53, C/5840/62, C/5880/50, C/5880/53, C/5880/65, C/5920/50, C/5920/53, C/5920NC
Synonyms:
Chromic acid; Chromic anhydride; Chromium(VI) oxide; Chromium trioxide.
Company Identification: Fisher Scientific UK
Bishop Meadow Road, Loughborough
Leics. LE11 5RG
For information in Europe, call:(01509) 231166
Emergency Number, Europe:01509 231166

Section 2 - Composition, Information on Ingredients

CAS#: 1333-82-0
Chemical Name: Chromium trioxide
%: >98
EINECS#: 215-607-8

Hazard Symbols:
T+ O N
Risk Phrases:
45 46 22 24/25 26 35 42/43 48/23 50/53 62 9

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Harmful if swallowed. Very toxic by inhalation. Causes severe burns. May cause sensitization by inhalation and skin contact. May cause cancer. May cause heritable genetic damage. Explosive when mixed with combustible material. Toxic in contact with skin and if swallowed. Toxic : danger of serious damage to health by prolonged exposure through inhalation. Possible risk of impaired fertility. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Potential Health Effects

Eye:
Causes severe eye burns. May cause irreversible eye injury. Causes redness and pain. May cause permanent corneal opacification.

Skin:
Harmful if absorbed through the skin. Causes skin burns. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. May cause deep, penetrating ulcers of the skin. Causes redness and pain. Chronic exposure to water insoluble hexavalent chromium compounds has been shown to be associated with lung cancer and gastrointestinal tract tumors. Substance is readily absorbed through the skin.

Ingestion:
Harmful if swallowed. May cause severe and permanent damage to the

digestive tract. Causes gastrointestinal tract burns. May cause liver and kidney damage. Exposure may cause anemia and other blood abnormalities. May cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). May cause systemic effects.

Inhalation:

May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. May cause asthmatic attacks due to allergic sensitization of the respiratory tract. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Prolonged exposure to dusts, vapors, or mists may result in the perforation of the nasal septum. May cause systemic effects.

Chronic:

Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis. Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration.

Chronic ingestion may cause effects similar to those of acute ingestion. May cause liver and kidney damage. Chronic exposure to water insoluble hexavalent chromium compounds has been shown to be associated with lung cancer and gastrointestinal tract tumors. Adverse reproductive effects have been reported in animals. Possible risk of harm to the unborn child. Confirmed Human Carcinogen. May impair fertility.

Section 4 - First Aid Measures

Eyes:

Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

Skin:

Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion:

Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:

Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician:

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. Strong oxidizer. Contact with other material may cause fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media:

Use extinguishing media most appropriate for the surrounding fire. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out. May require flooding with water in order to eliminate hazardous reactions since the materials generate their own oxygen.

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 or absorb material, then place into a suitable clean, dry, closed container for disposal. Avoid generating dusty conditions. Provide ventilation. Do not use combustible materials such as paper towels to clean up spill.

Section 7 - Handling and Storage

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not ingest or inhale. Use with adequate ventilation. Discard contaminated shoes.

Storage:

Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated location. Separate from combustible materials, halogens, sulfides, metals. See also NFPA 430, Code for the Storage of Liquid and Solid Oxidizers.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

CAS# 1333-82-0:

United Kingdom, WEL - TWA: (chromium (vi) compounds): 0.05 mg/m3 TWA (as Cr)
United Kingdom, WEL - STEL: (chromium (vi) compounds): 0.15 mg/m3 STEL (as Cr)
United States OSHA: 5 µg/m3 TWA (Chromium (VI) compounds).2.5 µg/m3 Action Level (as Cr.); 5 µg/m3 TWA (as Cr. Cancer hazard - See 29 CFR 1910.1026) (Chromium (VI) compounds).
Belgium - TWA: (chromium (vi) compounds- water soluble): 0.05 mg/m3 TWA (as Cr)
France - VME: 0.05 mg/m3 VME (as Cr)
France - VLE: 0.1 mg/m3 VLCT (as Cr)
Germany: (chromium (vi) compounds): 0.05 mg/m3 VME (as Cr)
Japan: (chromium (vi) compounds): 0.05 mg/m3 OEL (as Cr); 0.01 mg/m3 OEL (certain compounds, as Cr)
Malaysia: (chromium (vi) compounds- water soluble): 0.05 mg/m3 TWA (as Cr)
Netherlands: (chromium (vi) compounds- water soluble): 0.05 mg/m3 STEL
Netherlands: (chromium (vi) compounds- water soluble): 0.025 mg/m3 MAC
Russia: 0.01 mg/m3 TWA (aerosol)
Russia: 0.03 mg/m3 STEL (aerosol)
Spain: 0.05 mg/m3 VLA-ED
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 a chemical apron. Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear a chemical apron. Wear appropriate protective gloves to prevent skin exposure.
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:	Solid
Color:	dark red to purple
Odor:	odorless
pH:	
Vapor Pressure:	Not available
Viscosity:	No information
Boiling Point:	482 deg F (250.00 C)
Freezing/Melting Point:	385 deg F (196.11 C)
Autoignition Temperature:	None available.
Flash Point:	250 deg C (482.00 deg F)
Explosion Limits: Lower:	Not available
Explosion Limits: Upper:	Not available
Decomposition Temperature:	
Solubility in water:	Soluble
Specific Gravity/Density:	2.7 (Water=1)

Molecular Formula: CrO_3
Molecular Weight: 99.99

Section 10 - Stability and Reactivity

Chemical Stability:
Stable under normal temperatures and pressures. Hygroscopic: absorbs moisture or water from the air.

Conditions to Avoid:
Incompatible materials, dust generation, moisture, excess heat.

Incompatibilities with Other Materials
Metals, reducing agents, bases, acetic acid, acetic anhydride, alcohols, alkali metals, ammonia, chlorine trifluoride, finely powdered metals, halogens, phosphorus, diethyl ether, dimethyl formamide, acetone, diethyl formamide, methanol, glycerol, organics, ethanol, camphor, pyridine, hydrocarbons, ketones, turpentine, combustible materials, attacks metals in the presence of moisture, Aqueous solution is strongly acidic., Can ignite organic matter on contact., sulfides.

Hazardous Decomposition Products
Chromium fumes, possible trivalent chromium formation with liberated oxygen..

Hazardous Polymerization
Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 1333-82-0: GB6650000
LD50/LC50:
RTECS: CAS# 1333-82-0: Oral, mouse: LD50 = 127 mg/kg;
Oral, rat: LD50 = 80 mg/kg;.
Other: TDLO/TCLO-LOWEST PUBLISHED TOXIC DOSE/CONC. Human TCLo:
ROUTE: Inhalation: DOSE: 110ug/m3.
Carcinogenicity:
Chromium trioxide -
California: carcinogen, initial date 2/27/87 (Chromium (VI) compounds).
NTP: Known carcinogen
IARC: Group 1 carcinogen
Other:
See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity:
Fish: Pseudomonas putida:

Section 13 - Disposal Considerations

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

Section 14 - Transport Information

IATA

Shipping Name:	CHROMIUM TRIOXIDE, ANHYDROUS
Hazard Class:	5.1 (8)
UN Number:	1463
Packing Group:	II

IMO

Shipping Name:	CHROMIUM TRIOXIDE, ANHYDROUS
Hazard Class:	5.1 (8)
UN Number:	1463
Packing Group:	II

RID/ADR

Shipping Name: CHROMIUM TRIOXIDE, ANHYDROUS
Hazard Class: 5.1
UN Number: 1463
Packing Group: II

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T+ O N

Risk Phrases:

R 45 May cause cancer.
R 46 May cause heritable genetic damage.
R 22 Harmful if swallowed.
R 24/25 Toxic in contact with skin and if swallowed.
R 26 Very toxic by inhalation.
R 35 Causes severe burns.
R 42/43 May cause sensitization by inhalation and skin contact.
R 48/23 Toxic : danger of serious damage to health by prolonged exposure through inhalation.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R 62 Possible risk of impaired fertility.
R 9 Explosive when mixed with combustible material.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 60 This material and its container must be disposed of as hazardous waste.

WGK (Water Danger/Protection)

CAS# 1333-82-0: 3

Canada

CAS# 1333-82-0 is listed on Canada's DSL List

US Federal

TSCA

CAS# 1333-82-0 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date:
6/02/1998
Revision #9 Date
5/16/2007
Revisions were made in Sections:
2, 3, 15

MSDS Safety Information

TOP

FSC: 6850 **MSDS Date:** 03/18/1991 **MSDS Num:** BVTJQ

Submitter: F BT **LIIN:** 00F037221 **Tech Review:** 11/02/1994 **Status CD:** C

Product ID: 000000001 LEAD **MFN:** 01

Article: N **Kit Part:** N

Responsible Party **Cage:** 1D306

Name: AT AND T TECHNOLOGIES GENERAL HQ

Address: 1 OAK WAY **Box:** N/K

City: BERKELEY HEIGHTS **State:** NJ **Zip:** 07922−2727

Country: US

Info Phone Number: 201−771−2000/908−204−8243

Emergency Phone Number: 201−771−2000/908−204−8243

Preparer's Name: N/P

Proprietary Ind: N Review Ind: Y

Published: Y Special Project CD: N

Preparer Co. when other than Responsible Party Co.

TOP

Cage: 1D306 **Assigned Ind:** N

Name: AT AND T TECHNOLOGIES GENERAL HQ

Address: 1 OAK WAY **Box:**

City: BERKELEY HEIGHTS **State:** NJ **Zip:** 07922−2727

Contractor Summary

TOP

Cage: 1D306 **Name:** AT AND T TECHNOLOGIES GENERAL HQ

Address: 1 OAK WAY

City: BERKELEY HEIGHTS **State:** NJ **Zip:** 07922−2727

Country: US **Phone:** 201−771−2000/908−204−8243

Ingredients

TOP

Cas: 7439−92−1 Code: M RTECS #: OF7525000 Code: M

Name: **LEAD, INORGANIC LEAD (IARC GROUP 2B) *94−3***

% Text: >99 Environmental Wt:

Other REC Limits: N/K

OSHA PEL: 50 UG/CUM Code: M OSHA STEL: Code:

ACGIH TLV: 0.15 MG/CUM Code: M N/P Code:

EPA Rpt Qty:	1 LB	ACGIH STEL:	
		DOT Rpt Qty:	1 LB

Ozone Depleting Chemical: N

========== Health Hazards Data ==========

TOP

LD50 LC50 Mixture N/P

Route Of Entry Inds − Inhalation:YES	Skin:YES	Ingestion:NO
Carcinogenicity Inds − NTP:NO	IARC:YES	OSHA:NO

Health Hazards Acute And Chronic

EARLY SYMPTOMS OF LEAD INTOXICATION INCLUDE PERSISTENT METALLIC TASTE, ANOREXIA, CONSTIPATION & SEVERE ABDOMINAL PAIN. CONTINUED EXPOSURES RESULT IN MUSCLE WEAKNESS & FATIGUE, DEGENERATIVE CHANGES IN MOTOR NEURONS, PALLOR OF FACE, ANEMIA, LIVER & KIDNEY DAMAGE, HEADACHE & INSOMNIA. CAUSES CHROMOSOMAL ABBERATIONS.

Explanation Of Carcinogenicity

SEE INGREDIENTS.

Signs And Symptions Of Overexposure

EARLY SYMPTOMS OF LEAD INTOXICATION INCLUDE PERSISTENT METALLIC TASTE, ANOREXIA, CONSTIPATION & SEVERE ABDOMINAL PAIN. CONTINUED EXPOSURES RESULT IN MUSCLE WEAKNESS & FATIGUE, DEGENERATIVE CHANGES IN MOTOR NEURONS, PALLOR OF FACE, ANEMIA, LIVER & KIDNEY DAMAGE, HEADACHE & INSOMNIA. CAUSES CHROMOSOMAL ABBERATIONS.

Medical Cond Aggravated By Exposure

N/K

First Aid

FLUSH W/LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINS. SKIN: WASH W/SOAP & WATER. INHALATION: REMOVE TO FRESH AIR. INGESTION: IF CONSCIOUS GIVE LARGE AMOUNTS OF WATER & INDUCE VOMITING. OBTAIN MEDICAL A TTENTION IN ALL CASES.

Spill Release Procedures

IF MATERIAL IS RECLAIMED (GROUND/CHOPPED), CLEAN−UP SHOULD BE PERFORMED AS SOON AS POSSIBLE TO MINIMIZE DISPERSION. IF POSSIBLE, VACUUM EQUIPPED W/HEPA FILTER SHOULD BE USED. IF NOT, USE WET METHODS.

Neutralizing Agent

N/K

Waste Disposal Methods

DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS. LEAD MUST BE DISPOSED OF IN COMPLIANCE W/RCRA. RECLAMATION OF LEAD AT AN APPROPRIATE FACILITY IS SUGGESTED.

Handling And Storage Precautions

DON'T EAT, DRINK, SMOKE/APPLY COSMETICS IN ANY WORK AREA WHERE EXPOSURE TO LEAD, LEAD DUST/LEAD FUME MAY OCCUR.

Other Precautions

ANNUAL PHYSICAL EXAMINATIONS ARE REQUIRED WHEN AIRBORNE LEAD LEVELS EXCEED 30 UG/CUM FOR 30 DAYS.

========== Fire and Explosion Hazard Information

TOP

==========

Flash Point Method: N/P

Flash Point: | Flash Point Text: NONE

Autoignition Temp: | Autoignition Temp Text: N/A

Lower Limits: N/R | Upper Limits: N/R

Extinguishing Media

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE CONDITIONS.

Fire Fighting Procedures

USE SCBA & PROTECTIVE CLOTHING.

Unusual Fire/Explosion Hazard

N/K

========== Control Measures ==========

TOP

Respiratory Protection

REQUIRED IF CONCENTRATION EXCEEDS PEL. FOR CONCENTRATIONS 50−500 UG/CUM, USE HIGH EFFICIENCY TOXIC DUST RESPIRATOR CARTRIDGE.

Ventilation

GENERAL MAY BE ADEQUATE. LOCAL EXHAUST IS PREFERRED. SHOULD BE IN PATTERN/VOLUME SUFFICIENT TO MAINTAIN EXPOSURE LEVELS.

Protective Gloves

REQUIRED. COTTON TYPE SUGGESTED.

Eye Protection

SAFETY GLASSES W/SIDE SHIELDS

Other Protective Equipment

SHOE COVERS, COVERALLS, HEAD PROTECTION, GOGGLES

Work Hygienic Practices

CLOTHES MUST BE CLEANED &DRIED WEEKLY. WASH AFTER EXPOSURE/HANDLING &BEFORE EATING/DRINKING/SMOKING/APPLYING MAKE−UP.

Supplemental Safety and Health

N/K

========== Physical/Chemical Properties ==========

TOP

HCC: | NRC/State LIC No:

Net Prop WT For Ammo:

Boiling Point: | B.P. Text: 3164F

Melt/Freeze Pt:		M.P/F.P Text:	621.32F
Decomp Temp:		Decomp Text:	N/K
Vapor Pres:	1	Vapor Density:	N/R
Volatile Org Content %:		Spec Gravity:	11.3
VOC Pounds/Gallon:		PH:	N/R
VOC Grams/Liter:		Viscosity:	N/P

Evaporation Rate & Reference: N/R
Solubility in Water: INSOLUBLE
Appearance and Odor: HEAVY, DUCTILE SOFT GRAY SOLID

Percent Volatiles by Volume: 0 Corrosion Rate: N/K

========== Reactivity Data ========== TOP

Stability Indicator: YES

Stability Condition To Avoid: HIGH TEMPS

Materials To Avoid: STRONG OXIDIZERS, HYDROGEN PEROXIDE, ACTIVE METALS

Hazardous Decomposition Products: TOXIC FUMES OF LEAD

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization NONE

:

========== Toxicological Information ========== TOP

Toxicological Information: N/P

========== Ecological Information ========== TOP

Ecological: N/P

========== MSDS Transport Information ========== TOP

Transport Information: N/P

========== Regulatory Information ========== TOP

Sara Title III Information: N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

========== Other Information ========== TOP

Other Information: N/P

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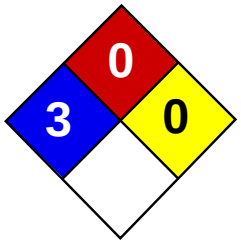


Health	3
Fire	0
Reactivity	0
Personal Protection	

Material Safety Data Sheet
Mercury MSDS

Section 1: Chemical Product and Company Identification

Product Name: Mercury

Catalog Codes: SLM3505, SLM1363

CAS#: 7439-97-6

RTECS: OV4550000

TSCA: TSCA 8(b) inventory: Mercury

CI#: Not applicable.

Synonym: Quick Silver; Colloidal Mercury; Metallic Mercury; Liquid Silver; Hydragyrum

Chemical Name: Mercury

Chemical Formula: Hg

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
Mercury	7439-97-6	100

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

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) 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 blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation.

Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

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. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

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

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

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: Not applicable.

Special Remarks on Fire Hazards:
When thrown into mercury vapor, boron phosphodiiodide ignites at once. Flame forms with chlorine jet over mercury surface at 200 deg to 300 deg C. Mercury undergoes hazardous reactions in the presence of heat and sparks or ignition.

Special Remarks on Explosion Hazards:
A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. CHLORINE DIOXIDE & LIQUID HG, WHEN MIXED, EXPLODE VIOLENTLY. Mercury and Ammonia can produce an

explosive compound. A mixture of the dry carbonyl and oxygen will explode on vigorous shaking with mercury. Methyl azide in the presence of mercury was shown to be potentially explosive.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. 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 locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. 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, metals.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 25°C (77°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor 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: 0.025 from ACGIH (TLV) [United States] SKIN TWA: 0.05 CEIL: 0.1 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 0.025 (mg/m3) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Heavy liquid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 200.59 g/mole

Color: Silver-white

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

Boiling Point: 356.73°C (674.1°F)

Melting Point: -38.87°C (-38°F)

Critical Temperature: 1462°C (2663.6°F)

Specific Gravity: 13.55 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 6.93 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Ground mixtures of sodium carbide and mercury, aluminum, lead, or iron can react vigorously. A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. Incompatible with boron diiodophosphide; ethylene oxide; metal oxides, metals(aluminum, potassium, lithium, sodium, rubidium); methyl azide; methylsilane, oxygen; oxidants(bromine, peroxyformic acid, chlorine dioxide, nitric acid, tetracarbonynickel, nitromethane, silver perchlorate, chlorates, sulfuric acid, nitrates,); tetracarbonylnickel, oxygen, acetylinic compounds, ammonia, ethylene oxide, methylsiliane, calcium,

Special Remarks on Corrosivity:
The high mobility and tendency to dispersion exhibited by mercury, and the ease with which it forms alloys (amalga) with many laboratory and electrical contact metals, can cause severe corrosion problems in laboratories. Special precautions: Mercury can attack copper and copper alloy materials.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

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

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS).

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material. May cause cancer based on animal data. Passes through the placental barrier in animal. May cause adverse reproductive effects(paternal effects- spermatogenesis; effects on fertility - fetotoxicity, post-implantation mortality), and birth defects.

Special Remarks on other Toxic Effects on Humans:

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 products of degradation are less toxic than the product itself.

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: Class 8: Corrosive material

Identification: : Mercury UNNA: 2809 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Mercury California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Mercury Connecticut hazardous material survey.: Mercury Illinois toxic substances disclosure to employee act: Mercury Illinois chemical safety act: Mercury New York acutely hazardous substances: Mercury Rhode Island RTK hazardous substances: Mercury Pennsylvania RTK: Mercury Minnesota: Mercury Massachusetts RTK: Mercury New Jersey: Mercury New Jersey spill list: Mercury Louisiana spill reporting: Mercury California Director's List of Hazardous Substances.: Mercury TSCA 8(b) inventory: Mercury SARA 313 toxic chemical notification and release reporting: Mercury CERCLA: Hazardous substances.: Mercury: 1 lbs. (0.4536 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):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R23- Toxic by inhalation. R33- Danger of cumulative effects. R38- Irritating to skin. R41- Risk of serious damage to eyes. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S2- Keep out of the

reach of children. S7- Keep container tightly closed. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label. 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.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

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

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

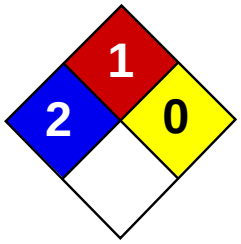
Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:22 PM

Last Updated: 05/21/2013 12:00 PM



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Selenium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Selenium

Catalog Codes: SLS2629

CAS#: 7782-49-2

RTECS: VS7700000

TSCA: TSCA 8(b) inventory: Selenium

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Se

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
Selenium	7782-49-2	100

Toxicological Data on Ingredients: Selenium: ORAL (LD50): Acute: 6700 mg/kg [Rat].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not available.

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: Material in powder form, capable of creating a dust explosion.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. 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. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes 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.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

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: 0.2 (mg/m3) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 78.96 g/mole

Color: Not available.

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

Boiling Point: 684.9°C (1264.8°F)

Melting Point: 217°C (422.6°F)

Critical Temperature: Not available.

Specific Gravity: 4.81 (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.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 6700 mg/kg [Rat].

Chronic Effects on Humans: Not available.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in animal. Excreted in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

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 products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Selenium powder : UN2658 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Selenium Massachusetts RTK: Selenium TSCA 8(b) inventory: Selenium SARA 313 toxic chemical notification and release reporting: Selenium CERCLA: Hazardous substances.: Selenium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

DSCL (EEC): R36- Irritating to eyes.

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. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

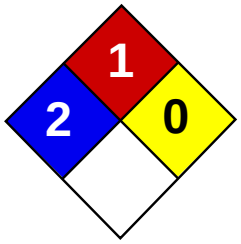
Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 06:24 PM

Last Updated: 05/21/2013 12:00 PM



Health	2
Fire	1
Reactivity	0
Personal Protection	J

Material Safety Data Sheet
Silver MSDS

Section 1: Chemical Product and Company Identification

Product Name: Silver

Catalog Codes: SLS4222, SLS2005, SLS3427, SLS1210, SLS2632, SLS4054, SLS1837

CAS#: 7440-22-4

RTECS: VW3500000

TSCA: TSCA 8(b) inventory: Silver

CI#: Not applicable.

Synonym:

Chemical Formula: Ag

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
Silver	7440-22-4	100

Toxicological Data on Ingredients: Silver: ORAL (LD50): Acute: 100 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact: No known effect on skin contact, rinse with water for a few minutes.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

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: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. 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 locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

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.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (mg/m3) from OSHA (PEL) TWA: 0.01 (mg/m3) from OSHA NIOSH Australia: TWA: 0.1 (mg/m3)Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

Odor: Not available.

Taste: Not available.

Molecular Weight: 107.87 g/mole

Color: Not available.

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

Boiling Point: 2212°C (4013.6°F)

Melting Point: 961°C (1761.8°F)

Critical Temperature: Not available.

Specific Gravity: 10.4 (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: Is not dispersed in cold water, hot water.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 100 mg/kg [Mouse].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Very hazardous in case of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

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 products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: Silver Pennsylvania RTK: Silver Minnesota: Silver Massachusetts RTK: Silver New Jersey: Silver TSCA 8(b) inventory: Silver TSCA 8(a) PAIR: Silver TSCA 8(d) H and S data reporting: Silver SARA 313 toxic chemical notification and release reporting: Silver: 1% CERCLA: Hazardous substances.: Silver: 1000 lbs. (453.6 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):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC): R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

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

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Not applicable. Lab coat. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:26 PM

Last Updated: 05/21/2013 12:00 PM

MSDS Safety Information

TOP

FSC:	MSDS Date:	MSDS Num:
6850	02/24/1995	CBYLC

Submitter:	LIIN:	Tech Review:	Status CD:
N EN	00N072525	08/29/1996	C

Product ID:	MFN:
2,3,7,8−TETRACHLORODIBENZO−P−DIOXIN SOLUTION, M−613	01

Article:	Kit Part:
N	N

Cage:

Responsible Party 0U4A8

Name:

ACCUSTANDARD INC

Address:

25 SCIENCE PARK SUITE 687

City:	State:	Zip:
NEW HAVEN	CT	06511

Country:

US

Info Phone Number:

203−786−5290

Emergency Phone Number:

203−786−5290

Radioactive Ind:

N

Preparer's Name:

N/P

Proprietary Ind:

N

Review Ind: N

Published: Y

Special Project CD: N

Contractor Summary

TOP

Cage:	Name:
0U4A8	ACCUSTANDARD INC

Address:

125 MARKET ST

City:	State:	Zip:
NEW HAVEN	CT	06513

Country:	Phone:
US	800−442−5290

Ingredients

TOP

==========

Cas: 1746−01−6 M HP3500000 M

Code: RTECS #: Code:

Name: **DIBENZO−P−DIOXIN, 2,3,7,8−TETRACHLORO−; (2,3,7,8−TETRACHLORODIBENZO−P−DIOXIN) (TCDD) (CERCLA)**

% Text: 0.001 Environmental Wt:

Other REC Limits: N/K

OSHA PEL:

N/K (FP N) Code: M OSHA STEL: Code:

ACGIH TLV: N/K (FP N) Code: M ACGIH STEL: N/P Code:

EPA Rpt Qty: DOT Rpt Qty:

Ozone Depleting Chemical:

Cas: 108−88−3 M XS5250000 M

Code: RTECS #: Code:

Name: **TOLUENE (SARA 313) (CERCLA)**

% Text: 99.999 Environmental Wt:

Other REC Limits: N/K

OSHA PEL:

200 PPM Code: M OSHA STEL: Code:

ACGIH TLV: 50 PPM, S Code: M ACGIH STEL: N/P Code:

EPA Rpt Qty: 1000 LBS DOT Rpt Qty: 1000 LBS

Ozone Depleting Chemical:

N

========== **Health Hazards Data** ========== TOP

LD50 LC50 Mixture

NONE SPECIFIED BY MANUFACTURER.

Route Of Entry Inds − Inhalation:YES Skin:YES Ingestion:YES

Carcinogenicity Inds − NTP:NO IARC:NO OSHA:NO

Health Hazards Acute And Chronic

ACUTE: HARMFUL/FATAL IF SWALLOWED. VAP HARMFUL IF INHALED. SYMPS: HDCH, DIZZ, HALLUCINATIONS, DISTORTED PERCEPTIONS, CHANGES IN MOTOR ACTIVITY, NAUS, RESP IRRIT, CNS DEPRESS, UNCON, LIVER, KIDNEY & LU NG DMG. CONT MAY CAUSE SEV EYE IRRIT. MAY CAUSE SKIN IRRIT. CHRONIC: TOLUENE APPEARS ON THE NAVY (EFTS OF OVEREXPOSURE)

Explanation Of Carcinogenicity

NOT RELEVANT.

Signs And Symptions Of Overexposure

HLTH HAZ: OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS LIST. SEEK CONSULTATION FROM APPROPRIATE HEALTH PROFESSIONALS CONCERNING LATEST HAZARD LIST INFORMATION AND SAFE HANDLING AND EXPOSURE INFORMATION (FP N).

Medical Cond Aggravated By Exposure

RESPIRATORY, LIVER AND KIDNEY CONDITIONS.

First Aid

GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE. EYES: IMMEDIATELY FLUSH THOROUGHLY W/WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH THOROUGHLY W/LARGE AMOUNTS OF WATER. INHAL: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED. INGEST: CALL MD IMMEDIATELY. ONLY INDUCE VOMITING AT THE INSTRUCTIONS OF MD. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

Spill Release Procedures

WEAR SUITABLE PROTECTIVE EQUIPMENT. ELIMINATE ANY IGNITION SORUCES UNTIL THE AREA IS DETERMINED TO BE FREE FROM EXPLOSION OR FIRE HAZARDS. CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE, IF THIS CAN BE DONE WITHOUT RISK.

Neutralizing Agent

NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods

DISPOSE AS HAZARDOUS WASTE. COMPLY WITH FEDERAL, STATE AND LOCAL REGULATIONS.

Handling And Storage Precautions

KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL AREA AWAY FROM IGNITION SOURCES AND OXIDIZERS. DO NOT BREATHE VAPOR OR MIST.

Other Precautions

DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. ELECTRICALLY GROUND ALL EQUIPMENT WHEN HANDLING THIS PRODUCT.

========== Fire and Explosion Hazard Information ==========

TOP

Flash Point Method:

TCC

Flash Point:

Flash Point Text: 40.0F,4.4C

Autoignition Temp:

Autoignition Temp Text: N/A

Lower Limits: 1.30%

Upper Limits: 7.10%

Extinguishing Media

USE DRY CHEMICAL, FOAM, CARBON DIOXIDE. WATER SPRAY TO COOL EXPOSED CONTAINERS.

Fire Fighting Procedures

WEAR NIOSH APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire/Explosion Hazard

DANGEROUS FIRE AND EXPLOSION HAZARD. VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCES AND FLASH BACK.

========== Control Measures ==========

TOP

Respiratory Protection

IF WORKPLACE EXPOS LIM OF PROD/ANY COMPONENT IS EXCEEDED (SEE TLV/PEL), A NIOSH APPRVD AIR SUPPLIED RESP IS ADVISED IN ABSENCE OF PROPER ENVIRON CTL. OSHA REGS ALSO PERMIT OTHER NIOSH APPRVD RESPS (NE G PRESS TYPE) UNDER SPECIFIED (SUP DAT)

Ventilation

MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH ADEQUATE VENTILATION.

Protective Gloves

VITON OR EQUIVALENT.

Eye Protection

ANSI APPRVD CHEM WORKERS GOGGS (FP N).

Other Protective Equipment

EMERGENCY EYEWASH DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N).

Work Hygienic Practices

WASH THOROUGHLY AFTER HANDLING. DO NOT TAKE INTERNALLY.

Supplemental Safety and Health

RESP PROT: CNDTNS (SEE YOUR SFTY EQUIP SUPPLIER). ENGINEERING AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOS.

Physical/Chemical Properties

TOP

HCC:

NRC/State LIC No:

Net Prop WT For Ammo:

Boiling Point: B.P. Text: 232F,111C

Melt/Freeze Pt: M.P/F.P Text: −139F,−95C

Decomp Temp: Decomp Text: N/K

Vapor Pres: 21.9 @ 20C Vapor Density: 3.2

Volatile Org Content %: Spec Gravity: 0.87 (H*2O=1)

VOC Pounds/Gallon:

PH: N/K

VOC Grams/Liter: Viscosity: N/P

Evaporation Rate & Reference: 2.2 (BUTYL ACETATE=1)

Solubility in Water: INSOLUBLE

Appearance and Odor: CLEAR LIQUID, WITH AROMATIC ODOR

Percent Volatiles by Volume: >99 Corrosion Rate: N/K

Reactivity Data

TOP

Stability Indicator:

YES

Stability Condition To Avoid: HEAT; CONTACT WITH IGNITION SOURCES.

Materials To Avoid: OXIDIZERS, STRONG MINERAL ACIDS.

Hazardous Decomposition Products: CO*X, HYDROCARBONS.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization NOT RELEVANT.

:

========== Toxicological Information ========== TOP

Toxicological Information:

N/P

========== Ecological Information ========== TOP

Ecological:

N/P

========== MSDS Transport Information ========== TOP

Transport Information:

N/P

========== Regulatory Information ========== TOP

Sara Title III Information:

N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

========== Other Information ========== TOP

Other Information:

N/P

========== HMIS HAZCOM Label ========== TOP

Print Labels

Product ID:

2,3,7,8−TETRACHLORODIBENZO−P−DIOXIN SOLUTION, M−613

Cage: 0U4A8 Assigned IND: N

Company Name:

ACCUSTANDARD INC

Street: 125 MARKET ST

PO Box:

City:

NEW HAVEN

State: CT

Zipcode: 06513

Country: US

Health Emergency Phone:

203−786−5290

Label Required IND:

Y

Date Of Label Review: 08/29/1996

Status Code: C

MFG Label NO:

Label Date: 08/29/1996

Year Procured:

Origination Code:

G

Chronic Hazard IND: Y

Eye Protection IND: YES

Skin Protection IND: YES

Signal Word: DANGER

Respiratory Protection IND: YES

Health Hazard:

Moderate

Contact Hazard: Moderate

Fire Hazard:

Severe

Reactivity Hazard: None

Hazard And Precautions

FLAMMABLE. ACUTE: HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL IF INHALED. SYMPTOMS: HEADACHE, DIZZINESS, HALLUCINATIONS, DISTORTED PERCEPTIONS, CHANGES IN MOTOR ACTIVITY, NAUSEA, RESPIRATORY IRRITATI ON, CENTRAL NERVOUS SYSTEM DEPRESSION, UNCONSCIOUSNESS, LIVER, KIDNEY AND LUNG DAMAGE. CONTACT MAY CAUSE SEVERE EYE IRRITATION. MAY CAUSE SKIN IRRITATION. CHRONIC: TOLUENE APPEARS ON THE NAVY OCCUPATI ONAL CHEMICAL REPRODUCTIVE HAZARDS LIST (FP N).

==========

Safety Data Sheet

Hydrochloric Acid, 12M, Concentrated

www.carolina.com

Section 1 Product Description

Product Name:	Hydrochloric Acid, 12M, Concentrated
Recommended Use:	Science education applications
Synonyms:	Muriatic Acid
Distributor:	Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215-3398
Chemical Information:	800-227-1150 (8am-5pm (ET) M-F)
Chemtrec:	800-424-9300 (Transportation Spill Response 24 hours)

Section 2 Hazard Identification

Classification of the chemical in accordance with paragraph (d) of §1910.1200;

DANGER

Causes severe skin burns and eye damage. Causes serious eye damage.

GHS Classification:
Skin Corrosion/Irritation Category 1A, Serious Eye Damage/Eye Irritation Category 1

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%
Water	7732-18-5	62.8
Hydrogen Chloride	7647-01-0	37.2

Section 4 First Aid Measures

Emergency and First Aid Procedures

Inhalation:	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Eyes:	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Skin Contact:	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse.
Ingestion:	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.

Section 5 Firefighting Procedures

Extinguishing Media:	Water fog in flooding quantities. Apply water from as far a distance as possible.
Fire Fighting Methods and Protection:	Firefighters should wear full protective equipment and NIOSH approved self-contained breathing apparatus.
Fire and/or Explosion Hazards:	Fire or excessive heat may produce hazardous decomposition products. Flammable Hydrogen gas may be produced over long periods of exposure to Aluminum, Tin, Lead, and Zinc.
Hazardous Combustion Products:	Hydrogen chloride

Section 6 Spill or Leak Procedures

Steps to Take in Case Material Is Released or Spilled: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.
Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation. If this material is released into a work area, evacuate the area immediately.

Section 7 Handling and Storage

Handling: Do not breathe dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection.
Storage: Store locked up. Keep container tightly closed in a cool, well-ventilated place.
Storage Code: White - Corrosive. Separate acids from bases; separate oxidizer acids from organic acids.

Section 8 Protection Information

	ACGIH		OSHA PEL	
Chemical Name	**(TWA)**	**(STEL)**	**(TWA)**	**(STEL)**
Hydrogen Chloride	N/A	N/A	N/A	N/A

Control Parameters
Engineering Measures: Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure.
Personal Protective Equipment (PPE): Lab coat, apron, eye wash, safety shower.
Respiratory Protection: Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.
Respirator Type(s): NIOSH approved air purifying respirator with acid gas cartridge and dust/mist filter
Eye Protection: Wear chemical splash goggles when handling this product. Have an eye wash station available.
Skin Protection: Avoid skin contact by wearing chemically resistant gloves, an apron and other protective equipment depending upon conditions of use. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work.
Gloves: Natural latex,, Butyl rubber, Nitrile, Neoprene

Section 9 Physical Data

Formula: HCl
Molecular Weight: 36.46
Appearance: Colorless Liquid
Odor: Strong Pungent
Odor Threshold: No data available
pH: -1.08
Melting Point: No data available -114 C
Boiling Point: No data available -85 C
Flash Point: No data available
Flammable Limits in Air: No data available
Vapor Pressure: 160 mmHg at 20°C
Evaporation Rate (BuAc=1): 2.0
Vapor Density (Air=1): 1.267
Specific Gravity: 1.1885
Solubility in Water: Soluble
Log Pow (calculated): No data available
Autoignition Temperature: No data available
Decomposition Temperature: No data available
Viscosity: No data available
Percent Volatile by Volume: No data available

Section 10 Reactivity Data

Reactivity: Mildly reactive - See below
Chemical Stability: Stable under normal conditions.
Conditions to Avoid: Reaction with water is exothermic.
Incompatible Materials: Water-reactive materials, Water, Caustics (bases), Oxidizing materials, Acetic anhydride, Amines, Alkanolamines, Isocyanates, Copper, Metals
Hazardous Decomposition Products: Hydrogen chloride
Hazardous Polymerization: Will not occur

Safety Data Sheet

Section 11 Toxicity Data

Routes of Entry Inhalation, ingestion, eye or skin contact.
Symptoms (Acute): Respiratory disorders
Delayed Effects: No data available

Acute Toxicity:

Chemical Name	CAS Number	Oral LD50	Dermal LD50	Inhalation LC50
Water	7732-18-5	Not applicable		
Hydrogen Chloride	7647-01-0	ORAL LD50 Rat 700 mg/kg	DERMAL LD50 Rabbit > 5010 mg/kg	INHALATION LC50-1H Rat 3124 ppm

Carcinogenicity:

Chemical Name	CAS Number	IARC	NTP	OSHA
Hydrogen Chloride	7647-01-0	Not listed	Not listed	Not listed

Chronic Effects:
Mutagenicity: No evidence of a mutagenic effect.
Teratogenicity: No evidence of a teratogenic effect (birth defect).
Sensitization: No evidence of a sensitization effect.
Reproductive: No evidence of negative reproductive effects.
Target Organ Effects:
Acute: No information available
Chronic: No information available

Section 12 Ecological Data

Overview: Slight ecological hazard. In high concentrations, this product may be dangerous to plants and/or wildlife.
Mobility: This material is expected to have high mobility in soil. It absorbs weakly to most soil types.
Persistence: Evaporation into atmosphere, dissolved in water.
Bioaccumulation: No data
Degradability: No data
Other Adverse Effects: No data

Chemical Name	CAS Number	Eco Toxicity
Water	7732-18-5	No data available
Hydrogen Chloride	7647-01-0	Aquatic LC50 (96h) Mosquitofish (Gambusia affinis) 282 MG/L

Section 13 Disposal Information

Disposal Methods: Dispose in accordance with all applicable Federal, State and Local regulations. Always contact a permitted waste disposer (TSD) to assure compliance.
Waste Disposal Code(s): If discarded, this product is considered a RCRA corrosive waste, D002.

Section 14 Transport Information

Ground - DOT Proper Shipping Name:
UN1789
Hydrochloric Acid
Class 8
P.G. II

Air - IATA Proper Shipping Name:
UN1789
Hydrochloric Acid
Class 8
P.G. II

Section 15 Regulatory Information

TSCA Status: All components in this product are on the TSCA Inventory.

Chemical Name	CAS Number	§ 313 Name	§ 304 RQ	CERCLA RQ	§ 302 TPQ	CAA 112(2) TQ
Hydrogen Chloride	7647-01-0	Hydrochloric acid	5000 lb RQ	5000 lb final RQ; 2270 kg final RQ	500 lb TPQ (gas only)	No

Section 16 Additional Information

Revised: 03/19/2013 **Replaces: None** **Printed: 06-21-2013**

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.

Glossary

ACGIH	American Conference of Governmental Industrial Hygienists
CAS	Chemical Abstract Service Number
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation
IARC	International Agency for 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
IDLH	Immediately dangerous to life and health

SAFETY DATA SHEET
NITRIC ACID (70% w/w)

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY:

PRODUCT NAME:	NITRIC ACID (70% w/w)
PART No.:	RM172
SUPPLIER:	J M Loveridge plc Southbrook Road, Southampton Hampshire SO15 1BH Tel: 023 8022 2008 Fax: 023 8022 2117

2. COMPOSITION/INFORMATION ON INGREDIENTS:

EU INDEX No.:	007-004-00-1
EEC (EINECS) No.	231-714-2
CAS No.:	7697-37-2

3. HAZARDS IDENTIFICATION:

Contact with combustible material may cause fire. Causes severe burns.

4. FIRST AID MEASURES:

GENERAL:	IN ALL CASES OF DOUBT OR WHEN SYMPTOMS PERSIST, ALWAYS SEEK MEDICAL ATTENTION
INHALATION:	Move affected person to fresh air.If recovery not rapid, seek medical attention.
INGESTION:	Only when conscious, rinse mouth with plenty of water and give plenty of water to drink - (approx 500ml). DO NOT INDUCE VOMITING. In case of spontaneous vomiting, be sure that vomit can freely drain because of danger of suffocation. Keep patient at rest and obtain medical attention.
SKIN:	Remove contaminated clothing. Wash affected area with plenty of soap and water. Obtain medical attention. Launder clothing before re-use.
EYES:	Rinse immediately with plenty of water for at least 5 minutes while lifting the eye lids. Seek medical attention. Continue to rinse.

5. FIRE FIGHTING MEASURES:

EXTINGUISHING MEDIA:	Use extinguishing media suitable against surrounding fire or the cause of fire.
UNUSUAL FIRE & EXPLOSION HAZARDS:	May ignite combustible materials.
HAZARDOUS COMBUSTION PRODUCTS:	Toxic or corrosive vapours may be released in fire situation. Oxides of nitrogen.
PROTECTIVE MEASURES IN FIRE:	Fire fighters should wear self-contained breathing apparatus. Do not release contaminated water into drains, soil or surface water.

6. ACCIDENTAL RELEASE MEASURES:

PERSONAL PRECAUTION IN SPILL:	Avoid direct contact with skin, eyes and clothing. Do not breathe vapour or fumes. Wear appropriate protective clothing.
PRECAUTIONS TO PROTECT ENVIRONMENT:	Prevent contamination of soil, drains and surface water.
SPILL CLEANUP METHODS:	Neutralise spillage with alkaline material (sodium bicarbonate or soda-ash). Take-up spillage with absorbent, inert material and place in a suitable and closable labelled container for recovery or disposal. Wash the area clean with water and detergent, observing environmental requirements.

7. HANDLING AND STORAGE:

USAGE PRECAUTIONS:	HANDLING - Product should be used in accordance with good industrial principles for handling and storing of hazardous chemicals. Avoid vapour inhalation, skin and eye contact.
STORAGE PRECAUTIONS:	Store in a cool, dry, well ventilated place, in securely closed original container. Store away from combustible materials.
STORAGE CRITERIA:	Corrosive storage.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION:

INGREDIENT NAME:	CAS No.:	STD	LT EXP 8 Hrs	ST EXP 15 Min
NITRIC ACID (70% w/w)	7697-37-2	OES	2 ppm	4 ppm

VENTILATION:	Work in a fume cupboard or use local exhaust ventilation.
RESPIRATORS:	Respiratory protection required in insufficiently ventilated working areas. For short periods of work, a suitable RPE fitted with a combination E1 filter cartridge is recommended.
PROTECTIVE GLOVES:	Use impervious gloves.
EYE PROTECTION:	Approved chemical safety goggles or face protection.
OTHER PROTECTION:	Wear protective clothing and closed footwear. Apron. Wear personal protective equipment appropriate to the quantity of material handled.
HYGIENIC WORK PRACTICES:	SKIN PROTECTION - apply barrier cream to hands and exposed skin. Promptly remove contaminated clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES:

APPEARANCE:	Colourless to slightly yellow fuming liquid.		
ODOUR/TASTE:	Pungent, suffocating.		
PHYSICAL DATA COMMENTS:	Not flammable, but will increase flammability of other materials.		
BOILING POINT (°C, interval):	89	**Pressure:**	
DENSITY/SPECIFIC GRAVITY (g/ml):	1.4 - 1.5	**Temperature (°C):**	
pH-VALUE, CONC. SOLUTION:	< 1		
SOLUBILITY DESCRIPTION:	Miscible with water in all proportions.		

10. STABILITY AND REACTIVITY:

STABILITY:	Stable under normal conditions of use.
MATERIALS TO AVOID:	Combustible materials. Oxidisable substances. May react violently with reducing agents, strong bases, organic materials, finely powdered metals and chlorates. Reaction with most common metals liberates toxic nitrogen oxides and hydrogen - CARE, risk of explosion.
HAZARDOUS DECOMP. PRODUCTS:	Thermal decomposition or burning may release toxic and corrosive oxides of nitrogen.

11. TOXICOLOGICAL INFORMATION:

HEALTH HAZARDS, GENERAL:	Strongly corrosive substance.
INHALATION:	Fumes are corrosive to the respiratory system. Pulmonary oedema may occur upto 48 hours after exposure and prove fatal.
INGESTION:	Swallowing concentrated chemical may cause severe internal injury. Ingestion may result in perforation of the oesophagus.
SKIN:	Corrosive to skin.
EYES:	Risk of serious damage to eye.

12. ECOLOGICAL INFORMATION:

ECOLOGICAL INFORMATION:	Avoid release to the environment. Prevent contamination of soil, drains or surface water, use appropriate containment method to avoid environmental contamination. Harmful effect due to pH shift. Can cause damage to vegetation.
MOBILITY:	Predicted to have high mobility in soil.
BIO ACCUMULATION:	Low bioaccumulation potential.
DEGRADABILITY:	Neutralised slowly by natural alkalinity.
WATER HAZARD CLASSIFICATION:	Hazard to drinking water supply.

13. DISPOSAL CONSIDERATIONS:

DISPOSAL METHODS:	This material and/or its container must be disposed of as hazardous waste according to Special Waste Regulations 1996 or according to local regulations, in compliance with Duty of Care Regulations and Special Waste Regulations.
WASTE CLASS:	WASTE CODE:0705** HAZARDOUS PROPERTY: H8

14. TRANSPORT INFORMATION:

UN No. ROAD:	2031
ADR CLASS No.:	8
ADR CLASS:	Class 8: Corrosive substances. - Subsidiary class 5.1
ADR ITEM No.:	2°(a)1
HAZARD No. (ADR):	885 Highly corrosive substance, oxidizing (fire-intensifying).
ADR MARGINAL:	2801
ADR LABEL No.:	8 + 05
HAZCHEM CODE:	2PE
PROPER SHIPPING NAME I:	NITRIC ACID
UN No. SEA:	UN 2031
IMDG CLASS:	8
IMDG PAGE No.:	8195
IMDG PACK GR.:	I
SEA TRANSPORT NOTES:	Subsidiary risk label required - class 5.1.
UN No., AIR:	UN-ID 2031
ICAO CLASS:	8
AIR SUB CLASS:	5.1
AIR PACK GR.:	I

15. REGULATORY INFORMATION:

LABEL FOR SUPPLY:

RISK PHRASES:	R-8 Contact with combustible material may cause fire.

	R-35 Causes severe burns.
SAFETY PHRASES:	S-1/2 Keep locked up and out of the reach of children. S-23C Do not breathe fumes. S-36 Wear suitable protective clothing. S-26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S-45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
UK REGULATORY REFERENCES:	Classification, Packaging and Labelling Regulations 1984. Chemicals (Hazard Information & Packaging) Regulations 1993.

16. OTHER INFORMATION:

INFORMATION SOURCES:	This product has been classified in accordance with CHIP3 regulations.
REVISION COMMENTS:	Edition 01; Revised item(s):
ISSUED BY:	MK
SDS No.:	317
DATE:	12/07/02
DISCLAIMER:	The foregoing data has been compiled for safety information only and does not form part of any selling specification. Information contained in this Data Sheet is to the best of JMLs knowledge correct at the time of publication. Customers should always satisfy themselves, that the product which they have selected is entirely suitable for their purpose under their conditions of use and in compliance with current regulations. For any further information, please contact the supplier.

International Methanol Company

Safety Data Sheet

According to Regulation (EC) No. 1272/2008, Regulation (EC) 1907/2006

1. Identification of the substance/mixture and of the responsible company

1.1. Product Identifier: Methanol (CH3OH)

METHANOL; WOOD ALCOHOL; METHYL HYDROXIDE; CARBINOL; MONOHYDROXYMETHANE; WOOD SPIRIT; WOOD NAPHTHA; METHYLOL; COLONIAL SPIRIT; COLUMBIAN SPIRIT; PYROXYLIC SPIRIT; STANDARD WATER IN METHANOL; RCRA U154; UN 1230; CH4O

1.2. Relevant identified uses of the substance or mixture and uses advised against:

Identified uses: Industrial solvent, fuel, feedstock for organic synthesis, gasoline octane booster

1.3. Details of the supplier of the safety data sheet:

International Methanol Company (IMC)
PO Box 12021
Post Coe 31961
Jubail Industrial City
Kingdom of Saudi Arabia

Website: www.sipchem.com/en/affiliates.htm

1.4. Emergency telephone number: 00966-359 9985 (24 hours)

2. Hazards Identification

Methanol CAS 67-56-1 Purity: 99.5% minimum

Trace Impurities: Acetone and aldehydes < 30 ppm, acetic acid Max.30mg/kg, Ethanol(%w/w) Max.50mg/kg, Water(%w/w) Max.0.1

2.1. Classification of the substance or mixture:

Classification of Labeling in accordance with the CLP Regulations:

Index No	International Chemical Identification	EC No	CAS No	Classification		Labeling			Specific Conc. Limits, M-factors	Notes
				Hazard Class and Category Code(s)	Hazard statement Code(s)	Pictogram Signal Word Code(s)	Hazard Statement Code(s)	Suppl. Hazard statement Code(s)		
	Methyl alcohol	200-659-6	67-56-1	Flam. Liq. 2 Acute Tox. 3 (Oral) Acute Tox. 3 (Dermal) Acute Inh. Tox. 3 STOT SE 1	F T; R:11-23/24 /25-39/23/24/25		H225 H301 H311 H331 H370		100	

Classification according to Regulation 1272/2008/EC (CLP)

Basis for Classification This substance is classified based on Directive 1272/2008/EC and its amendments (CLP Regulation, GHS)

METHYL ALOHOL (67-56-1)

Symbol(s):

Signal Word: Danger

Hazard(s):

H225: Highly flammable liquid and vapor

H301: Toxic if swallowed

H311: Toxic in contact with skin

H331: Toxic if inhaled

H370: Causes damage to organs

Prevention:

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapors/spray.

P264: Wash ... thoroughly after handling.

P270: Do not eat, drink or smoke when using this product.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P311: Call a POISON CENTER or doctor/physician. **P302+P352**: IF ON SKIN: Wash with plenty of soap and water. **P303+P361+P353**: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P321: Specific treatment (see ... on this label).

P330: Rinse mouth.

P370+P378: In case of fire: Use ... for extinction.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P403+P235: Store in a well-ventilated place. Keep cool.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

SAFETY DATA SHEET

Emergency overview: DANGER! Flammable liquid and vapor. Poison, may be fatal or cause blindness if swallowed. Cannot be made non-poisonous. Vapor harmful. Toxic by inhalation, in contact with skin and if swallowed. Irritating to eyes and skin. May cause irritation of respiratory tract. Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.

Potential chronic health effects:

CARCINOGENIC EFFECTS: Low carcinogenicity potential.

MUTAGENIC EFFECTS: See Section 12. Mutagenic effects reported**.**

REPRODUCTION TOXICITY: See Section 12. Reproductive effects reported.

2.2. Label: See table above.

2.3. Other hazards: None known.

3. Composition/information on ingredients

Formula	CH3OH
CAS-No.	67-56-1
Index-No.	603-001-00-X
EC-No.	200-659-6
Mol Wt.	32.04 g/mol

4. First Aid Measures

4.1. Description of first aid measures

Eye Contact: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion: Wash out mouth and water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

4.2. Most important symptoms and effects, both acute and delayed:

Irritant effects, drowsiness, dizziness, narcosis, nausea, vomiting, headache, blindness, vision impairment, coma. Drying and defatting of skin.

4.3. Indication of immediate medical attention and special treatment needed:

No additional information available.

5. Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: Use dry chemical, CO2, water spray (fog) or alcohol resistant foam

Unsuitable extinguishing media: *None noted.*

5.2. Special hazards arising from the substance or mixture:

Flammable. In a fire or if heated, a pressure increase will occur and the contain may burst, with risk of subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Acidic gases formed. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

5.3. Advice for fire fighters:

Special protective equipment for fire fighters: Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Further information: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving an personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. Do not allow fire extinguishing water to contaminate surface or groundwater systems.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures:

Advice for non-emergency personnel: Evacuate the danger zone; follow emergency precautions. Secure emergency assistance immediately. Avoid contact with the material; do not breath vapors or aerosol. If possible, provide additional ventilation.

Advice for emergency responders: Do not take action without proper training and emergency equipment. See Section 8 for additional information. Evacuate surrounding areas. Eliminate all ignition sources including flares and all open flames. Avoid all contact with spiller material. Maintain adequate ventilation and wear appropriate respiratory protection.

6.2. Environmental precautions:

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6.3. Methods and materials for containment:

Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, surface waters, basements or confined areas. Wash spillage into effluent treatment plant. Contain and collect spillage using appropriate personal protective equipment. Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handing chemical products or if a risk assessment indicates this is necessary. Collect and contain spillage with non-combustible, absorbent material (e.g. sand, earth, vermiculite or diatomaceous earth) and place in a container for disposal according to local regulations. Use spark-proof tools and explosion proof equipment. Contaminated absorbent material may pose the same hazard(s) as the spilled product.

6.4. Reference to other sections:

See disposal instruction 13 and exposure controls Section 8.

7. Handling and storage

7.1. Precautions for safe handling:

Observe all label precautions. Use appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on protection against fire and explosion: Keep away from flames and sources of ignition – including static.

7.2. Conditions for safe storage, including any incompatibilities:

Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

7.3. Specific end uses:

No other additional special end uses are anticipated.

8. Exposure controls/personal protection

8.1. Control parameters:

Personal, workplace or environmental monitoring may be necessary to ensure exposures are below recommended and legal limits.

Exposure limits:

ACGIH: 200 ppm TWA

250 ppm STEL

Skin - potential significant contribution to overall exposure by the cutaneous route

NIOSH: 200 ppm TWA; 260 mg/m3 TWA

250 ppm STEL; 325 mg/m3

STEL Potential for dermal absorption

6000 ppm IDLH

Europe: 200 ppm TWA; 260 mg/m3 TWA

Possibility of significant uptake through the skin

OSHA (US): 200 ppm TWA; 260 mg/m3 TWA

Mexico: 2 00 ppm TWA LMPE-PPT; 260 mg/m3 TWA LMPE-PPT

250 ppm STEL [LMPE-CT]; 310 mg/m3 STEL [LMPE-CT]

Skin - potential for cutaneous absorption

Exposure Limits for Chemicals which may be generated during processing
This material has no components listed.

8.2. Exposure controls:

Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Engineering measures: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Individual protection measures:

Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Discard contaminated clothing or wash thoroughly before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Hand protection: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is required.

Glove material: butyl rubber
Glove thickness: 0.7 mm or thicker
Break through time: > 240 minutes

Other protective equipment: Flame retardant antistatic protective clothing

Respiratory protection: A properly fitted air purifying respirator or air supply respirator should be worn if a risk assessment indicates that respiratory protection is necessary. Respirator selection must be based upon known or measured levels of exposure.

Environmental exposure controls: Ventilation and engineering controls to protect workers and ventilate work area to at or below recommended employee exposure levels. Technical measures are preferred over use of personal protective equipment. Environmental controls, such as scrubber or thermal oxidizer may be required to prevent process releases to the atmosphere. Do not empty into drains—risk of explosion.

9. Physical and chemical properties

9.1. Information on basic physical and chemical properties:

Physical State: Liquid	**Appearance:** clear
Color: colorless	**Physical Form:** liquid
Odor: alcohol odor	**Odor Threshold:** 100 ppm
pH: Not available	**Melting Point:** -94 °C
Boiling Point: 65 °C	**Evaporation Rate:** 4.6 butyl acetate=1
Flash Point: 11 °C CC	**LEL:** 6.0 %
OSHA Flammability Class: IB	**UEL:** 36.0 %
Autoignition: 385 °C	**Vapor Pressure:** 97.25 mmHg 20 °C
Vapor Density (air = 1): 1.11	**Density:** Not available
Specific Gravity (water = 1): 0.7914	**Water Solubility:** soluble
Coeff. Water/Oil Dist: Not available	**Viscosity:** 0.59 cP 20 °C
Volatility: 100 % by volume	**Molecular Weight:** 32.04
Molecular Formula: C-H3-O-H	

Solvent Solubility

Soluble: ether, benzene, alcohol, acetone, chloroform, ethanol, ketones, organic solvents

10. Stability and reactivity

10.1. Reactivity:

Will not polymerize. Vapors may form explosive mixture with air.

10.2. Chemical stability:

Stable at normal temperature and pressures.

10.3. Possibility of hazardous reactions:

Will not polymerize. May decompose, exotherm or catch fire with mixed with incompatible materials.

10.4. Conditions to avoid:

Avoid heat, flames, sparks and other sources of ignition. Minimize contact with material. Avoid inhalation of material or combustion by-products. Keep out of water supplies and sewers. Do not store at elevated temperatures.

10.5. Incompatible materials:

Halocarbons, combustible materials, metals, oxidizing materials, halogens, metal carbide, bases, acids, amines.

10.6. Hazardous decomposition products:

Carbon oxides.

11. Toxicological information

11.1. Information on toxicological effects:

Acute oral toxicity LD50 rat:	5628 mg/kg (IUCLID)
Acute oral LDLO human:	143 mg/kg (RTECS)
Acute inhalation toxicity:	*64000 ppm 4 hours (RTECS)*
Acute dermal toxicity LD50 rabbit:	15800 mg/kg (RTECS)
Skin irritation:	*Irritation, may cause burns on long term exposure*
Eye irritation:	*Risk of serious damage to eyes. Risk of blindness.*
Genotoxicity in vitro:	
Ames test:	negative (IUCLID)
Mutagenicity:	numerous endpoints reported in RTECS indicate mutagenicity and developmental effects in various species of bacteria, rats, and mice via oral, dermal, inhalation and intraperitoneal routes and levels of exposure.
Specific target organ toxicity - single exposure:	*Central nervous system*
Specific target organ toxicity - repeated exposure:	*Central nervous system. Skin, eye, kidney.*
Aspiration hazard:	*No information available*

11.2. Additional information:

Further data: Symptoms may be delayed. Handle using good occupational and environmental health practices.

12. Ecological information

12.1. Toxicity

Toxicity in fish LC50:	*15400* mg/L (ECOTOX: 96 hour, Bluegill sunfish)
Toxicity to daphnia and other aquatic invertebrates:	*>10000* mg/L; (IUCLID: 24 hour, Daphnia magna)
Toxicity to algae:	*8000 mg/L (IUCLID: 16 hr. Scenedesmus quadricauda)*
Toxicity to bacteria:	6600 mg/L (IUCLID: 16 hr. Pseudomonas flurorescens)

12.2. Persistence and degradability:

Readily biodegradable 99% (OECD Test Guideline 301D , 30 day)

BOD: 600-1200 mg/g (IUCLID) COD: 1400 mg/g (IUCLID)

12.3. Bio accumulative potential:

Not expected (experimental log Pow: -0.77)

12.4. Mobility in soil:

No information available.

12.5. Results of PBT and vPvB assessment:

Not classified as PBT or vPvB.

12.6. Other adverse effects:

Additional ecological information: Do not allow product to enter surface waters, wastewater or soil. Stability in water reported to be 2.2 years (IUCLID)

13. Disposal considerations

Waste treatment methods: The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Subject to disposal regulations in the U.S.-- EPA 40 CFR 262 Hazardous Waste Number(s): U154.

14. Transport Information

The transport regulations are cited according to international and/or harmonized transport regulations. Possible national deviations and country specific requirements are not considered.

US DOT Information
Shipping Name: Methanol
Hazard Class: 3
UN/NA #: UN1230
Packing Group: II
Required Label(s): 3,3, 6.1

TDG Information
Shipping Name: Methanol Hazard Class: 3
UN #: UN1230
Packing Group: II
Required Label(s): 3, (6.1)

ADR Information
Shipping Name: Methanol Hazard Class: 3
UN #: UN1230
Packing Group: II
Required Label(s): 3, 6.1

ADR Tunnel Code Restrictions
This list contains tunnel restriction codes for those substances and/or chemically related entries which are found in chapter 3.2 of the ADR regulations.

METHYL ALCOHOL (67-56-1) Restriction(s): D/E [UN1230] (II)

RID Information
Shipping Name: Methanol
Hazard Class: 3
UN #: UN1230
Packing Group: II
Required Label(s): 3, 6.1

IATA Information
Shipping Name: Methanol Hazard Class: 3
UN #: UN1230
Packing Group: II
Required Label(s): 3, 6.1

ICAO Information

Shipping Name: Methanol Hazard Class: 3
UN #: UN1230
Packing Group: II
Required Label(s): 3

IMDG Information
Shipping Name: Methanol Hazard Class: 3
UN #: UN1230
Packing Group: II
Required Label(s): 6.1

15. Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture:

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40CFR 355 Appendix A), SARA Section 311/312 (40 CFR 370.21), SARA Section 313 (40 CFR 372.65), CERCLA(40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

METHYL ALCOHOL (67-56-1)

SARA 313: 1.0 % de minimis concentration

CERCLA: 5000 lb final RQ; 2270 kg final RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C)
Acute Health: Yes **Chronic Health:** Yes **Fire:** Yes **Pressure:** No **Reactive:** No

U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
METHYL ALCOHOL	67-56-1	Yes	Yes	Yes	Yes	Yes

Not listed under California Proposition 65

Canadian WHMIS Ingredient Disclosure List (IDL)
Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL.

METHYL ALCOHOL (67-56-1)
1 %

Germany Water Classification

METHYL ALCOHOL (67-56-1)
ID Number 145, hazard class 1 - low hazard to waters

Symbol(s)
F Highly Flammable
T Toxic

Risk Phrases
R11 Highly flammable.

R23/24/25 Toxic by inhalation, in contact with skin and if swallowed.

R39/23/24/25 Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.

R20/21/22 Harmful by inhalation, in contact with skin and if swallowed.

R39/23/24/25 Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.

R68/20/21/22 Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if swallowed.

Safety Phrases

S1/2 Keep locked-up and out of the reach of children.

S7 Keep container tightly closed.

S16 Keep away from sources of ignition - No smoking.

S36/37 Wear suitable protective clothing and gloves.

S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
METHYL ALCOHOL	67-56-1	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes

Globally Harmonized System of Classification and Labeling (GHS)

The listed component(s) of this material have been checked for country-specific published classifications according to the Globally Harmonized System of Classification and Labeling (GHS).

European Union GHS Classifications

Classifications below according to Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures (CLP).

METHYL ALCOHOL (67-56-1)

Flammable liquids -	Category 2	**H225** Highly flammable liquid and vapor.
Acute toxicity - Oral -	Category 3	**H301** Toxic if swallowed.
Acute toxicity - Dermal -	Category 3	**H311** Toxic in contact with skin.
Acute toxicity - Inhalation -	Category 3	**H331** Toxic if inhaled.
Specific target organ toxicity-	Category 1	**H370** Causes damage to organs.

European Union GHS Labeling Information

Labeling information below is according to Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures (CLP).

METHYL ALCOHOL (67-56-1) Symbol(s):

Signal Word: Danger

Hazard(s):

H225: Highly flammable liquid and vapor

H301: Toxic if swallowed

H311: Toxic in contact with skin

H331: Toxic if inhaled

H370: Causes damage to organs

Prevention:

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapors/spray.

P264: Wash ... thoroughly after handling.

P270: Do not eat, drink or smoke when using this product.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P311: Call a POISON CENTER or doctor/physician.

P302+P352: IF ON SKIN: Wash with plenty of soap and water. **P303+P361+P353**: IF ON SKIN (or hair):

Remove/Take off immediately all
contaminated clothing. Rinse skin with water/shower.

P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P321: Specific treatment (see ... on this label).

P330: Rinse mouth.

P370+P378: In case of fire: Use ... for extinction.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P403+P235: Store in a well-ventilated place. Keep cool.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Japan GHS Classifications

Classifications below published under Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

METHYL ALCOHOL (67-56-1)

Flammable liquids - Category 2	**H225** Highly flammable liquid and vapor.
Acute toxicity - Oral - Category 4	**H302** Harmful if swallowed.
Serious eye damage/eye Irritation Category2A	**H319** Causes serious eye irritation.
Toxic to reproduction - Category 1B	**H360** May damage fertility or the unborn child.
Specific target organ toxicity/Single exposure Category 1	**H370** Causes damage to central nervous system, retina, and/or systemic toxicity.
Specific target organ toxicity/Single exposure Category 3	**H335** May cause respiratory irritation.
Specific target organ toxicity/Single exposure Category 3	**H336** May cause drowsiness or dizziness.

Specific target organ toxicity/Repeated exposure Category 1 **H372** Causes damage to central nervous system and/or retina through prolonged or repeated exposure.

Japan GHS Labeling Information

Labeling information below according to classifications published by Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

METHYL ALCOHOL (67-56-1) Symbol(s):

Signal Word: Danger

Hazard(s):

H225: Highly flammable liquid and vapor

H302: Harmful if swallowed

H319: Causes serious eye irritation

H360: May damage fertility or the unborn child

H370: Causes damage to organs

H335: May cause respiratory irritation

H336: May cause drowsiness or dizziness

H372: Causes damage to organs through prolonged or repeated exposure

Prevention:

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapors/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313: If eye irritation persists: Get medical advice/attention.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P321: Specific treatment (see ... on this label).

P330: Rinse mouth.

P370+P378: In case of fire: Use ... for extinction.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P403+P235: Store in a well-ventilated place. Keep cool.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to **…**

Korea GHS Classifications (SV)

Classifications below published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only).

METHYL ALCOHOL (67-56-1)

MOE:	Flammable liquids - Category 2	H**225** Highly flammable liquid and vapor.
	Acute toxicity - Oral - Category 3	**H301** Toxic if swallowed.
	Acute toxicity - Dermal - Category 3	**H311** Toxic in contact with skin.
	Acute toxicity - Inhalation - Category 3	**H331** Toxic if inhaled.
	Serious eye damage/eye Irritation - Category 2	H**319** Causes serious eye irritation.
	Specific target organ toxicity/Single exposure Category 1	**H370** Causes damage to organs.
MOEL:	Flammable liquids - Category 2	**H225** Highly flammable liquid and vapor.
	Serious eye damage/eye Irritation - Category 2A	**H319** Causes serious eye irritation.
	Reproductive Toxicity - Category 2	**H361** Suspected of damaging fertility or the unborn child.
	Specific target organ toxicity/Single exposure Category 1	**H370** Causes damage to body, central nervous system, and/or optic nerve.
	Specific target organ toxicity/Single exposure Category 3	**H335** May cause respiratory irritation.
	Specific target organ toxicity/Single exposure Category 3	**H336** May cause drowsiness or dizziness.
	Specific target organ toxicity/Repeated exposure Category1	**H372** Causes damage to central nervous system and/or eyes through prolonged or repeated exposure.
NEMA:	Flammable liquids - Category 2	**H225** Highly flammable liquid and vapor.

Korea GHS Labeling Information

Labeling information below according to classifications published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only).

METHYL ALCOHOL (67-56-1)

Symbol(s):

Signal Word: Danger

Hazard(s):

H225: Highly flammable liquid and vapor

H301: Toxic if swallowed

H311: Toxic in contact with skin

H331: Toxic if inhaled

H319: Causes serious eye irritation

H370: Causes damage to organs **Prevention**:

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapors/spray.

P264: Wash ... thoroughly after handling.

P270: Do not eat, drink or smoke when using this product.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P311: Call a POISON CENTER or doctor/physician.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313: If eye irritation persists: Get medical advice/attention.

P302+P352: IF ON SKIN: Wash with plenty of soap and water. **P303+P361+P353**: IF ON SKIN (or hair):

Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P321: Specific treatment (see ... on this label).

P330: Rinse mouth.

P370+P378: In case of fire: Use ... for extinction.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P403+P235: Store in a well-ventilated place. Keep cool.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Symbol(s):

Signal Word: Danger

Hazard(s):

H225: Highly flammable liquid and vapor

H319: Causes serious eye irritation

H361: Suspected of damaging fertility or the unborn child

H370: Causes damage to organs

H335: May cause respiratory irritation

H336: May cause drowsiness or dizziness

H372: Causes damage to organs through prolonged or repeated exposure

Prevention:

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapors/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313: If eye irritation persists: Get medical advice/attention.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P312: Call a POISON CENTER or doctor/physician if you feel unwell.

P321: Specific treatment (see ... on this label).

P370+P378: In case of fire: Use ...for extinction.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P403+P235: Store in a well-ventilated place. Keep cool.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Symbol(s):

Signal Word: Danger

Hazard(s):

H225: Highly flammable liquid and vapor

Prevention:

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response:

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P370+P378: In case of fire: Use ... for extinction.

Storage:

P403+P235: Store in a well-ventilated place. Keep cool.

Disposal:

P501: Dispose of contents/container to ...

New Zealand GHS Classifications

Classifications below according to the Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended.

METHYL ALCOHOL (67-56-1) Approval: HSR001186

Flammable liquids - Category 2	**H225** Highly flammable liquid and vapor.
Acute toxicity - Oral - Category 4	**H302** Harmful if swallowed.
Serious eye damage/eye Irritation - Category 2A	**H319** Causes serious eye irritation.
Reproductive Toxicity - Category 2	**H361** Suspected of damaging fertility or the unborn child.
Specific target organ toxicity/Single exposure- Inhalation Category 1	**H370** Causes damage to eyes and/or nervous system if inhaled.
Terrestrial Vertebrate Eco toxicity - Category 3	**H433** Harmful to terrestrial vertebrates.

New Zealand GHS Labeling Information

Labeling information below according to classifications published by New Zealand's Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended.

METHYL ALCOHOL (67-56-1)

Symbol(s):

Signal Word: Danger

Hazard(s):

H225: Highly flammable liquid and vapor

H302: Harmful if swallowed

H319: Causes serious eye irritation

H361: Suspected of damaging fertility or the unborn child

H370: Causes damage to organs

H433: Harmful to terrestrial vertebrates

Prevention:

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapors/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313: If eye irritation persists: Get medical advice/attention.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P321: Specific treatment (see ... on this label).

P330: Rinse mouth.

P370+P378: In case of fire: Use ... for extinction.

Storage:

P403+P235: Store in a well-ventilated place. Keep cool.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Taiwan GHS Classifications

.

METHYL ALCOHOL (67-56-1)

Taiwan:	Flammable liquids - Category 2	**H225** Highly flammable liquid and vapor.
	Serious eye damage/eye Irritation - Category 2A	**H319** Causes serious eye irritation.
	Reproductive Toxicity - Category 2	**H361** Suspected of damaging fertility of the unborn child.
	Specific target organ toxicity/Repeated exposure Category 1	**H372** Causes damage to organs through prolonged or repeated exposure.

Taiwan GHS Labeling Information
METHYL ALCOHOL (67-56-1)

Symbol(s):

Signal Word: Danger

Hazard(s):

H225: Highly flammable liquid and vapor

H319: Causes serious eye irritation

H361: Suspected of damaging fertility or the unborn child

H372: Causes damage to organs through prolonged or repeated exposure

Prevention:

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapors/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313: If eye irritation persists: Get medical advice/attention.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P370+P378: In case of fire: Use ... for extinction.

Storage:

P403+P235: Store in a well-ventilated place. Keep cool.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

15.2. Chemical Safety Assessment:

Sipchem has not conducted a chemical safety assessment for this product.

16. Other information

16.1. Training Advice:

Provide safety information, instruction and training to operators handling Methanol.

The information and recommendations herein are taken from data contained in independent, industry recognized references. Although reasonable care has been taken in the preparation of the information herein, Sipchem and International Methanol Company. Make no guarantee, warranty (express or implied) or other representation and assume no responsibility as to the accuracy or suitability of such information for application of the information, since conditions of its use are beyond control of these companies. Sipchem and International Methanol Company shall not bear any liability whatsoever for any loss or damage incurred in connection with the use of this substance.

SAFETY DATA SHEET
AMMONIUM SULPHATE

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY:

PRODUCT NAME:	AMMONIUM SULPHATE
PART No.:	RM018
SUPPLIER:	J M Loveridge plc Southbrook Road, Southampton Hampshire SO15 1BH Tel: 023 8022 2008 Fax: 023 8022 2117

2. COMPOSITION/INFORMATION ON INGREDIENTS:

EEC (EINECS) No.	231-984-1
CAS No.:	7783-20-2

3. HAZARDS IDENTIFICATION:

Not regarded as a health hazard under current legislation.

Slightly irritating to skin, eyes and respiratory system.

4. FIRST AID MEASURES:

GENERAL:	IN ALL CASES OF DOUBT OR WHEN SYMPTOMS PERSIST, ALWAYS SEEK MEDICAL ATTENTION
INHALATION:	Remove affected person from exposure, rest and keep warm. If recovery not rapid or complete seek medical attention.
INGESTION:	DO NOT INDUCE VOMITING. In case of spontaneous vomiting, be sure that vomit can freely drain because of danger of suffocation. Only when conscious, rinse mouth with plenty of water and give plenty of water to drink - (approx 500ml). Keep patient at rest and obtain medical attention.
SKIN:	Remove contaminated clothing. Wash affected area with plenty of soap and water. If irritation persists, seek medical attention.
EYES:	Rinse immediately with plenty of water for at least 5 minutes while lifting the eye lids. Seek medical attention. Continue to rinse.

5. FIRE FIGHTING MEASURES:

EXTINGUISHING MEDIA:	Water spray, fog or mist, carbon dioxide (CO2), alcohol resistant foam, dry chemicals, sand, dolomite etc.
SPECIAL FIRE FIGHTING PROCEDURES:	Take measures to retain water used for extinguishing. Do not release contaminated water into drains, soil and surface water. Dispose of contaminated water and soil according to local regulations.
HAZARDOUS COMBUSTION PRODUCTS:	Toxic or corrosive vapours may be released in fire situation. Oxides of sulphur, ammonia.
PROTECTIVE MEASURES IN FIRE:	Fire fighters should wear self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES:

PERSONAL PRECAUTION IN SPILL:	Avoid direct contact with skin, eyes and clothing. Avoid breathing dust.
PRECAUTIONS TO PROTECT ENVIRONMENT:	Prevent contamination of soil, drains and surface water.
SPILL CLEANUP METHODS:	Vacuum or wet-sweep and place into a suitable closable, labelled container for disposal. Wash the area clean with water and detergent, observing environmental requirements.

7. HANDLING AND STORAGE:

USAGE PRECAUTIONS:	HANDLING - Product should be used in accordance with good industrial principles for handling and storing of hazardous chemicals. Ensure good ventilation and local exhaust extraction in work place. Avoid creating or raising dust.
STORAGE PRECAUTIONS:	Store in a cool, dry, well ventilated place, in securely closed original container.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION:

INGREDIENT COMMENTS:	No specific OES assigned, however for dusts of any kind, ensure LTEL (8-hour TWA ref. period) level does not exceed 10 mg.m3 for total inhalable dust or 4 mg.m3 for respirable dust (or) as recommended in current edition of EH40.
VENTILATION:	Provide adequate general and local exhaust ventilation.
RESPIRATORS:	If unable to control dust emissions below OES limits, an approved dust protection to P2 level of protection is recommended.
PROTECTIVE GLOVES:	Use protective gloves.
EYE PROTECTION:	Use eye protection.
OTHER PROTECTION:	Wear personal protective equipment appropriate to the quantity of material handled.
HYGIENIC WORK PRACTICES:	SKIN PROTECTION - apply barrier cream to hands and exposed skin. Regularly vacuum dust to minimise the potential of air-borne exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES:

APPEARANCE:	White crystalline solid.
ODOUR/TASTE:	Odourless or no characteristic odour.

DENSITY/SPECIFIC GRAVITY (g/ml):	1.77	**Temperature (°C):**	
SOLUBILITY VALUE (g/100g H2O 20°C):	76		
DECOMPOSITION TEMP.(°C):	235		

10. STABILITY AND REACTIVITY:

STABILITY:	Stable under normal conditions of use.
CONDITIONS TO AVOID:	Avoid excessive heat.
MATERIALS TO AVOID:	Strong alkalies. Organic and inorganic nitrates.
HAZARDOUS DECOMP. PRODUCTS:	Thermal decomposition may release noxious, toxic or corrosive gases or vapours. When strongly heated, ammonium sulphate decomposes without melting, releasing ammonia or amines, oxides of nitrogen; it slowly transforms into acid sulphate.

11. TOXICOLOGICAL INFORMATION:

TOXIC DOSE - LD 50:	3000 mg/kg (oral rat)
HEALTH HAZARDS, GENERAL:	May cause irritation to eyes, skin, and mucous membranes.

12. ECOLOGICAL INFORMATION:

Ecotoxicological data	EC50 algae > 10 mg/l
LC 50, 96 HRS, FISH mg/l:	> 10
EC 50, 48 HRS, DAPHNIA, mg/l:	> 10
ECOLOGICAL INFORMATION:	Regarded as having low toxicity to aquatic organisms.
MOBILITY:	Soluble in water.
BIO ACCUMULATION:	Does not bioaccumulate.
DEGRADABILITY:	Readily biodegradable.

13. DISPOSAL CONSIDERATIONS:

DISPOSAL METHODS:	Via authorised/licenced waste disposal contractor to an approved waste disposal site, observing all local and national regulations.

14. TRANSPORT INFORMATION:

GENERAL: Not classified as hazardous for transport.

15. REGULATORY INFORMATION:

NC Not classified

RISK PHRASES: Not classified.

SAFETY PHRASES: Not classified.

16. OTHER INFORMATION:

INFORMATION SOURCES: This product has been classified in accordance with CHIP3 regulations.

REVISION COMMENTS: Edition 01; Revised item(s):

ISSUED BY: MK

SDS No.: 025

DATE: 12/07/02

DISCLAIMER: The foregoing data has been compiled for safety information only and does not form part of any selling specification. Information contained in this Data Sheet is to the best of JMLs knowledge correct at the time of publication. Customers should always satisfy themselves, that the product which they have selected is entirely suitable for their purpose under their conditions of use and in compliance with current regulations. For any further information, please contact the supplier.

ATTACHMENT D

INTEGRATED AIR SAMPLING

Methods of Personal Air Sampling

ER will perform Personal Exsposure Monitoring (PEM) per NIOSH Method 7300 specified metals listed in section 4.1 of this HASP.).PEM samples for metals will be analyzed by an AIHA accredited laboratory.

Sampling Locations

Homogeneous exposure groups (HEGs) will be identified as part of this excavation and materials-handling phase of the project. Establishing HEGs is a recognized exposure assessment method for personnel performing similar activities where exposure potential would be predicted to be the same or reasonably equivalent. ER will identify personnel in each HEG to wear the personal monitoring devices.

Frequency of Sampling

In general, dust samples will be obtained once the initial intrusive activity commences and will continue for a minimum six samples per HEG will be collected in order to characterize potential worker exposures. Periodic monitoring will be conducted when work begins on a different portion of the Site, if a different type of operation is being initiated, or if employees are working with materials known to contain lead and arsenic at locations where monitoring was not performed previously. Air sampling will be performed for the duration of field activities conducted in hazardous areas of the site or after analyzing the sample data ER's or the Site's health and safety officer determines that air sampling is not required.

Record Keeping

All records will be compiled and maintained by ER for the project duration.
Records will include the following:

1. Pre-calibration (before personal air sampling begins)
2. Post-calibration (after personal air sampling has been completed)
3. Field observations
4. Calculations and chain-of-custody forms
5. Metals analytical results
6. Daily monitoring will be recorded in the log book
7. Downloaded electronic data from air monitor equipment. (if sampling pumps are equipped)

Minimum Field Data Requirements

The following lists the minimum data that are to be collected for sampling:
Air pump/monitor data

Pump or instrument ID	Initial flow rate (L/min)
Final flow meter setting	Calibration date
Final flow rate (L/min)	Calibrator type
Average flow rate (L/min)	Initial flow meter setting

Sample media information (filter cassettes)

Field sample ID	Media type
Lab ID #	Type sample

Sampling information

Start date	Sample time
Start time	Sample volume (L)
End date	Sample volume (m3
End time	Analysis
Sample time	

Task description (for personal monitoring)

Employee name/area description	Job task
Employer	Activity

Results

Total mass (µg) (metals lab results Lab comments

Lab result only)

The air-monitoring program at the Kokomo Site consists of a combination of work zone, personnel (worker) monitoring for particulates (dust), and air sampling for metals.

ATTACHMENT E

SITE SPECIFIC TRAINING RECORD

SITE-SPECIFIC TRAINING RECORD

This is to advise that _____conducted a Site-Specific Training
(Instructor's name)

course for_____at the
(Company Name)

_____ project on_____.
(TO #, Project Name) (Date)

The total duration of the instructions was_____hours.

Instruction covered the topics checked off below:

- Site Location, Description and History ☐
- Potential site hazards (chemical, physical, and biological) ☐
- Chemical, physical, and toxicological properties of site contaminants ☐
- Safe work practices ☐
- Training requirements ☐
- Medical Surveillance ☐
- Control Zones ☐
- Monitoring ☐
- Selection, use, and limitation, of personal protective equipment ☐
- Personnel and equipment decontamination ☐
- Emergency response procedures ☐
- Hazard communication ☐
- Blood borne pathogen briefing ☐

The following participant attended the training course for the full duration indicated above.

_____ _____
Name (Print) Signature

APPENDIX E

Project Schedule

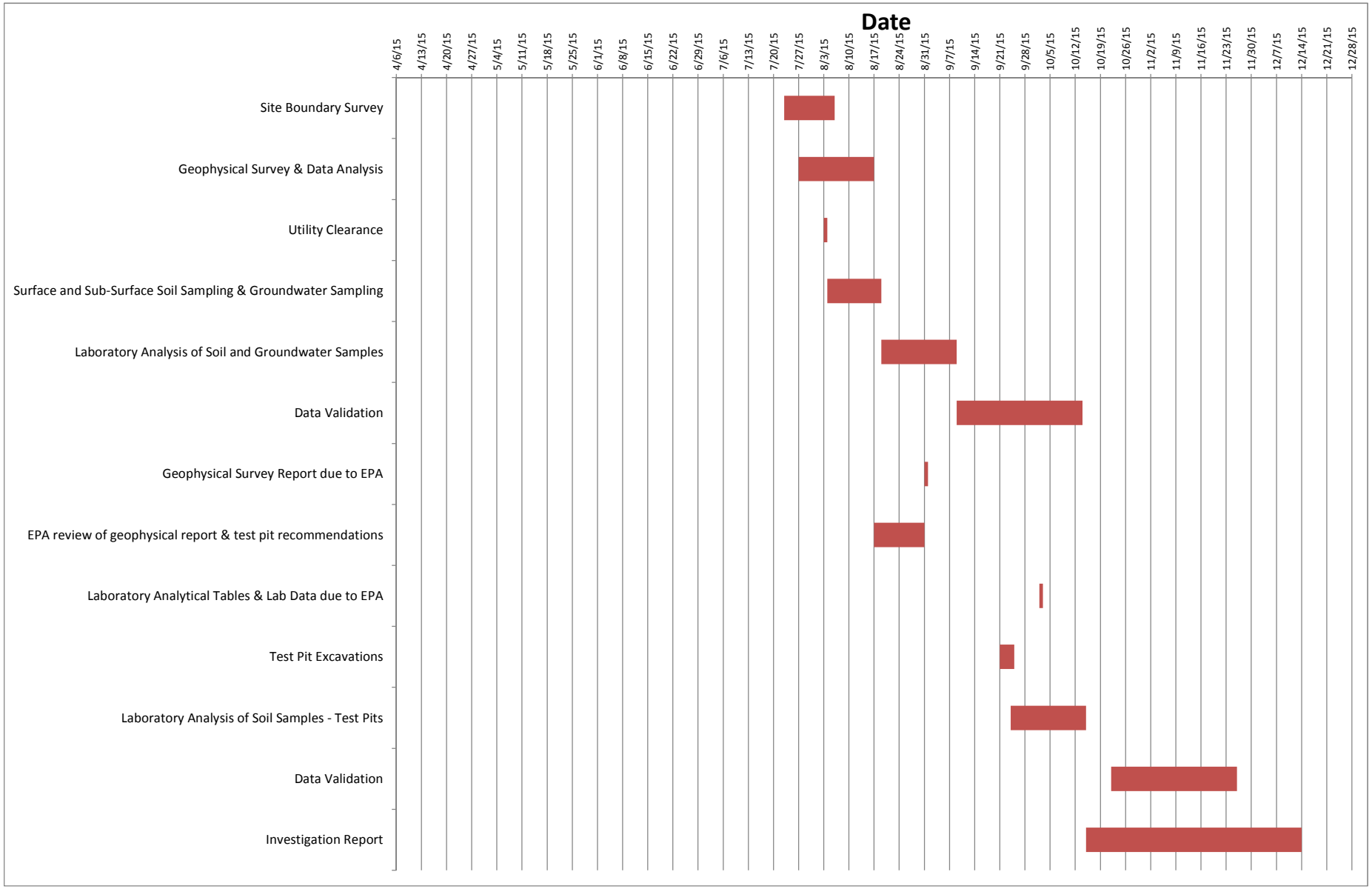
Estimated Schedule

Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number: C5M5
Administrative Settlement Agreement and Order on Consent for Removal Action Docket Number V-W-15•C-021

Order #	Milestone	Start Date	Duration (days)	End Date
89	Effective Date (ED)	4/7/2015		
16b	Site Security			
12	Contractor Notification, including Quality Management Plan		ED + 5 BD	4/14/2015
13	Project Coordinator Notification		ED + 5 BD	4/14/2015
18	HASP		ED + 30 CD	5/7/2015
17a	Work Plan, Including QAPP		ED + 30 CD	5/7/2015
17a	USEPA Review of Work Plan, HASP, & QAPP		30 CD	6/6/2015
17b	Work Plan Revisions	6/6/2015	17	6/23/2015
16c	**Field Investigation:**			
	Site Boundary Survey	7/23/2015	14	8/6/2015
	Geophysical Survey & Data Analysis	7/27/2015	21	8/17/2015
	Utility Clearance	8/3/2015	1	8/3/2015
	Surface and Sub-Surface Soil Sampling & Groundwater Sampling	8/4/2015	15	8/19/2015
	Laboratory Analysis of Soil and Groundwater Samples	8/19/2015	21	9/2/2015
	Data Validation	9/9/2015	35	10/14/2015
	Geophysical Survey Report due to EPA	8/31/2015	1	8/31/2015
	EPA review of geophysical report & test pit recommendations	8/17/2015	14	8/31/2015
	Laboratory Analytical Tables & Lab Data due to EPA	10/2/2015	1	10/2/2015
	Test Pit Excavations	9/21/2015	4	9/24/2015
	Laboratory Analysis of Soil Samples - Test Pits	9/24/2015	21	10/15/2015
	Data Validation	10/22/2015	35	11/26/2015
	Investigation Report	10/15/2015	60	12/14/2015
22	Final Report, to be drafted following all completed work	TBD	-	TBD
16e	Sampling Notification to EPA, 5 days prior		5	
21a	Progress Reports - 30th of every month			

BD = Business Days
CD = Calendar Days
TBD = To Be Determined

DIXON ROAD SITE SCHEDULE



APPENDIX G

SOP #WP-01, SESCO Surface & Shallow Subsurface Soil Sampling SOP

1.0 INTRODUCTION

SESCO Field Staff routinely collect surface soils and shallow sub-surface soils using a variety of hand tools and techniques. In addition, there are several types of electric hand-held hammer drill/hollow stem auger kits that allow the sampler to drill down into the subsurface for the collection of soil samples, soil gas, and shallow groundwater. These techniques' are often faster - more cost-effective way to obtain shallow soil analytical data without using a drilling subcontractor.

2.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide a standardized method for the collection of surface and shallow sub-surface soil samples at SESCO projects. Surface soils are generally classified as soils between the ground surface and 6 to 12 inches below the ground surface (bgs). Shallow subsurface interval may be considered to extend from approximately 12 inches bgs to a site-specific depth at which sample collection using manual collection methods becomes impractical and inefficient.

This SOP describes the equipment and procedures used for sampling surface and shallow subsurface soils used to detect or verify a surface release of a contaminant has occurred and also to evaluate potential direct contact risks and exposure scenarios.

3.0 EQUIPMENT & MATERIALS

Field Book	Marking Paint/Flags/Stakes	Hand Tools/Soil Sampling Tools	Topsoil/Gravel	Sample Bottles & Coolers
Site Map	Measuring Wheel	Tape Measure/Ruler	Ziploc® Baggies	5035-A Kits
Soil Sampling Forms & COC	PID/FID/XRF	Munsell® Soil Color Charts	Sampling & *Decontamination Supplies	PPE

* Decontamination equipment (i.e. phosphate-free detergent (Alconox®), distilled water, brushes, spray bottles, bucket, etc.). Please note that the decontamination methodology is dependent on the contaminant-of-concern and additional supplies/procedures may be required depending on a number of factors.

4.0 RESPONSIBILITIES

4.1 Procedure Responsibility

SESCO Standards & Quality Assurance/Quality Control (QA/QC) Manager (with input from SESCO Field Staff) is responsible for the maintenance, management, and revision of this procedure and the information presented in this SOP.

4.2 Project Responsibility

SESCO personnel performing this task, or any portion thereof, are responsible for following the requirements of this procedure. SESCO management personnel conducting technical review of task performance are responsible for following appropriate sections of this SOP.

For those projects where activities of this SOP are performed, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures.

5.0 PROCEDURE

5.1 Surface Soil Sampling Procedures

Hollow Stem Auger Kit

Hand Auger

Soil Corer with Slide Hammer

Soil Probe Trowel Shovel Spade

Stainless Steel Spoon

Scoopula

- Understand the scope of the project, the contaminants-of-concern and wear the proper personal protective equipment (PPE);
- Using a decontaminated hollow stem auger kit, hand auger, soil corer, soil probe, shovel, trowel, spoons or disposable scoopula collect a soil sample(s) at the desired depth(s);
  - ❖ <u>Collection of non-volatile "discrete" soil samples for laboratory analysis</u>: After reaching the desired depth – carefully remove the soil from the sampling tool and place a portion of the sample directly into the laboratory sample container and seal. Place the remaining sample on plastic sheeting to describe the soil.
  - ❖ <u>Collection of non-volatile "homogenized" soil samples for laboratory analysis</u>: Homogenization refers to collecting several soil samples from either different locations or from the same location but at different depth intervals and placing the soils in a glass or

stainless steel container and mixing thoroughly with a stainless steel spoon. Once the soil is mixed thoroughly then it is placed directly into the laboratory sample container and seal. The remaining sample can be used to describe the soil.

- ❖ Collection of volatile "discrete" soil samples for laboratory analysis: After reaching the desired depth – minimize disturbance when collecting the soil sample and immediately remove the soil from the sampling tool and place a portion of the sample directly into the laboratory sample container and seal. Place the remaining sample on plastic sheeting to describe the soil. Please see **SESCO's 5035A Soil Sampling SOP** that describes the proper procedures of collecting soil samples via United States Environmental Protection Agency (USEPA) Sampling Method 5035A.

- Place collected soil sample in a Ziploc® bag for field screening for vapor and or metals readings:

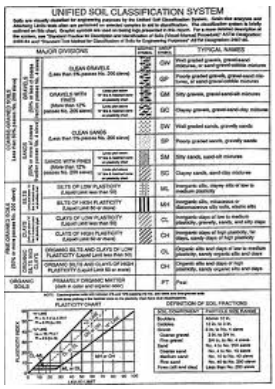
PID

FID

XRF Analyzer

- ❖ Photoionization detector (PID);
- ❖ Flame-ionization detector (FID);
- ❖ or XRF Analyzer screening

- Log soil lithology or description (composition, moisture content, Munsell® color, etc.) using the Unified Soil Classification System (USCS);



- After measuring and documenting PID/FID/XRF readings, transfer collected soil into appropriate laboratory sampling containers for analysis;
- Backfill location with existing soil and fill with additional topsoil if necessary;

- Place a marking flag , stake and/or paint location for mapping and/or a survey (if necessary);


- Decontaminate reusable equipment and properly discard disposable equipment/supplies;
- Prepare/finalize paperwork and management of samples.

5.2 Field Documentation

Field Staff must document the sample collection activities that include the following:

- Location/Sample ID;
- Depth below ground surface (i.e. 0.5');
- Date;
- Time;
- Analysis;
- Soil lithology or description;
- Sampler(s);
- Tools and techniques used to collect the samples;
- Use a ground positioning satellite (GPS) and/or a measuring wheel to mark on site map and/or field notebook where the samples were collected.

5.0 ATTACHMENTS

Attachment A – SESCO Soil Sampling Form

6.0 DOCUMENTATION & FORMS

SESCO Site-Specific Field Book
SESCO Soil Sampling Form(s)

7.0 TERMS & DEFINITIONS

Hand Auger – A sample collection device consisting of a T-bar handle, extension rods, and a detachable metal auger head or auger bucket. The auger head is a hollow metal tube with two (2) cutting edges at the bottom curved into each other to hold the material being cut and pushed up into the tube as the auger is turned clockwise and forced deeper. All trace environmental samples should be collected using stainless steel auger heads. See ASTM D1452 for a description of various types of augers (sand/mud/etc.) available for use.


Soil Corer – A sample collection device consisting of a T-handle or slide hammer, extension rods, and a sampling head. The sampling head is a thin-walled, one (1) or two (2)-piece metal tube (split lengthwise) into which a metal or plastic sleeve can be placed if required. For two (2)-piece tubes; the halves are held together with screw-locked ends, the bottom one having a cutting edge or point. The sleeve fills with material as the sampling head is forced downward, allowing for an undisturbed core to be collected.


Soil Probe – A core sample collection devise consisting of a thin-walled metal tube with a cutting edge on the bottom. The tube is cut-away from its tip to approximately one-third of the way to the top to allow material to enter. The top of a soil probe is removable, and a plastic or metal sleeve can be inserted through the top and is held in place by the reduced diameter of the tube at the top of the cutout. Soil probes can be attached to extension rods and T-handles or may be of one-length construction. Samples collected from a soil probe are almost always submitted to the laboratory intact.



9.0 REFERENCES

U.S. Army Corps of Engineers, 2001, *Requirements for the Preparation of Sampling and Analysis Plans*, EM-200-1-3.

American Society for Testing and Materials, *Standard Practice for Soil Investigation and Sampling by Auger Borings*, D1452-80 (Re-Approved 2000).

U.S. Environmental Protection Agency, 1994, *Soil Sampling* EPA/ERT SOP 2012, November.

This SOP is intended to provide general guidance for SESCO personnel and its' subcontractors for technical guidance, standard procedures and project management issues identified/encountered during environmental site investigations, remediation activities or other company related activities. It should be noted that each site, project and/or scope-of-work can be unique and SOPs are no substitute for common sense, legal requirements, company policies, and good management practices based on professional training and experience. In addition, individual contract terms may affect the implementation of this SOP. SESCO reserves the unrestricted right to change, modify or not apply these procedures in their sole, complete, and unrestricted discretion to meet certain circumstances, contractual requirements, specific site conditions, or job requirements.

Attachment A

SESCO Soil/Sediment Sampling Form

Soil/Sediment Sample Form

SESCO GROUP
Environmental Investigation & Remediation

Project Information (Section I)

Project #: _____ **Project Name:** _____

Task #: _____ **Project Location:** _____

Sampler(s): _____ / _____

Sample Date: _____ **Time:** _____

Weather Conditions: _____

Sample Location Map (Section II)

Sample Depth (feet/inches): _____

Sample Type: (circle)		Sample Color (Munsell® Soil Color Chart)	Moisture Content (circle)
Grab	Composite		Dry
Surface Soil	Sediment		Moist
Subsurface Soil	Other: _____		Wet

Sample Location Map (Section III)

↑ North

Sample Description: _____

Field Screening Results	PID Reading	FID Reading	LEL Meter Reading	Toxic Gas Meter Reading	Dosimeter (radioactive) Reading	XFF Analyzer	Other
	ppm	ppm	ppm	ppm	mr/hr or mRem/hr	ppm	

Sampling Tools/Equipment: _____

Decontamination Methods: ☐ None (X) _____

Sampling & Laboratory Analysis (Section IV)

Sample ID #: _____

Sample Analaysis: _____

Sample Analaysis: _____

Laboratory Name: _____

Turnaround Time (X): ☐ Standard ☐ Rush

QA/QC Samples (X): ☐ Duplicate ☐ MS/MSD ☐ Equip Blank

Sample ID #: _____ Sample ID #: _____

QA/QC Level (X): ☐ Level I ☐ Level II ☐ Level III ☐ Level IV

Sample Notes: _____

APPENDIX H

SOP #WP-02, SESCO Sample Chain-of-Custody SOP

1.0 INTRODUCTION

The Chain-of-Custody (COC) documentation incorporates a number of controls to assure the integrity of a sample(s). A COC form provides a way to track the lineage of a sample from collection to data reporting in order to provide the utmost confidence in the analytical results. In addition, the COC is also utilized as an analytical request document when submitting samples to laboratories.

The Chain-of-Custody is a LEGAL DOCUMENT!

In legal contexts, the COC refers to the chronological documentation or paper trail, of the physical possession, transportation, and storage of samples. Each individual that signs the COC is responsible for the care, safekeeping, and preservation of the samples while under their control. This accountability is important because if the samples are not properly maintained (controlled), the integrity of the samples may be questioned and the analytical results may not be admissible in court or be acceptable to the regulatory agencies.

2.0 PURPOSE

The purpose of this procedure is to provide the requirements for the preparation of a written COC documentation.

This procedure is applicable to all SESCO sampling events/projects where samples are transferred among parties, including to the off-site laboratories performing the various analytical analysis on the samples. Therefore, SESCO personnel should be familiar and follow the COC procedures outlined in this Standard Operating Procedure (SOP). Adherence to this procedure is <u>not</u> required whenever the same individual/sampling team is performing the sampling and testing within the same workday, and transfer to the testing process is being documented by other means (e.g. submitting samples to an onsite mobile laboratory).

Some larger environmental consulting companies have their own company COC forms that are used on their projects when collecting samples. SESCO does not have their own company COC, but rely on the various laboratories it contracts with to supply the COC with the sample bottles/jars.


Microbac

Chain of Custody Record

Microbac Laboratories, Inc.

Microbac Information

Sample ID | Sample Description | Date | Time | Analysis Requested | Container Type | No. of Cont. | Cont. Size | Preservative

Relinquished By | Date/Time

Received By | Date/Time

Relinquished By | Date/Time

Received By | Date/Time

Received At Lab By | Date/Time

Field Parameters

pH | Temperature | Time | DO

Field Limits:

pH

Temperature

Type of Error:

Page 1

Microbac Laboratories, Inc. - Chain-of-Custody Record

3.0 RESPONSIBILITIES

3.1 Procedure Responsibilities

SESCO Standards & Quality Assurance/Quality Control (QA/QC) Manager (with input from SESCO field personnel) is responsible for the maintenance, management, and revision of this procedure and the information presented in this SOP.

3.2 Project Responsibilities

SESCO personnel performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. SESCO management personnel conducting technical review of task performance are responsible for following appropriate sections of this SOP.

For those projects where activities of this SOP are performed, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Field personnel conducting sampling activities and responsible for managing the samples, must document the requirements of this SOP have been met.

4.0 PROCEDURE

4.1 Chain-of-Custody Preparation

During the sampling events, each sample collected must be entered on the COC form at the time of collection in order to document possession and must accompany the samples at all times. The sampler must not wait until sampling is completed before entering samples on COC.

COC's typically contains the same basic project/sample information and must be filled out completely prior to transferring or submitting the samples to a laboratory for analysis. Typical project/sample information requested in the boxes on the COC form includes the following:

- Each COC form must be assigned a unique reference number (COC number - typically preprinted by the laboratories in red numbering in the right corner of the COC form).
- Complete client name (Company) and address;

- The name and telephone number of the *Project Contact* information; the Project Contact should be a responsible individual that the laboratory may contact regarding analytical issues, project questions, and is typically the individual who should receive the laboratory report.
  - ❖ If multiple reports/locations are required, the information should be provided on a separate page included with the COC;
  - ❖ Some COC's also request the contact information of the sampler(s) and should include all samplers whose initials appear on any of the sample containers, to provide the laboratory a means of cross-referencing sample containers;
- Complete project name and number;
- If available, the laboratory Purchase Order (PO) number should be included on the appropriate line.
- Sample Identification (ID) - Include sample depth, if applicable. If there are multiple container types for a sample, use additional lines to indicate the required information. Sample ID nomenclature to be used may be specified in the Field Work Order, Workplan or Sample Analysis Plan (SAP);
- Sample Matrix Name or Code (e.g. Soil, Water, Air, etc.). Use the matrix codes listed on the respective COC;
- Sample Type (i.e. Grab, Composite, etc.);
- Sample Collection Date & Time - Use military time (0900, 1030, 1425, 1700, etc.);
- Indicate the number of samples containers collected per sample location. Include list of preservatives (if applicable);
- Include Quality Assurance/Quality Control (QA/QC) samples, including blind duplicate, matrix spike/matrix duplicate (MS/MSD), Trip Blank (TB), Equipment Blank (EB) samples (if applicable).
  - ❖ Note: MS/MSD samples should not be listed as separate samples. A note should be written next to the appropriate sample identifying where the MS/MSD samples were collected and the number of sample containers at the said location should reflect all three (3) sets of samples.
- The page identifier and total page count section must be completed (i.e. Page _ of _) – Additional COC forms may need to be completed if there are more samples then space on the first COC.
- Identify QA/QC data package requested (Level II, III, or IV). Note: if no box exists on the form for QA/QC level requested (i.e. Pace), write in comments section.

- Sample analysis for each matrix - Include analysis name (e.g. VOCs) and methodology (e.g. USEPA Method 8260C). Outlined in the Field Work Order, Workplan or Sample Analysis Plan (SAP);
- Include analytical data package turn-around time (TAT) request information (i.e. standard, rush, etc.);
- Note which Electronic Data Deliverable (EDD) format is requested for receiving the sample results (laboratory analysis report) - if applicable;
- Notes or Special Instruction Section – Use this section to include important information to the laboratory (e.g. samples that may require dilution or samples that will need to be composited by the laboratory. In addition, this section may also be used for any additional job-specific information or requirements. See Field Work Order, Workplan or Sample Analysis Plan (SAP);
- Relinquish by - Relinquish the samples by signing the form and providing the date & time upon delivery to the laboratory or other entity. The first *Relinquished By* space must be completed by the individual who will either transfer the samples or seal the shipping container. Note: Make sure the time relinquished matches the time accepted by the laboratory representative. If shipping the samples, see SESCO's *Handling, Packaging, and Shipping (Non-Hazardous) Samples SOP*.
- If shipping by national carriers (e.g. FEDX, DHL), the *Waybill/Airbill Number* <u>must</u> be included. Note: carriers will not sign custody documents. Therefore, inclusion of the Waybill/Airbill number on the COC is the <u>only</u> means of documenting the transfer to the carrier and transportation of the samples. The preparer of the COC <u>must</u> complete the first *Relinquished By* space and put the carrier's Waybill/Airbill number in the first *Received By* space and the second *Relinquished By* space. See SESCO's *Handling, Packaging, and Shipping (Non-Hazardous) Samples SOP*.
- If shipping by local courier (e.g. Now Courier, Inc.), the courier will not sign custody documents. The preparer of the COC <u>must</u> complete the first *Relinquished By* space and put the courier's company name in the first *Received By* space and the second *Relinquished By* space. See SESCO's *Handling, Packaging, and Shipping (Non-Hazardous) Samples SOP*.
- All other transfers <u>must</u> be performed in person, and the Relinquisher <u>must</u> witness the signing by the Receiver.
- Samples may be brought back to the office and placed neatly grouped in the refrigerator located in the large conference room with the empty cooler nearby. The COC must be left with the project manager, the PM should sign the COC as the next person on the chain-of-custody showing they approved and received it. If the PM is not around and you need to leave the office for another job, leave the COC on their desk and call the PM with an appropriate time frame to discuss any issues with the COC.

- If dropping off the samples directly to the lab, you must take a picture of the COC with your phone and email it to the PM for review and approval. If you don't receive your approval from your PM by the time you reach the laboratory, then you should write a note on the COC that states "hold until notice from the PM." Then you need to inform your PM.
- The COC preparer (Relinquisher) must maintain one (1) of the COC carbon copies as proof that the samples were submitted to a laboratory for analysis or to another entity that is now responsible for maintain the samples. The COC copy should be included in all sampling paperwork delivered to the Project Manager (PM) and should be maintained in the project file until the laboratory has issued its' analytical report. Typically, a copy of the COC is included in the laboratory analysis report.

- Sample Condition Section – Some laboratory COCs have *Sample Condition Section* that laboratory personnel (Receiver) completes as to the condition of the samples received.
- COC per cooler – Samplers should prepare a COC(s) to match samples packaged in each cooler that will be relinquished/transferred.
- COC data should match the sample labels so that the lab can cross-reference and that the integrity of the COC or the samples can be questioned.
- All COC documentation must be completed in indelible ink.
- COC correction - NEVER ERASE MISTAKES! If an entry is erased the integrity of the COC could be in question and may appear as being doctored or left intentionally incomplete. If you make a mistake and want to delete an entry you should draw a single line through it so that it's still legible. Corrections should be made adjacent to the deleted entry, initialed and dated.

5.0 ATTACHMENTS

Attachment A – Example of a completed Chain-of-Custody

6.0 DOCUMENTATION & FORMS

None

7.0 TERMS & DEFINITIONS

Chain-of-Custody (COC) Form – A form used to document and track the custody and transfers of a sample from collection to analysis or placement in a designated secure area within the testing facility.

Custody – The legal term used to define the control and evidence traceability of an environmental sample. A sample is considered in a individual's custody when it is in actual physical possession of the person, is in view of the person, is locked in a container controlled by the person, or has been placed into a designated secure area by the person.

Receiver – The company or individual that has officially received the samples, has physical possession, and is responsible for the management and security of the samples.

Reliquisher – The individual who will either transfer and relinquish the physical possession of the samples or seal the shipping container.

8.0 REFERENCES

U.S. Environmental Protection Agency, 1986, *Test Methods for Evaluating Solid Waste*; *Physical/Chemical Methods SW-846*, Third Edition.

U.S. Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plans*, EM200-1-3.

This SOP is intended to provide general guidance for SESCO personnel and its' subcontractors for technical guidance, standard procedures and project management issues identified/encountered during environmental site investigations, remediation activities or other company related activities. It should be noted that each site, project and/or scope-of-work can be unique and SOPs are no substitute for common sense, legal requirements, company policies, and good management practices based on professional training and experience. In addition, individual contract terms may affect the implementation of this SOP. SESCO reserves the unrestricted right to change, modify or not apply these procedures in their sole, complete, and unrestricted discretion to meet certain circumstances, contractual requirements, specific site conditions, or job requirements.

Attachment A

Completed Chain-of-Custody Example

Microbac

Samples Submitted to:
[ ] 250 West 84th Drive, Merrillville, IN 46410, Tel: 219-769-8378, Fax: 219-769-1664
[X] 5713 West 85th Street, Indianapolis, IN 46278, Tel: 317-872-1375, Fax: 317-872-1379

Chain of Custody Record

Number 66676

Instructions on back

Client Name: SESCO GROUP	Project: FORMER JUSTAK TRUCKING	Turnaround Time	Report Type
Address: 1426 W. 29TH STREET	Location: WHITING, IN	[X] Routine (7 working days)	[ ] Results Only [X] Level II
City, State, Zip: INDIANAPOLIS, IN 46208	PO #: 03390	[ ] RUSH* (notify lab)	[ ] Level III [ ] Level III CLP-like
Contact: RUSSELL SCHLUKEBIR	Compliance Monitoring? [ ] Yes(1) [X] No	(needed by)	[ ] Level IV [ ] Level IV CLP-like
Telephone #: 317-347-9590 EXT 17	(1)Agency/Program		[ ] EDD

Sampled by (PRINT): MIKE COOPER Sampler Signature: Mike Cooper Sampler Phone #: 765-891-9476

Send Report via [ ] Mail [ ] Telephone [ ] Fax (fax #) [X] e-mail (address) russell@sescogroup.com

* **Matrix Types:** Soil/Solid (S), Sludge, Oil, Wipe, Drinking Water (DW), Groundwater (GW), Surface Water (SW), Waste Water (WW), Other (specify)

** **Preservative Types:** (1) HNO3, (2) H2SO4, (3) HCl, (4) NaOH, (5) Zinc Acetate, (6) Methanol, (7) Sodium Bisulfate, (8) Sodium Thiosulfate, (9) Hexane, (U) Unpreserved

Client Sample ID	Matrix*	Grab	Composite	Filtered	Date Collected	Time Collected	No. of Containers	Requested Analyses → Preservative Types **	VOCs (8260)	PAHs (8270SIM)	For Lab Use Only
MW-1	GW	X			2-26-13	0935	4	(3)(U)	X	X	
MW-2	↓	↓			↓	1030	4	↓	↓	↓	
MW-3	↓	↓			↓	1145	4	↓	↓	↓	
MW-4	↓	↓			↓	1630	4	↓	↓	↓	
MW-5	↓	↓			↓	1600	12	↓	↓	↓	
MW-6	↓	↓			↓	1240	4	↓	↓	↓	
MW-7	↓	↓			↓	1435	4	↓	↓	↓	
DUPLICATE	↓	↓			↓	—	4	↓	↓	↓	
TRIP BLANK	—	—			—	—	2	(3)	↓		

Possible Hazard Identification: [ ] Hazardous [X] Non-Hazardous [ ] Radioactive

Sample Disposition: [X] Dispose as appropriate [ ] Return [ ] Archive

Comments: * MS/MSD COLLECTED FROM MW-5

Relinquished By (signature)	Date/Time	Received By (signature)	Date/Time
Mike Cooper	2-26-13 1815		
Relinquished By (signature)	Date/Time	Received By (signature)	Date/Time
Relinquished By (signature)	Date/Time	Received for Lab By (signature)	Date/Time
		DAR	2/26/13 1815

Sample temperature upon receipt in degrees C =

rev. 11/04/04

APPENDIX I

SOP #WP-03, SESCO Custody Seals SOP

SESCO Sample Management - Custody Seals SOP

1.0 INTRODUCTION

Custody Seals are an important method to prevent tampering of samples and maintaining the integrity of samples when relinquishing possession of the samples to a 2nd party (Receiver) or when shipped (FEDEX®/courier/etc.).

2.0 PURPOSE

The purpose of this procedure is to provide the requirements for preparation and attachment of Custody Seals on environmental samples and shipping containers.

This procedure is applicable to all SESCO sampling activities where sample legal defensibility and custody integrity is required – which would apply to most of SESCO projects. Therefore, SESCO personnel should be familiar and follow the Custody Seals procedures outlined in this Standard Operating Procedure (SOP) unless directed not to by the Project Manager. However, adherence to this procedure is not required when the same individual/team is performing the sampling and testing within the same workday, and transfer of the samples to the laboratory is being performed by the same individual/team.

Although SESCO does not have its' own company Custody Seals, most SESCO contracted laboratories have their own pre-printed Custody Seals and will include them with the sample bottle orders/coolers. Custody Seals can also be prepared using security tape with the initials of the sampler and the date/time placed over the lid of the cooler or shipment container with samples.

3.0 RESPONSIBILITIES

3.1 Procedure Responsibility

SESCO Senior Project Managers and Project Managers (with input from SESCO field personnel) are responsible for the maintenance, management, and revision of this procedure and the information presented in this SOP.

3.2 Project Responsibility

SESCO personnel performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. SESCO management personnel conducting technical review of task performance are responsible for following appropriate sections of this SOP.

For those projects where activities covered under this SOP are performed, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Field personnel conducting sampling activities and responsible for managing the samples, must document the requirements of this SOP have been met.

4.0 PROCEDURE

4.1 Completing the Custody Seal Information

1. All Custody Seals must be completed in indelible ink. All corrections must be made using standard single-line cross-out methods, and the initials of the individual making the change must be included beside the corrected entry.

2. Each Custody Seal attached must be completed by writing the date, at a minimum, and signing with a full signature by the person responsible for the sealing of the sample.

3. If a space is provided – the time should also be included.

4.2 Attaching the Custody Seals

Whenever possible, Custody Seals should be attached over the sample container lids during actual sampling and not when the samples are packaged for shipment. This will provide confidence in legal custody and will demonstrate non-tampering during the sample collection process.

Do Not Attach Custody Seals to Volatile Organic Compound (VOC) sample containers (i.e. VOA's or vials), as potential contamination may occur. For these samples, the Custody Seal should be used to seal the folded plastic Ziploc® brand bag that holds the sample containers.

Vials with a Custody Seal


Sample Bottles with Custody Seals

Sample Shipping Cooler with Custody Seal

1. For sample jars, the completed Custody Seal should be placed across the top of the lid with the edges below the lid/jar interface and attached to the jar body. This will require the breaking of the seal in order to open the sample container.

2. When Field Staff are required to ship (FEDEX®/courier/etc.) samples to a laboratory, Custody Seals should be placed in such a manner that the seal extends lengthwise from the top edge of the lid to the side of the cooler/container so that it must be broken to gain access to the contents (samples) and assuring the integrity of the samples. Custody Seals should be

placed on coolers/shipping containers and the cooler circumference should be taped (covering the Custody Seal) prior to the sampler's (Relinquisher) transferring possession to a shipping company or 2nd party (Receiver).

5.0 ATTACHMENTS

None

6.0 FORMS

None

7.0 TERMS & DEFINITIONS

Custody – The legal term used to define the control and evidence traceability of an environmental sample. A sample is considered in an individual's custody when it is in actual physical possession of the person, is in view of the person, is locked in a container controlled by the person, or has been placed into a designated secure area by the person.

Custody Seal – Commercially available thin strips of adhesive paper with write-in lines for the date, time and identification of the preparer. Custody Seals are placed over the caps of sample containers and along the cover seals of shipping containers (coolers) as a means to detect tampering before arrival at the testing facility. Most laboratories provide Custody Seals with sample container supply kits.

8.0 REFERENCES

U.S. Environmental Protection Agency, 1986, *Test Methods for Evaluating Solid Waste*; *Physical/Chemical Methods SW-846*, Third Edition.

U.S. Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plans*, EM200-1-3.

APPENDIX J

SOP #WP-04, SESCO Subsurface Soil Sampling SOP

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) outlines SESCO's procedures for subsurface soil sampling using a direct push methodology as performed by a licensed drilling subcontractor. These subsurface soil sampling guidelines follow guidance provided in the Indiana Department of Environmental Management (IDEM) Remediation Closure Guide (RCG) document. SESCO Field Staff routinely collect subsurface soil samples using a variety of hand tools and techniques. In addition, there are several types of electric hand-held hammer drill/hollow stem auger kits that allow the sampler to drill down into the subsurface for the collection of soil samples, soil gas, and shallow groundwater. These techniques are often a faster, more cost-effective way to obtain shallow soil analytical data without using a drilling subcontractor (see **SESCO's Surface-Shallow Soil Sampling SOP**).

2.0 PURPOSE

The purpose of this SOP is to provide a standardized method for the collection of subsurface soil samples by SESCO employees. In this SOP, subsurface soils are classified as soil intervals collected at a site-specific depth at which sample collection using manual collection methods becomes impractical and inefficient. Pursuant to the IDEM RCG, subsurface soils may be collected and analyzed for site-specific constituents of concern (COCs) for the following reason(s):

- Evaluating soil direct contact risks, if it is likely that excavation activities will bring soil to the surface or other direct contact exposure risks potentially exist;
- Evaluate the potential for COCs in the soil to leach to groundwater and present risks associated with groundwater ingestion and vapor inhalation;
- Ensure the proper placement of monitoring well screens; and,
- Provide data for effective design and monitoring performance of remediation systems.

This SOP describes the equipment and procedures used for sampling subsurface soils used to evaluate potential direct contact risks and other exposure scenarios.

3.0 EQUIPMENT & MATERIALS

Field Book	Marking Paint/Flags/Stakes	Hand Tools/Soil Sampling Tools	Topsoil/Gravel	Sample Bottles & Coolers
Site Map	Measuring Wheel	Tape Measure/Ruler	Ziploc® Baggies	5035-A Kits
Soil Boring Logs & Chain-of-Custody	PID/FID/XRF	Munsell® Soil Color Charts	Sampling & *Decontamination Supplies	PPE

* Decontamination equipment (i.e. phosphate-free detergent (Alconox®), distilled water, brushes, spray bottles, bucket, etc.). Please note that the decontamination methodology is dependent on the contaminant-of-concern and additional supplies/procedures may be required depending on a number of factors.

4.0 RESPONSIBILITIES

4.1 Procedure Responsibility

SESCO Senior Project Managers and Project Managers are responsible for the maintenance, management, and revision of this procedure and the information presented in this SOP.

4.2 Project Responsibility

SESCO personnel performing this task, or any portion thereof, are responsible for following the requirements of this procedure. SESCO management personnel conducting technical review of task performance are responsible for following appropriate sections of this SOP.

For those projects where activities covered under this SOP are performed, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures.

5.0 PROCEDURE

5.1 Subsurface Soil Sampling Procedures

- Understand the scope of the project, the COCs, and wear the proper personal protective equipment (PPE);
- Using a decontaminated drill rig operated by a professionally certified contractor, collect subsurface soil samples continuously in two (2)-foot depth intervals in each boring beginning at the ground surface.

Geoprobe® Direct Push Drill Rig

5.1.1 Field Screening Soil Sample Procedures:

- Split each sample lengthwise into two (2) duplicate portions. Place one (1) portion of the sample immediately into a laboratory-supplied container and store on ice at approximately four (4) degrees Celsius (°C) for possible laboratory analysis. See **Section 5.1.2** below for more detail.

- Place the other portion of the sample in a Ziploc® bag (or similar) for field screening for vapor and/or metals readings using the appropriate equipment:

PID

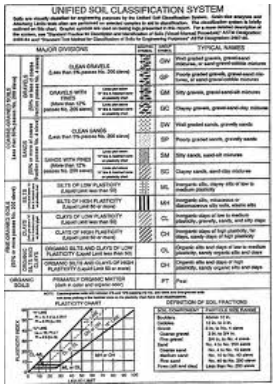
FID

XRF Analyzer

  - Photoionization detector (PID);
  - Flame-ionization detector (FID);
  - or XRF Analyzer screening

- Following placement in the plastic bag, allow the headspace to equilibrate for approximately 15 minutes. Then insert the PID or FID monitoring probe into the plastic bag, and record the maximum instrument reading on the boring log. If utilizing an XRF analyzer, follow screening instructions in the operator's manual specific to the model being used.

- Log soil lithology or description (composition, moisture content, Munsell® color, etc.) using the Unified Soil Classification System (USCS);



- Select the appropriate soil depth intervals for laboratory analysis using field observations (i.e., discoloration, odor, elevated field PID/FID/XRF readings, lithologic unit) or pre-determined soil sampling interval selections, and collect soil samples per the following procedures:

5.1.2 Soil Sample Collection Procedures:

- Collection of volatile "discrete" soil samples for laboratory analysis: After reaching the desired depth – minimize disturbance when collecting the soil sample and immediately remove the soil from the sampling tool and place a portion of the sample directly into the laboratory sample container and seal, per the United States Environmental Protection Agency (USEPA) Sampling Method 5035A, as outlined in the USEPA SW-846 guidance manual.

❖ **USEPA 5035A Sampling Methodology Procedures**:
  - Remove the pre-cleaned plastic cap from the laboratory-supplied 5035 Terra Core® sampler (plastic T-shaped syringe).
  - Holding the wingtips on either side of the sampler body, push the 5035 sampler into the soil to be sampled.
  - Pack the 4.5 to 5.5 grams of dry to semi-dry soil tightly into the body of the 5035 sampler, pushing the plunger into its rear position.
  - Push the plug of soil into each of three (3) pre-weighed (tared) unpreserved 40 milliliter (mL) vials with stir bars.


5035 Terra Core® Sampler


5035 Preserved 40 mL Vials

- Collection of non-volatile "discrete" soil samples for laboratory analysis: After reaching the desired depth – carefully remove the soil from the sampling tool and place a portion of the sample directly into the laboratory sample container and seal.

- Collection of non-volatile "composite" soil samples for laboratory analysis: Composite refers to collecting several soil samples from either different locations or from the same location but at different depth intervals and placing the soils in a glass or stainless steel container and mixing thoroughly with a stainless steel spoon. Once the soil is mixed thoroughly it is placed directly into the laboratory sample container and sealed.

5.1.3 Subsurface Soil Sampling Completion:

- Fill out the laboratory-supplied label with the sample name, sample depth, date, time, preservative and requested analysis and place tightly around the sample container (see **SESCO's Sample Labeling SOP**).

- Place the sample container into a cooler filled with ice and maintain at a maximum temperature of 4°C for transportation to the laboratory (see **SESCO's Sample Management SOP**);

- Fill in the appropriate information on the site-specific chain-of-custody prior to packing the sample cooler (see **SESCO's Chain-of-Custody SOP**).

- Upon completion of soil boring advancement and sample collection, backfill boring with bentonite;

- Place a marking flag , stake and/or paint location for mapping and/or a survey (if necessary);


- Decontaminate reusable equipment and properly discard disposable equipment/supplies;

- Finalize paperwork and field notes (see **SESCO's Field Notes & Documentation SOP**).

- Upon completion of field work or prior to expiration of analytical hold times, transport sample cooler to laboratory or appropriate shipping facility (see **SESCO's Custody Seal SOP**).

5.2 Field Documentation

Field Staff must document the sample collection activities that include the following:

- Location/Sample ID;
- Depth below ground surface (i.e. 6-8');
- Date;
- Time;
- Analysis;
- Soil lithology or description;
- Field screening results (PID, FID or XRF instrument reading)
- Sampler(s);
- Tools and techniques used to collect the samples;
- Use a global positioning system (GPS) unit and/or a measuring wheel to mark on site map and/or field notebook where the samples were collected.

6.0 ATTACHMENTS

None

7.0 DOCUMENTATION & FORMS

SESCO Site-Specific Field Book
SESCO Soil Boring Log(s)
SESCO Soil Sampling Form(s)

8.0 TERMS & DEFINITIONS

None

9.0 REFERENCES

Indiana Department of Environmental Management (IDEM), 2012, *Remediation Closure Guide (with corrections through July 9, 2012).*

U.S. Army Corps of Engineers, 2001, *Requirements for the Preparation of Sampling and Analysis Plans*, EM-200-1-3.

U.S. Environmental Protection Agency, 1994, *Soil Sampling* EPA/ERT SOP 2012, November.

U.S. Environmental Protection Agency, 1980, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* Update IV of SW-846

This SOP is intended to provide general guidance for SESCO personnel and its' subcontractors for technical guidance, standard procedures and project management issues identified/encountered during environmental site investigations, remediation activities or other company related activities. It should be noted that each site, project and/or scope-of-work can be unique and SOPs are no substitute for common sense, legal requirements, company policies, and good management practices based on professional training and experience. In addition, individual contract terms may affect the implementation of this SOP. SESCO reserves the unrestricted right to change, modify or not apply these procedures in their sole, complete, and unrestricted discretion to meet certain circumstances, contractual requirements, specific site conditions, or job requirements.

APPENDIX K

SOP #WP-05, SESCO Test Pit Excavation SOP

1.0 INTRODUCTION

SESCO Field Staff routinely conduct sub-surface environmental investigations using a variety of techniques. Test pit excavations are often utilized following review of historical documentation (i.e. Sanborn fire insurance maps) or completion of geophysical exploration indicating areas of potential environmental concern or interest. The SESCO Test Pit Excavation SOP describes the methods/procedures utilized to investigate sub-surface conditions at specific locations while covering a greater area than direct push or auger drilling.

2.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide technical guidance and standardized methods for the investigation of sub-surface conditions using test pit excavation at SESCO projects. Test pit excavation may be conducted for the following reasons:

- Investigation to determine the presence or absence of sub-surface anomalies including underground storage tanks (USTs), buried drums, fill material, etc.
- Soil lithology descriptions (composition, moisture content, Munsell® color, etc.) using the Unified Soil Classification System (USCS).
- Field screening for vapor and or metals readings using a Photoionization detector (PID), Flame-ionization detector (FID), x-ray fluorescence (XRF) Analyzer, or other screening methods.
- Collection of sub-surface soil samples for submittal to an environmental laboratory for analysis of site specific constituents of interest (COI).

3.0 EQUIPMENT & MATERIALS

Field Book	Marking Paint/Flags/Stakes	Hand Tools/Soil Sampling Tools	Digital Camera	Sample Bottles & Coolers
Site Map	Measuring Wheel/Tape Measure	Backhoe or other excavation equipment (sub-contractor)	Ziploc® Baggies	5035-A Kits
Soil Sampling Forms & COC	PID/FID/XRF	Munsell® Soil Color Charts	Sampling & *Decontamination Supplies	Personal Protective Equipment (PPE)

* Decontamination equipment (i.e. phosphate-free detergent (Alconox®), distilled water, brushes, spray bottles, bucket, etc.). Please note that the decontamination methodology is dependent on the constituents of interest and additional supplies/procedures may be required depending on a number of factors.

4.0 RESPONSIBILITIES

4.1 Procedure Responsibility

SESCO Standards & Quality Assurance/Quality Control (QA/QC) Manager (with input from SESCO Field Staff) is responsible for the maintenance, management, and revision of this procedure and the information presented in this SOP.

4.2 Project Responsibility

SESCO personnel performing this task, or any portion thereof, are responsible for following the requirements of this procedure. SESCO management personnel conducting technical review of task performance are responsible for following appropriate sections of this SOP.

For those projects where activities of this SOP are performed, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures.

5.0 PROCEDURE

5.1 Test Pit Excavation Procedures

- Review and understand the scope of the project and the site specific COIs.
- Prepare and/or review the site-specific Health & Safety Plan (HASP) (see **HASP Development SOP**).
- Verify/obtain access to the site and work area(s).
- Schedule excavation sub-contractor, SESCO personnel, and field equipment.
- Schedule private utility locate with a SESCO approved locating company (see **Private Utility Locate SOP**).
- As required by law you <u>must</u> call in a public utility locate at least 48 hours (preferably 72 hours) prior to performing field work that requires penetrating the ground surface (see **Public Utility Locate SOP**).
- Meet the private utility locator at the site after the public utilities are marked.
- Meet the excavation sub-contractor at the site and
- Conduct Health & Safety tailgate meeting (see **Tailgate Safety Meeting/Briefing SOP**) and complete any additional safety requirements. All on-site personnel will sign the "HASP Acknowledgement Forms," and wear the proper personal protective equipment (PPE) as described in the HASP.

- Perform site walk-through to locate all proposed excavation areas.
- Communicate with the sub-contractor to excavate the test pit areas according to the workplan.
- Depending on the purpose of the test pit excavation(s) and scope of work, complete the following:
  - ❖ Log soil lithology or description (composition, moisture content, Munsell® color, etc.) using the USCS (see **Logging Soils using the USCS SOP**);

  - ❖ Field screen (PID, FID, XRF, etc.) and/or collect representative soil samples (see **Surface – Shallow Sub-Surface Soil Sampling SOP**).

PID FID XRF Analyzer

- Backfill location with existing soil and fill with additional topsoil if necessary. Restore excavated area as close to original condition as practicable.
- Place a marking flag , stake and/or paint location for mapping and/or a survey (if necessary).

- Decontaminate reusable equipment and properly discard disposable equipment/supplies.
- Prepare/finalize paperwork.

5.2 Field Documentation

Field Staff must document test pit excavation activities that include the following (see **SESCO Field Notes and Documentation SOP** for additional information):

- Test pit Location/Sample ID;
- Excavation measurements (Length, width, and total depth below ground surface);
- Date;
- Time;
- On-Site personnel;
- Photographs of on-site activities
- Use a global positioning system (GPS) unit and/or a measuring wheel to mark on site map and/or field notebook where the test pit excavations were completed.

6.0 ATTACHMENTS

None

7.0 DOCUMENTATION & FORMS

SESCO Site-Specific Field Book
SESCO Site-Specific Health & Safety Plan (HASP)

8.0 TERMS & DEFINITIONS

None

9.0 REFERENCES

None

This SOP is intended to provide general guidance for SESCO personnel and its' subcontractors for technical guidance, standard procedures and project management issues identified/encountered during environmental site investigations, remediation activities or other company related activities. It should be noted that each site, project and/or scope-of-work can be unique and SOPs are no substitute for common sense, legal requirements, company policies, and good management practices based on professional training and experience. In addition, individual contract terms may affect the implementation of this SOP. SESCO reserves the unrestricted right to change, modify or not apply these procedures in their sole, complete, and unrestricted discretion to meet certain circumstances, contractual requirements, specific site conditions, or job requirements.

APPENDIX L

Site Cleanup Criteria

Soil Cleanup Criteria
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

Units in mg/kg (ppm)

	ANALYTE	On-Site	Off-Site	MTG
Metals	Arsenic	30	9.4	5.9
	Barium	100,000	21,000	1,700
	Cadmium	980	98	7.5
	Chromium, Total	NE	NE	1,000,000
	Chromium, Hexavalent*	63	4.2	0.14
	Lead	800	400	270
	Mercury	3.1	3.1	2.1
	Selenium	5,800	550	5.3
	Silver	5,800	550	16
PCBs	Aroclor 1016	52	5.6	2.7
	Aroclor 1221*	6.6	2.1	0.016
	Aroclor 1232*	6.6	2.1	0.016
	Aroclor 1242	10	3.4	1.2
	Aroclor 1248	10	3.4	1.2
	Aroclor 1254	10	1.5	2.0
	Aroclor 1260	10	3.4	5.5
Dioxin	2,3,7,8-TCDD	0.00022	0.000069	0.0003
Semi-Volatile Organic Compounds (SVOCs)	Acenaphthene	45,000	4,900	110
	Acenaphthylene	NE	NE	NE
	Anthracene	100,000	24,000	1,200
	Benzo[a]anthracene	29	2.1	2.4
	Benzo[a]pyrene	2.9	0.21	4.7
	Benzo[b]fluoranthene	29	2.1	8.2
	Benzo[g,h,i]perylene	NE	NE	NE
	Benzo[k]fluoranthene	290	21	80
	Benzyl alcohol	82,000	8,700	9.7
	Bis(2-chloroethoxy) methane*	2,500	250	0.27
	Bis(2-chloroethyl) ether*	10	3.2	0.00074
	Bis(2-chloroisopropyl) ether	NE	NE	NE
	Bis(2-ethylhexyl) phthalate	1,600	530	29
	4-Bromophenyl phenyl ether	NE	NE	NE
	Butyl benzyl phthalate	12,000	3,900	46
	Caprolactam	100,000	43,000	49
	4-Chloroaniline*	120	38	0.031
	4-Chloro-3-methylphenol	NE	NE	NE
	2-Chloronaphthalene	93,000	8,800	77
	2-Chlorophenol	5,800	550	1.5
	4-Chlorophenyl phenyl ether	NE	NE	NE
	Chrysene	2,900	210	250
	Dibenz[a,h]anthracene	2.9	0.21	2.6
	Dibenzofuran	1,000	100	2.9
	Di-*n*-butyl phthalate	NE	NE	NE
	3,3'-Dichlorobenzidine*	51	17	0.16
	2,4-Dichlorophenol	2,500	250	1.1
	Diethyl phthalate	100,000	69,000	120
	2,4-Dimethylphenol	16,000	1,700	9

Units in mg/kg (ppm)

	ANALYTE	On-Site	Off-Site	MTG
Volatile Organic Compounds (VOCs)	Acetone	100,000	85,000	57
	Acrolein*	0.6	0.2	0.00017
	Acrylonitrile*	11.0	3.50	0.0023
	Benzene	51	17	0.051
	Bromobenzene	680	410	0.84
	Bromochloromethane	630	210	0.41
	Bromodichloromethane	13	4.1	0.43
	Bromoform	2,900	940	0.42
	Bromomethane	30	9.5	0.038
	n-Butanol	82,000	8,700	8.3
	2-Butanone (Methyl Ethyl Ketone - MEK)	28,000	28,000	23
	n-Butylbenzene	110	110	64
	sec-Butylbenzene	150	150	120
	tert-Butylbenzene	180	180	31
	Carbon Disulfide	740	740	4.8
	Carbon Tetrachloride	29	9.1	0.039
	Chlorobenzene	760	390	1.4
	Chloroethane (Ethyl Chloride)	2,100	2,100	120
	2-Chloroethylvinylether	NE	NE	NE
	Chloroform	14	4.5	0.44
	Chloromethane	460	150	0.98
	2-Chlorotoluene (o-Chlorotoluene)	910	910	4.7
	4-Chlorotoluene (p-Chlorotholuene)	250	250	4.8
	1,2-Dibromo-3-chloropropane	0.64	0.074	0.0017
	Dibromochloromethane	32	10	0.43
	1,2-Dibromoethane (EDB)*	1.6	0.5	0.00028
	Dibromomethane (Methylene Bromide)	98	32	0.039
	1,2-Dichlorobenzene	380	380	12
	1,3-Dichlorobenzene	NE	NE	NE
	1,4-Dichlorobenzene	110	36	1.4
	trans-1,4-Dichloro-2-Butene*	0.32	0.1	0.00012
	Dichlorodifluoromethane	370	120	6.0
	1,1-Dichloroethane	160	50	0.15
	1,2-Dichloroethane	20	6.4	0.028
	1,1-Dichloroethene	1,000	320	0.05
	cis-1,2-Dichloroethene (cDCE)	2,300	220	0.41
	trans-1,2-Dichloroethene (tDCE)	1,700	1,700	0.59
	1,2-Dichloropropane	44	14	0.033
	1,3-Dichloropropane	1,500	1,500	2.6
	2,2-Dichloropropane	NE	NE	NE
	1,1-Dichloropropene	NE	NE	NE
	cis-1,3-Dichloropropene	NE	NE	NE
	trans-1,3-Dichloropropene	NE	NE	NE
	Ethyl Methacrylate	1,100	1,100	2.2
	Ethylbenzene	250	81	16
	Hexachloro-1,3-butadiene	NE	NE	NE

Soil Cleanup Criteria
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

	ANALYTE	Units in mg/kg (ppm) On-Site	Off-Site	MTG
Semi-Volatile Organic Compounds (SVOCs)	Dimethylphthalate	NE	NE	NE
	4,6-Dinitro-2-methylphenol*	NE	NE	NE
	2,4-Dinitrophenol	1,600	170	0.87
	2,4-Dinitrotoluene	74	24	0.065
	2,6-Dinitrotoluene	15	5	0.013
	Di-*n*-octyl phthalate	8,200	870	1,100
	Fluoranthene	30,000	3,200	1,800
	Fluorene	30,000	3,200	110
	Hexachlorobenzene*	14	4.6	0.25
	Hexachloro-1,3-butadiene*	NE	NE	NE
	Hexachlorocyclopentadiene	4,900	520	3.1
	Hexachloroethane*	580	60	0.084
	Indeno[1,2,3-cd]pyrene	29	2.1	47
	Isophorone	24,000	7,800	5
	2-Methylphenol	NE	NE	NE
	3 & 4-Methylphenol	NE	NE	NE
	1-Methylnaphthalene	730	240	1.2
	2-Methylnaphthalene	3,000	320	3.7
	N-Nitroso-di-*n*-propylamine*	3.3	1.1	0.0017
	N-Nitrosodiphenylamine	4,700	1,500	13
	Naphthalene*	170	53	0.11
	2-Nitroaniline	8,000	850	1.6
	3-Nitroaniline	NE	NE	NE
	4-Nitroaniline*	1200	350	0.32
	Nitrobenzene*	220	71	0.018
	2-Nitrophenol	NE	NE	NE
	4-Nitrophenol*	NE	NE	NE
	Pentachlorophenol	40	14	0.2
	Phenanthrene	NE	NE	NE
	Phenol	100,000	25,000	67
	Pyrene	23,000	2,400	260
	2,4,5-Trichlorophenol	82,000	8,700	90
	2,4,6-Trichlorophenol	820	87	0.9

	ANALYTE	Units in mg/kg (ppm) On-Site	Off-Site	MTG
Volatile Organic Compounds (VOCs)	n-Hexane	140	140	44
	2-Hexanone	1,300	280	0.18
	Iodomethane	NE	NE	NE
	Isopropylbenzene (Cumene)	270	270	15
	p-Isopropyltoluene	NE	NE	NE
	4-Methyl-2-Pentanone (Methyl Isobuytl Ketone - MIBK)	3,400	3,400	5.4
	Methyl tert-Butyl Ether (MtBE)	2,100	660	0.63
	Methylene Chloride	3,200	490	0.025
	Naphthalene	170	53	0.11
	Propylbenzene	260	260	25
	Styrene	870	870	2.2
	1,1,1,2-Tetrachloroethane	88	28	0.043
	1,1,2,2-Tetrachloroethane	27	8.40	0.0059
	Tetrachloroethene (PCE)	170	110	0.045
	Toluene	820	820	14
	1,2,3-Trichlorobenzene	660	69	0.42
	1,2,4-Trichlorobenzene	260	81	4.1
	1,1,1-Trichloroethane	640	640	1.4
	1,1,2-Trichloroethane	6.3	2.1	0.032
	Trichloroethene (TCE)	19	5.7	0.036
	Trichlorofluoromethane	1,200	1,000	14
	1,2,3-Trichloropropane*	1.1	0.071	0.000065
	1,2,4-Trimethylbenzene	220	81	0.44
	1,3,5-Trimethylbenzene	180	180	3.4
	Vinyl Acetate	2,800	1,300	1.7
	Vinyl Chloride	17	0.83	0.014
	Total Xylenes	260	260	200

NE = Not Established
mg/kg = milligrams per kilogram
ppm = parts per million

Soil Cleanup Criteria:
On-Site = Indiana Department of Environmental Management Remediation Closure Guide (2015) Industrial Direct Contact Screening Levels
Off-Site = Indiana Department of Environmental Management Remediation Closure Guide (2015) Residential Direct Contact Screening Levels
MTG = Indiana Department of Environmental Management Remediation Closure Guide (2015) Migration to Groundwater Screening Levels
NOTE: Laboratory may not be able to achieve MTG Screening Level for certain chemicals denoted by *

Groundwater Cleanup Criteria - Vapor Screening Levels

Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

	ANALYTE	Units in ug/L (ppb) On-Site	Off-Site
VOCs	Benzene	120	24
	Carbon Tetrachloride	28	5.7
	Naphthalene	460	91
	1,1,2,2-Tetrachloroethane	310	63
	Tetrachloroethene (PCE)	470	110
	1,1,1-Trichloroethane	54,000	13,000
	1,1,2-Trichloroethane	46	11
	Trichloroethene (TCE)	39	9.1
	Vinyl Chloride	35	2

VOCs = Volatile Organic Compounds
ug/L = Micrograms per Liter
ppb = parts per billion
NE = Not Established

Groundwater Cleanup Criteria:

On-Site = Indiana Department of Environmental Management Remediation Closure Guide (2015) Vapor Intrusion Groundwater Industrial Screening Levels

Off-Site = Indiana Department of Environmental Management Remediation Closure Guide (2015) Vapor Intrusion Groundwater Residential Screening Levels

Groundwater Cleanup Criteria - Ecological Screening Levels
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

	ANALYTE	Units in µg/L (ppb)		ANALYTE	Units in µg/L (ppb)
Metals	Arsenic	148	Volatile Organic Compounds (VOCs)	Acetone	1,700
	Barium	220		Acrolein	0.19
	Cadmium	0.15		Acrylonitrile	66
	Chromium, Total	42		Benzene	114
	Chromium, Hexavalent	NE		Bromobenzene	NE
	Lead	1.17		Bromochloromethane	NE
	Mercury	0.0013		Bromodichloromethane	NE
	Selenium	5		Bromoform	230
	Silver	0		Bromomethane	NE
PCBs	Aroclor 1016	0.00012		n-Butanol	NE
	Aroclor 1221	0.00012		2-Butanone (Methyl Ethyl Ketone - MEK)	2,200
	Aroclor 1232	0.00012		n-Butylbenzene	NE
	Aroclor 1242	0.00012		sec-Butylbenzene	NE
	Aroclor 1248	0.00012		tert-Butylbenzene	NE
	Aroclor 1254	0.00012		Carbon Disulfide	15
	Aroclor 1260	0.00012		Carbon Tetrachloride	240
Dioxin	2,3,7,8-TCDD	NE		Chlorobenzene	47
Semi-Volatile Organic Compounds (SVOCs)	Acenaphthene	38		Chloroethane (Ethyl Chloride)	NE
	Acenaphthylene	4,840		2-Chloroethylvinylether	NE
	Anthracene	0.035		Chloroform	140
	Benzo[a]anthracene	0.025		Chloromethane	NE
	Benzo[a]pyrene	0.014		2-Chlorotoluene (o-Chlorotoluene)	NE
	Benzo[b]fluoranthene	9.07		4-Chlorotoluene (p-Chlorotholuene)	NE
	Benzo[g,h,i]perylene	7.64		1,2-Dibromo-3-chloropropane	NE
	Benzo[k]fluoranthene	NE		Dibromochloromethane	NE
	Benzyl alcohol	8.6		1,2-Dibromoethane (EDB)	NE
	Bis(2-chloroethoxy) methane	NE		Dibromomethane (Methylene Bromide)	NE
	Bis(2-chloroethyl) ether	19,000		1,2-Dichlorobenzene	14
	Bis(2-chloroisopropyl) ether	NE		1,3-Dichlorobenzene	38
	Bis(2-ethylhexyl) phthalate	0.3		1,4-Dichlorobenzene	9.4
	4-Bromophenyl phenyl ether	NE		trans-1,4-Dichloro-2-Butene	NE
	Butyl benzyl phthalate	23		Dichlorodifluoromethane	NE
	4-Chloroaniline	232		1,1-Dichloroethane	47
	4-Chloro-3-methylphenol	NE		1,2-Dichloroethane	910
	2-Chloronaphthalene	0.396		1,1-Dichloroethene	65
	2-Chlorophenol	24		cis-1,2-Dichloroethene (cDCE)	NE
	4-Chlorophenyl phenyl ether	NE		trans-1,2-Dichloroethene (tDCE)	970
	Chrysene	NE		1,2-Dichloropropane	NE
	Dibenz[a,h]anthracene	NE		1,3-Dichloropropane	NE
	Dibenzofuran	4		2,2-Dichloropropane	NE
	Di-*n*-butyl phthalate	9.7		1,1-Dichloropropene	NE
	3,3'-Dichlorobenzidine	4.5		cis-1,3-Dichloropropene	NE
	2,4-Dichlorophenol	11		trans-1,3-Dichloropropene	NE
	Diethyl phthalate	NE		Ethyl Methacrylate	NE
	2,4-Dimethylphenol	100		Ethylbenzene	14
	Dimethylphthalate	NE		Hexachloro-1,3-butadiene	NE

Groundwater Cleanup Criteria - Ecological Screening Levels
Dixon Road Site
1114 South Dixon Road
Kokomo, Indiana 46901
Site Spill Identification Number C5M5

	ANALYTE	Units in µg/L (ppb)
Semi-Volatile Organic Compounds (SVOCs)	4,6-Dinitro-2-methylphenol	NE
	2,4-Dinitrophenol	19
	2,4-Dinitrotoluene	44
	2,6-Dinitrotoluene	81
	Di-*n*-octyl phthalate	NE
	Fluoranthene	1.9
	Fluorene	19
	Hexachlorobenzene	0.0003
	Hexachloro-1,3-butadiene	NE
	Hexachlorocyclopentadiene	77
	Hexachloroethane	8
	Indeno[1,2,3-cd]pyrene	4.31
	Isophorone	920
	2-Methylphenol	NE
	3 & 4-Methylphenol	NE
	1-Methylnaphthalene	NE
	2-Methylnaphthalene	330
	N-Nitroso-di-*n*-propylamine	NE
	N-Nitrosodiphenylamine	NE
	Naphthalene	13
	2-Nitroaniline	NE
	3-Nitroaniline	NE
	4-Nitroaniline	NE
	Nitrobenzene	220
	2-Nitrophenol	NE
	4-Nitrophenol	60
	Pentachlorophenol	4
	Phenanthrene	3.6
	Phenol	180
	Pyrene	0.3
	2,4,5-Trichlorophenol	NE
	2,4,6-Trichlorophenol	4.9

	ANALYTE	Units in µg/L (ppb)
Volatile Organic Compounds (VOCs)	n-Hexane	NE
	2-Hexanone	99
	Iodomethane	NE
	Isopropylbenzene (Cumene)	NE
	p-Isopropyltoluene	NE
	4-Methyl-2-Pentanone (Methyl Isobutyl Ketone - MIBK)	170
	Methyl tert-Butyl Ether (MtBE)	NE
	Methylene Chloride	940
	Naphthalene	13
	Propylbenzene	NE
	Styrene	32
	1,1,1,2-Tetrachloroethane	NE
	1,1,2,2-Tetrachloroethane	380
	Tetrachloroethene (PCE)	45
	Toluene	253
	1,2,3-Trichlorobenzene	NE
	1,2,4-Trichlorobenzene	30
	1,1,1-Trichloroethane	76
	1,1,2-Trichloroethane	500
	Trichloroethene (TCE)	47
	Trichlorofluoromethane	NE
	1,2,3-Trichloropropane	NE
	1,2,4-Trimethylbenzene	NE
	1,3,5-Trimethylbenzene	NE
	Vinyl Acetate	248
	Vinyl Chloride	930
	Total Xylenes	27

NE = Not Established
µg/L = micrograms per Liter
ppb = parts per billion

Groundwater Cleanup Criteria:
U.S. Environmental Protection Agency Region 5 Ecological Screening Levels (August 22, 2003)

APPENDIX M

EPA Action Memorandum dated October 10, 2014

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 W. JACKSON BLVD
CHICAGO, IL 60604

MEMORANDUM

SUBJECT: ACTION MEMORANDUM – Determination of Threat to Public Health and the Environment and Selection of Time-Critical Removal Actions at the Dixon Road Site, Kokomo, Howard County, Indiana (Site ID # C5M5)

FROM: Shelly Lam, On-Scene Coordinator
Emergency Response Branch 1/Response Section 1

THRU: Jason H. El-Zein, Chief
Emergency Response Branch 1

TO: Richard C. Karl, Director
Superfund Division

I. PURPOSE

This memorandum documents the determination of an imminent and substantial threat to public health, welfare, and the environment posed by the presence of uncontrolled hazardous substances, and requests and documents your approval of the time-critical removal actions to be performed at the Dixon Road Site (the Site) in Kokomo, Howard County, Indiana. The actions proposed herein are necessary in order to mitigate threats to public health, welfare, and the environment posed by the presence of uncontrolled hazardous substances at the site. Hazardous substances, including arsenic, cadmium, lead, hexavalent chromium, mercury, and polychlorinated biphenyls (PCBs), have been documented at the Site.

The time-critical removal actions proposed herein will mitigate the threats by establishing site security; conducting a comprehensive site assessment and engineering evaluation to determine the extent of buried drums and contamination in soil and potential removal options to control, contain, and/or remove drums, waste, and contaminated soil; implementing the selected control and/or removal action as approved by the U.S. Environmental Protection Agency (EPA); transporting and disposing hazardous substances, pollutants and contaminants off-site; taking any other response actions to address any release or threatened release of a hazardous substance, pollutant or contaminant that the EPA On-Scene Coordinator (OSC) determines may pose an imminent and substantial endangerment to the public health or the environment.

These response actions will be conducted in accordance with Section 104(a)(1) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S. Code (U.S.C.) § 9604(a)(1), and 40 C.F.R. § 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to abate or eliminate the immediate threats posed to public health and/or the environment. The uncontrolled conditions of the hazardous substances present at the Site require that this action be classified as a time-critical removal action.

There are no nationally significant or precedent setting issues associated with the Site. This Site is not listed on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID:	INN000510728
RCRA ID:	Pending
Category:	Time-Critical Removal Action

The Dixon Road Site occupies 10.08 acres on two parcels - 9.76 acres at 1114 South Dixon Road (Parcel No. 34-09-02-101-009.000-002) and 0.32 acre at 1110 ½ -1112 South Dixon Road (Parcel No. 34-09-02-101-004.000-002). The Vernon L. Graves Revocable Living Trust has owned the property since 2007, when it was conveyed to the Trust by Vernon L. and Shirley F. Graves. In 1976, Edward and Melba C. Graves conveyed the property to Vernon and Shirley Graves. Edward and Melba Graves, the parents of Vernon L. Graves, acquired the Site property in 1951, along with the adjacent Kokomo Dump Site property, located to the South, which they conveyed to the City of Kokomo (the City) in 1963.

The Dixon Road Site lies adjacent to the Kokomo Dump Site (Site ID C564), which is still owned by the City of Kokomo (the City) (Photo 1 and Figures 1 and 2). The City operated an incinerator and municipal landfill at the Kokomo Dump Site from approximately 1963 to the 1970s. EPA documented the presence of drums and hazardous substances, pollutants, and contaminants at the Kokomo Dump Site (Administrative Record [AR] #9). A list of Howard County dumps provided by the Indiana Department of Environmental Management (IDEM) indicates that residue from the City's incinerator went to the "Graves Dump," which is the Dixon Road Site (AR #1). Vernon L. Graves, the trustee of the Vernon L. Graves Revocable Living Trust that currently owns the Site property, has also stated that the City disposed of ash from their incinerator at the Dixon Road Site.

Edward and Melba Graves operated a dump at the Site in the 1950s. Neighboring landowners sued Edward and Melba Graves over their dumping operations in 1958 and obtained an injunction in 1959. On May 12, 1958 Edward and Melba Graves had entered an Option and Agreement for Dumping Trash and Refuse that gave the City the option of dumping trash and refuse on their property at the southeast corner of Dixon Road and the extension of Markland Avenue for a period of 5 years. Vernon L. Graves, son of Edward and Melba Graves, was the president of Graves Westside Auto Parts, Inc., which operated at the Site between 1961 and at least 1977. A 1982 article in the Kokomo Tribune says that Westside Auto Parts held the City's towing contract. Other operators at the Site may have included the dissolved Dillon's Westside Auto & Wrecker, Inc., whose officers had entered into a contract for Sale of Real Estate for the

Site and another property with Vernon and Shirley Graves in 1986 and quitclaimed it back to them in 1998; the dissolved First Choice Auto Repair; Sutton's Towing and Repair, Inc., which filed for bankruptcy in 2011; Johnson's Towing and Recycling, whose operations were damaged by a fire in 2003; and Going Green Recycling, which began operating a metal recycling facility at the Site in 2011. As of April 2014, the Site was vacant.

A. Site Description

1. Removal Site Evaluation

IDEM discovered drums at the neighboring Kokomo Dump Site in April 2011 during an oil spill at the nearby Haynes International property. IDEM documented that drums and waste piles extended onto the property to the north (the Dixon Road Site). Drums were exposed on the banks of Wildcat Creek (Photo 2) on the Dixon Road Site. The drums were in poor condition. Waste extended down the creek banks. IDEM requested assistance from EPA with both properties.

EPA, IDEM, and the Superfund Technical Assessment and Response Team (START) contractor conducted a Site Assessment at the Dixon Road Site on December 3, 2012. During the assessment, EPA documented numerous drums and waste piles (Photos 3-7). The Site is on the south bank of Wildcat Creek and waste extended down the creek bank (Photo 8). Site assessment activities included sampling surface soil, subsurface soil, waste piles, and buried waste. The Site Assessment Report is posted to the Administrative Record (AR #11). Photographs of sampling activities are attached to this Action Memorandum (Photos 9-10). Sample locations are shown in Figure 3 and analytical results are presented in Tables 1 and 2.

Analytical results were compared to:

- EPA's June 2014 Removal Management Levels (RML) for industrial soil;
- IDEM's 2014 commercial/industrial direct contact soil exposure levels. IDEM identified their Remediation Closure Guide, including the exposure levels therein, as an applicable or relevant and appropriate requirement (ARAR) (see Section V.A.4); and
- Regulatory levels for toxicity established in regulations promulgated under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901-6992, at 40 CFR § 261.24. A solid waste that exhibits the characteristic of toxicity at 40 CFR § 261.24 is a hazardous waste under RCRA.

Surface Soil Results

During the assessment, EPA collected nine surface soil samples for total and Toxicity Characteristic Leaching Procedure (TCLP) metals, pesticides, and PCBs analysis. The bullets below summarize surface soil and surface waste pile sample results above screening levels.

- Aroclors 1248 and 1254, both PCBs, were detected in all surface soil samples. Concentrations ranged from 0.099 milligrams per kilogram (mg/kg) to 19 mg/kg. In three samples, the concentrations of both Aroclors exceeded the IDEM screening level of 7.4 mg/kg.

- Total lead concentrations exceeded the RML and IDEM screening level of 800 mg/kg in all nine surface soil samples. Concentrations ranged from 1,400 to 32,000 mg/kg.
- Mercury exceeded the IDEM screening level of 3.1 mg/kg in one sample, at a concentration of 13 mg/kg.
- Hexavalent chromium (chromium VI) exceeded the RML of 630 mg/kg and IDEM screening level of 56 mg/kg in one sample, at a concentration of 1,100 mg/kg.
- Three surface soil samples exceeded the 40 CFR § 261.24 TCLP level for lead of 5 milligrams per liter (mg/L), at concentrations ranging from 5.4 to 19 mg/L.
- One surface soil sample exceeded the 40 CFR § 261.24 TCLP level for cadmium of 1 mg/L, at a concentration of 2.3 mg/L.

Subsurface Soil Results

EPA advanced soil borings in subsurface soil and buried waste to a minimum depth of four feet below ground surface (bgs), with approximately every third boring extended to a depth of 12 feet bgs to assess the depth of waste. EPA collected 11 subsurface samples for total and TCLP metals, total and TCLP semi-volatile organic compounds (SVOC), pesticides, and PCBs. Subsurface soil and buried waste sample results above screening levels are summarized below.

- Six samples contained Aroclor 1248 above IDEM's screening level of 7.4 mg/kg, at depths up to 12 feet bgs. Aroclor 1248 was detected at a maximum concentration of 95 mg/kg.
- Aroclor 1254 exceeded IDEM's screening level of 7.4 mg/kg in five samples, at concentrations ranging from 9.1 to 28 mg/kg at depths ranging from 1-8 feet bgs.
- Arsenic exceeded IDEM's screening level of 24 mg/kg in two samples, at concentrations of 25 and 27 mg/kg.
- Lead exceeded the RML and IDEM screening level of 800 mg/kg in all samples at a maximum concentration of 2,500 mg/kg at a depth from 1-4 feet. Concentrations ranged from 910 to 2,500 mg/kg and lead was detected above the RML at a maximum depth of 12 feet bgs.
- Mercury was above IDEM's screening level of 3.1 mg/kg in one sample, at a concentration of 4.2 mg/kg at a depth from 4-8 feet bgs.
- Cadmium was above the 40 CFR § 261.24 TCLP limit of 1 mg/L in one sample, at a concentration of 2.2 mg/L at a depth of 1-4 feet bgs.

The nature and type of contamination at the Dixon Road Site was similar to that found at the Kokomo Dump Site. At the Kokomo Dump Site, EPA documented drums and waste piles, and identified lead, arsenic, and Aroclors 1248 and 1254 above screening levels (AR #9). The Site Assessment results from the Dixon Road Site and historical documentation indicate that the Kokomo Dump Site is a likely contributor to contamination at the Dixon Road Site.

2. Physical location

The Dixon Road Site is located at 1110-1/2 to 1112 and 1114 S. Dixon Road in Kokomo, Howard County, Indiana, 46901. The Site is in an area that is residential, commercial, and industrial. It is bounded by Wildcat Creek to the north, Haynes International and a railroad to the east, the Kokomo Dump Site to the south, and residential properties and Dixon Road to the west. The geographical coordinates for the Site are 40.474473° north latitude and 86.162617° west longitude.

EPA conducted an Environmental Justice (EJ) analysis for the Site. Screening of the surrounding area used Region 5's EJ Screen Tool, which applies the interim version of the national EJ Strategic Enforcement Assessment Tool (EJSEAT). Region 5 has reviewed environmental and demographic data for the area surrounding the Site, and determined there is a low potential for EJ concerns at this location.

3. Site characteristics

The Site is 10.08 acres in size, and contains three buildings. As of April 2014, the Site was vacant. Prior to that, the facility was operated as a dump, auto salvage yard, towing yard, and metal recycling facility.

The proposed time-critical removal will be the first removal action at the Site by EPA. Based on the OSC's observations in April 2014, it appears that someone had removed drums and possibly surface waste since the Site Assessment. However, based on available information, no one has conducted efforts to characterize, delineate, monitor, or control hazardous substances, pollutants, or contaminants. IDEM indicated that this site is not enrolled in any state cleanup programs.

4. Release or threatened release into the environment of a hazardous substance, or pollutant, or contaminant

A release or threat of release of hazardous substances, pollutants, or contaminants is present at the Site. EPA confirmed the presence of hazardous substances as defined by Section 101(14) of CERCLA including arsenic, lead, mercury, cadmium, hexavalent chromium, and PCBs. The Site Assessment Report documenting these findings is part of the Administrative Record (AR #11).

Hazardous substances are present in waste piles, surface and subsurface soil, and buried waste. Release mechanisms from these sources include fugitive dust generation from surface soil or waste piles to air; contaminated surface soil or waste pile runoff and overland flow to Wildcat Creek; leaching of surface and buried waste to deeper soils, groundwater, or Wildcat Creek; and tracking of contaminated surface soil or waste. Possible exposure routes for hazardous substances include dermal contact with contaminated soil or waste piles; inhalation or accidental ingestion of fugitive dust; and direct contact with potentially-impacted surface water or sediment in Wildcat Creek. Potential human receptors include site workers, site visitors, trespassers at the Site, recreational users of Wildcat Creek, and nearby residents.

5. NPL status

This site is not on the NPL. The Site has not been proposed for the NPL and has not received a Hazard Ranking Score (HRS). The OSC does not know if IDEM will refer the Site to the NPL site assessment program.

6. Maps, pictures and other graphic representations

The following figures are attached to this memorandum.

- Figure 1 Site Location Map
- Figure 2 Site Features Map
- Figure 3 Sample Location Map, and
- Photographs

B. Other Actions to Date

1. Previous actions

No previous actions have been conducted.

2. Current actions

No actions are currently being conducted at the Site.

C. State and Local Authorities' Roles

IDEM requested assistance from EPA because IDEM does not have the resources to mitigate the threat of release. On April 6, 2011, IDEM requested assistance from EPA with the Site and the adjacent Kokomo Dump Site. By email dated December 28, 2012, IDEM requested further assistance at the Dixon Road Site (AR #10).

III. THREATS TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

The conditions present at the Dixon Road Site present an imminent and substantial threat to the public health, or welfare, and the environment based upon the factors set forth in NCP § 300.415(b)(2). These factors include, but are not limited to, the following:

Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

As detailed in the Removal Site Evaluation section, the Site Assessment documented that hazardous substances were present in waste piles, surface soil, subsurface soil, and buried waste. As recently as 2013, the facility was operated as a metal recycling center, and was open to the public. Additionally, the facility was not fenced completely along the southern, western, and

northern property boundaries, potentially allowing access to trespassers. The OSC observed that waste extended down the banks to Wildcat Creek (Photos 2 and 8). Hazardous substances identified include arsenic, cadmium, hexavalent chromium, lead, mercury, and PCBs.

Release mechanisms from these sources include fugitive dust generation from surface soil or waste piles to air; contaminated surface soil or waste pile runoff and overland flow to Wildcat Creek; leaching of surface and buried waste to deeper soils, groundwater, or Wildcat Creek; and tracking of contaminated surface soil or waste. Possible exposure routes for hazardous substances include dermal contact with contaminated soil or waste piles; inhalation or accidental ingestion of fugitive dust; and direct contact with potentially impacted surface water or sediment in Wildcat Creek. Potential human receptors include current and future site workers, site visitors, trespassers at the Site, recreational users of Wildcat Creek, and nearby residents. The closest residence is located at the western part of the Site, near Dixon Road.

The Agency for Toxic Substances and Disease Registry (ATSDR) has studied the health effects of these hazardous substances, and information about each is provided below.

Arsenic: Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling. Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans (AR #5).

Cadmium: Breathing high levels of cadmium can severely damage the lungs. Eating food or drinking water with very high levels severely irritates the stomach, leading to vomiting and diarrhea. Long-term exposure to lower levels of cadmium in air, food, or water leads to a buildup of cadmium in the kidneys and possible kidney disease. Other long-term effects are lung damage and fragile bones. DHHS has determined that cadmium and cadmium compounds are known human carcinogens (AR #6).

Chromium: Breathing high levels of chromium (VI), or hexavalent chromium, can cause irritation to the lining of the nose, nose ulcers, runny nose, and breathing problems, such as asthma, cough, shortness of breath, or wheezing. The concentrations of chromium in air that can cause these effects may be different for different types of chromium compounds, with effects occurring at much lower concentrations for chromium (VI) compared to chromium (III). The main health problems seen in animals following ingestion of chromium (VI) compounds are irritation and ulcers in the stomach and small intestine and anemia. Sperm damage and damage to the male reproductive system have also been seen in laboratory animals exposed to chromium (VI). Skin contact with certain chromium (VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium (VI) or chromium (III). Allergic reactions consisting of

severe redness and swelling of the skin have been noted. DHHS, the IARC, and EPA have determined that chromium (VI) compounds are known human carcinogens (AR #7).

Lead: Lead can affect almost every organ and system in the body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production. DHHS has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen (AR #4).

Mercury: The nervous system is very sensitive to all forms of mercury. Methyl mercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems. The EPA has determined that mercuric chloride and methyl mercury are possible human carcinogens (AR #3).

PCBs: The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. A few studies of workers indicate that PCBs are associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. DHHS has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the IARC have determined that PCBs are probably carcinogenic to humans (AR #2).

Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;

EPA documented numerous drums and other containers at the Site (see photos). Drums were exposed in the bank of Wildcat Creek and lying on the ground surface. Drum contents pose a threat of release.

High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate;

Site assessment results indicated high levels of hazardous substance in surface soil, as high as 32,000 mg/kg for lead and 1,100 mg/kg for hexavalent chromium. Leachable concentrations of both lead and cadmium were detected in surface soils. Additionally, sample results from subsurface soils showed that arsenic, lead, cadmium, and PCBs have migrated to deeper soils.

Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

Weather conditions could cause hazardous substances to migrate or be released. High winds could cause dispersion of surface soils or waste. Additionally, heavy rains could cause runoff or overland flow of soil or waste to Wildcat Creek, thereby causing migration through surface water and sediment.

The availability of other appropriate federal or State response mechanisms to respond to the release;

On December 28, 2012, IDEM requested assistance from EPA (AR #10). IDEM does not have the resources to mitigate the threat of release.

IV. ENDANGERMENT DETERMINATION

Given the site conditions, the nature of the known and suspected hazardous substances on site, and the potential exposure pathways described in Sections II and III, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

Analytical data documented that soil results exceeded relevant screening or regulatory levels. These conditions document the need for a time-critical removal action.

V. PROPOSED ACTIONS

A. Proposed Actions

1. Proposed action description

The following response actions are required to mitigate threats posed by the presence of hazardous substances at the Dixon Road Site:

1. Develop and implement site plans including a site-specific Quality Assurance Project Plan (QAPP), Health and Safety Plan, an Emergency Contingency Plan, and a Work Plan, including an Air Monitoring Plan;

2. Establish site security;

3. Conduct a comprehensive site assessment and engineering evaluation to determine the extent of buried drums and contamination in soil; evaluate potential removal options to control, contain, and/or remove drums, waste, and contaminated soil.

4. Implement the selected control and/or removal action as approved by EPA.

5. Consolidate and package hazardous substances, pollutants and contaminants for transportation and off-site disposal in accordance with the EPA Off-Site Rule at 40 C.F.R. § 300.440.

The removal actions will be conducted in a manner not inconsistent with the NCP. The OSC has begun planning for provision of post-removal site control, consistent with the provisions of 40 C.F.R. § 300.415(l).

The threats posed by uncontrolled substances considered hazardous meet the criteria listed in 40 C.F.R. § 300.415(b)(2), and the response actions proposed herein are consistent with any long-term remedial actions which may be required. Elimination of hazardous substances, pollutants and contaminants that pose a substantial threat of release is expected to minimize substantial requirements for post-removal site controls.

2. Contribution to remedial performance

The proposed action should not impede future actions based on available information.

3. Engineering Evaluation/Cost Analysis (EE/CA)

Not Applicable

4. Applicable or relevant and appropriate requirements

The OSC sent a letter on March 28, 2013, to Rex Osborn at IDEM requesting the identification of any applicable state ARARs (AR #12). IDEM identified the following ARARs (AR #13).

<u>Action Specific</u>

1. Pursuant to Indiana Administrative Code (IAC) tit. 326 r. 6-4-2(4), visible fugitive dust must not cross an adjacent property line.

2. Pursuant to IAC tit. 326 r. 6-4-4, any vehicle driven on any public right of way must not allow its contents to escape and form fugitive dust.

3. IAC tit. 327 r. 2-11-1 through 2-11-9 maintains and protects the quality of Indiana's groundwater. For example, no person shall cause the groundwater in a drinking water supply wells (IAC tit. 327 r. 2-11-2(e)) or nondrinking water supply well (IAC tit. 327 r. 2-11-2(f)) to have contaminant concentration that renders the well unusable for its current use.

4. Pursuant to IAC tit. 327 r. 5-2-2, any discharge of pollutants into water of the State as a point of source discharge during the removal action would require a National Pollutant Discharge Elimination System (NPDES) permit. However, this is a U.S. EPA removal action, and as pursuant to IAC tit. 327 r. 5-2-4(5), discharges of pollutants in compliance with the instruction of a U.S. EPA OSC will not require a NPDES permit. Moreover,

pursuant to Section 121(e)(1) of CERCLA, 42 U.S.C. § 9621(e)(1), no federal, state or local permit is required for that portion of any removal action conducted entirely on-site. The substantive requirements of a permit, however, will still need to be met.

Chemical Specific

5. IAC tit. 329 r. 3.1 regulates the management of hazardous wastes. Indiana rule IAC tit. 329 r. 3.1-1-1 adopts RCRA regulations of 40 CFR 260 through 40 CFR 270. More specifically:

    a. 40 CFR § 262.11 requires that a proper hazardous waste determination must be made on all wastes generated from removal actions including substances in containers, drums, pits, waste piles, and tanks along with any decontamination washes or rinsates.

    b. 40 CFR § 262.12 requires a generator not treat, store, dispose of, or offer for transportation, hazardous waste without receiving a U.S. EPA identification number. A generator must not offer his hazardous waste to transporters or treatment, storage, or disposal facilities that have not received a U.S. EPA identification number.

    c. 40 CFR § 261, Subpart B requires that all hazardous waste must be properly packaged, with labels, marking and placards prior to transport (see also 40 CFR §§ 262.30 - packaging, 262.31 - labeling, 262.32 - marking, and 263.33 - placarding).

    d. 40 CFR Part 261, Subpart B requires that hazardous waste must be manifested as such for transport to a permitted treatment, storage, and disposal facility (TSDF).

    e. For all hazardous waste related equipment, structures, and pads, remove or decontaminate all hazardous waste residues, contaminated containment components, contaminated soils, and structures and equipment contaminated with waste and manage them as hazardous waste unless 40 CFR § 261.3(d) applies

    f. 40 CFR § 262.34 requires that hazardous waste containers shall not be accumulated on-site for greater than 90 days without a hazardous waste permit for storage. As indicated above, however, a permit is not required for activities conducted on-site.

    g. Excavated contaminated soils must not be placed back on the ground so as to create a waste pile as defined in 40 CFR Part 264, Subpart L.

    h. 40 CFR § 265.17 includes general requirements for ignitable, reactive, or incompatible wastes.

i. Hazardous waste in containers shall be managed in accordance with the standards of 40 CFR Part 263, Subpart I.

j. 40 CFR Part 268 identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise prohibited waste may continue to be land disposed.

6. IAC tit. 329 art. 3.1 establishes standards for identifying hazardous waste as well as standards for hazardous waste management procedures for generators, transporters, and owners or operators of hazardous waste facilities.

7. IAC tit. 329 art. 10 regulates the management of solid wastes. IAC tit. 329 r. 10-7.2-1 requires all waste to undergo a waste determination, and if found to be nonhazardous, be disposed of in a permitted solid waste disposal facility.

Location Specific

8. If there is soil excavation or other work within the floodway of a stream/creek, then Indiana Code (IC) § 14-28-1 applies. Approval is needed by Indiana Department of Natural Resources (IDNR) for any construction, excavation or filling in or on floodways.

9. If there is soil excavation or other work along a public freshwater lake, then IC § 14-26-2 applies. Approval is needed by IDNR for any construction, excavation, or filling in along a public freshwater lake.

To Be Considered (TBC)

10. The IDEM Remediation Closure Guide (RCG) is a Nonrule Policy Document (NPD) that provides guidance for the investigation, remedy section, and closure of contaminated sites. As an NPD, the IDEM RCG does not have the effect of law. If a conflict exists between the RCG and state or federal rules and statutes, the rules and statutes will prevail.

The OSC determined ARARs identified by IDEM may apply to the Site, with the following exceptions:

- ARAR #5: 40 CFR Part 270 applies to permitting requirements, such as application requirements, standard permit conditions, and monitoring and reporting requirements, at operating landfills. The Site is not an operating landfill. . However, the substantive requirements of 40 CFR Part 270 may apply if waste is generated and stored for more than 90 days; if waste is treated in a containers other than a tank; or if waste is treated and placed back in the ground. As mentioned above, no federal, state or local permit is required for that portion of any removal action conducted entirely on-site.
- ARAR #9: No excavations will be conducted along a public freshwater lake.

The OSC also identified the following ARARs:

1. Hazardous substances, pollutants or contaminants removed off-site pursuant to this emergency response action for treatment, storage and disposal shall be treated, stored, or disposed at a facility in compliance, as determined by EPA, with the EPA Off-Site Rule, 40 C.F.R. § 300.440.

2. 49 U.S.C. § 5101 et seq. regulates the transportation of hazardous waste and hazardous substances by aircraft, railcars, vessels, and motor vehicles to or from a site.

3. The regulations promulgated under the Toxic Substances Control Act, 15 U.S.C. §§ 2601-2697, at 40 CFR Part 761, regulate the storage, incineration, and landfilling of PCBs.

4. The regulations promulgated under the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661 – 667e, at 40 CFR § 6.302 and 40 CFR Part 6, Appendix A, regulate the protection of floodplains. Removal actions must avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values of floodplains.

5. If a cap is placed over waste, 40 CFR § 264.288(a) (Surface Impoundments), 40 CFR § 264.258(b) (Waste Piles), or 40 CFR § 264.310(a) (Landfills) may apply. Placement of a cap over waste (e.g., closing a landfill, or closing a surface impoundment or waste pile as a landfill, or similar action) requires a cover designed and constructed to:

    a. Provide long-term minimization of migration of liquids through the capped area;
    b. Function with minimum maintenance;
    c. Promote drainage and minimize erosion or abrasion of the cover;
    d. Accommodate settling and subsidence so that the cover's integrity is maintained; and
    e. Have a permeability less than or equal to the permeability of any bottom liner system or natural sub-soils present.

6. If any containers are found in surface waste piles or buried in the subsurface, the following may apply to container storage:

    a. Containers of RCRA hazardous waste must be maintained in good condition; compatible with hazardous waste to be stored; and closed during storage (except to add or remove waste) (40 CFR §§ 264.171-172);
    b. Containers must be placed on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system (40 CFR § 264.175);
    c. Containers of ignitable or reactive waste must be kept at least 50 feet from the facility's property line (40 CFR § 264.176);
    d. Incompatible materials must be kept separate. Incompatible materials stored near each other must be separated by a dike or other barrier (40 CFR § 264.177);

e. At closure, all hazardous waste and residue from the containment system must be removed, and all containers or liners must be decontaminated or removed (40 CFR § 264.178).

Pursuant to 40 CFR § 300.415(j), removal actions shall, to the extent practicable considering the exigencies of the situation, attain ARARs. Pursuant to Section 121(e)(1) of CERCLA, 42 U.S.C. § 9621(e)(1), no federal, state or local permit is required for that portion of any removal action conducted entirely on-site.

The response actions described in this memorandum directly address the actual or threatened release of hazardous substances, pollutants, or contaminants at the Site which may pose an imminent and substantial endangerment to public health or welfare or to the environment. These response actions do not impose a burden on affected property disproportionate to the extent to which that property contributes to the conditions being addressed.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Given the site conditions, the nature of the hazardous substances documented on-site, and the potential exposure pathways to nearby populations described in Sections II and III above, actual or threatened release of hazardous substances from the Site, if not addressed by implementing the time-critical actions described in this Action Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment. Delayed or no action concerning the remaining hazardous substances, pollutants and contaminants at the Site will result in increased potential of the toxic and hazardous substances to release, thereby threatening the environment and the health and welfare of nearby residents and other persons who are in proximity to the Site.

VII. OUTSTANDING POLICY ISSUES

None.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this site is contained in the Confidential Enforcement Addendum.

IX. RECOMMENDATION

This decision document represents the selected removal actions for the Dixon Road Site located in Kokomo, Howard County, Indiana. This document has been developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record for the Site (see Attachment II).

Conditions at the Site meet the NCP criteria at 40 C.F.R. § 300.415(b)(2) for time-critical removal actions. The PRPs are expected to perform the time-critical removal action. I recommend your approval of the proposed removal action. You may indicate your decision by signing below.

APPROVE: _____ DATE: 10/10/2014
for Director, Superfund Division

DISAPPROVE: _____ DATE: _____
Director, Superfund Division

Enforcement Addendum

Figures:

1 Site Location Map
2 Site Features Map
3 Soil Boring Locations and Sample Locations Map

Tables:

1 Surface Soil Analytical Results
2 Subsurface Soil Analytical Results

Attachments:

I. Site Photo Log
II. Administrative Record Index

cc: Sherry Fielding, U.S. EPA, 5104A
Valencia Darby, U.S. DOI, **w/o Enf. Addendum**
Rex Osborn, IDEM **w/o Enf. Addendum**

BCC PAGE HAS BEEN REDACTED

NOT RELEVANT TO SELECTION

OF REMOVAL ACTION

<u>ENFORCEMENT ADDENDUM</u>

HAS BEEN REDACTED – NINE PAGES

ENFORCEMENT CONFIDENTIAL

NOT SUBJECT TO DISCOVERY

FOIA EXEMPT

NOT RELEVANT TO SELECTION

OF REMOVAL ACTION

FIGURE 1

SITE LOCATION MAP

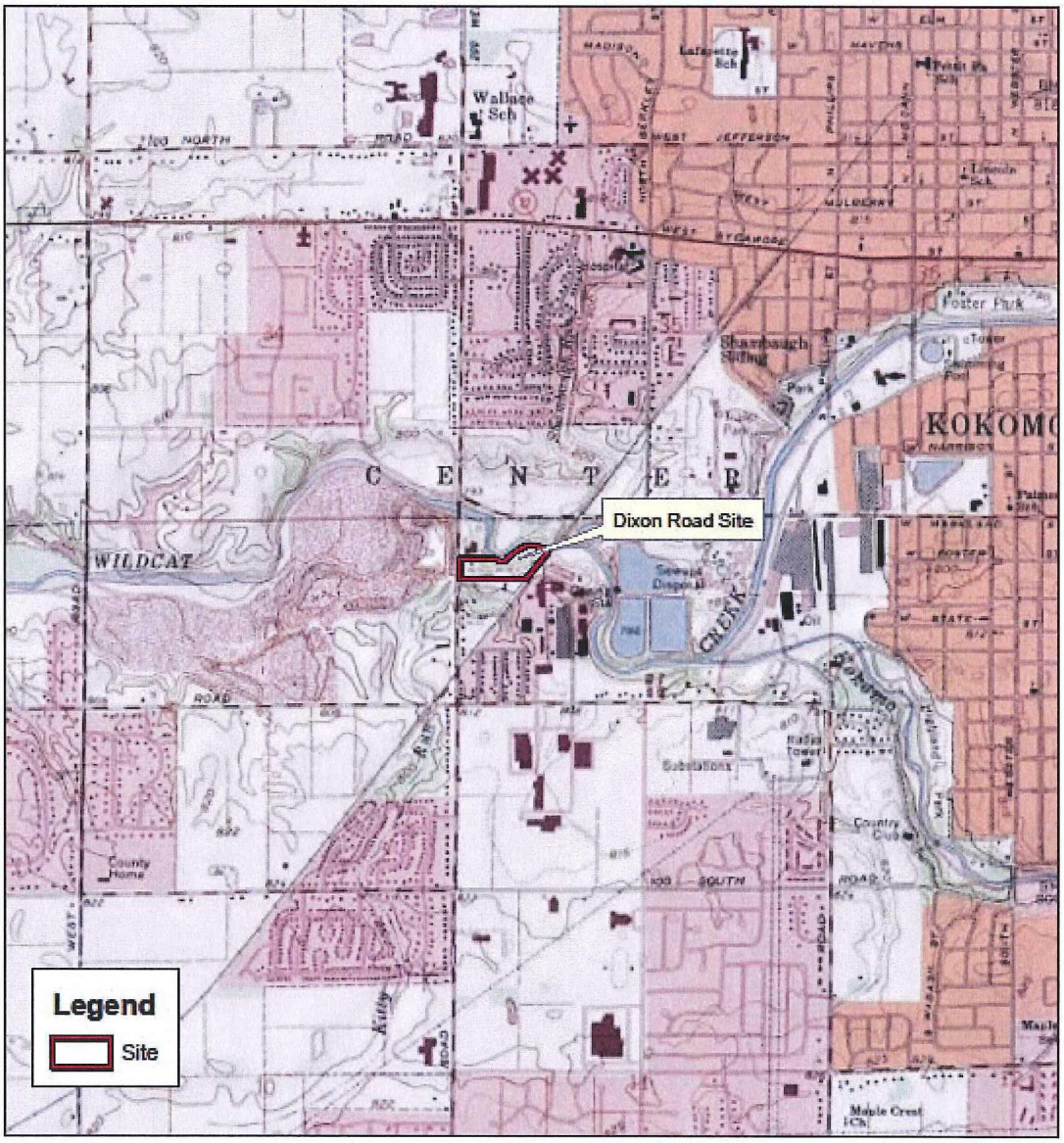


FIGURE 1
SITE LOCATION MAP
DIXON ROAD SITE
1114 S. DIXON ROAD
KOKOMO, HOWARD COUNTY, INDIANA

This map presents land cover imagery for the world and detailed topographic maps for the United States. The map includes the National Park Service (NPS) Natural Earth physical map at 1.24km per pixel for the world at small scales, i-cubed eTOPO 1:250,000-scale maps for the contiguous United States at medium scales, and National Geographic TOPO! 1:100,000 and 1:24,000-scale maps (1:250,000 and 1:63,360 in Alaska) for the United States at large scales. The TOPO! maps are seamless, scanned images of United States Geological Survey (USGS) paper topographic maps.

1:24,000

0 1,000 2,000 Feet

FIGURE 2

SITE FEATURES MAP

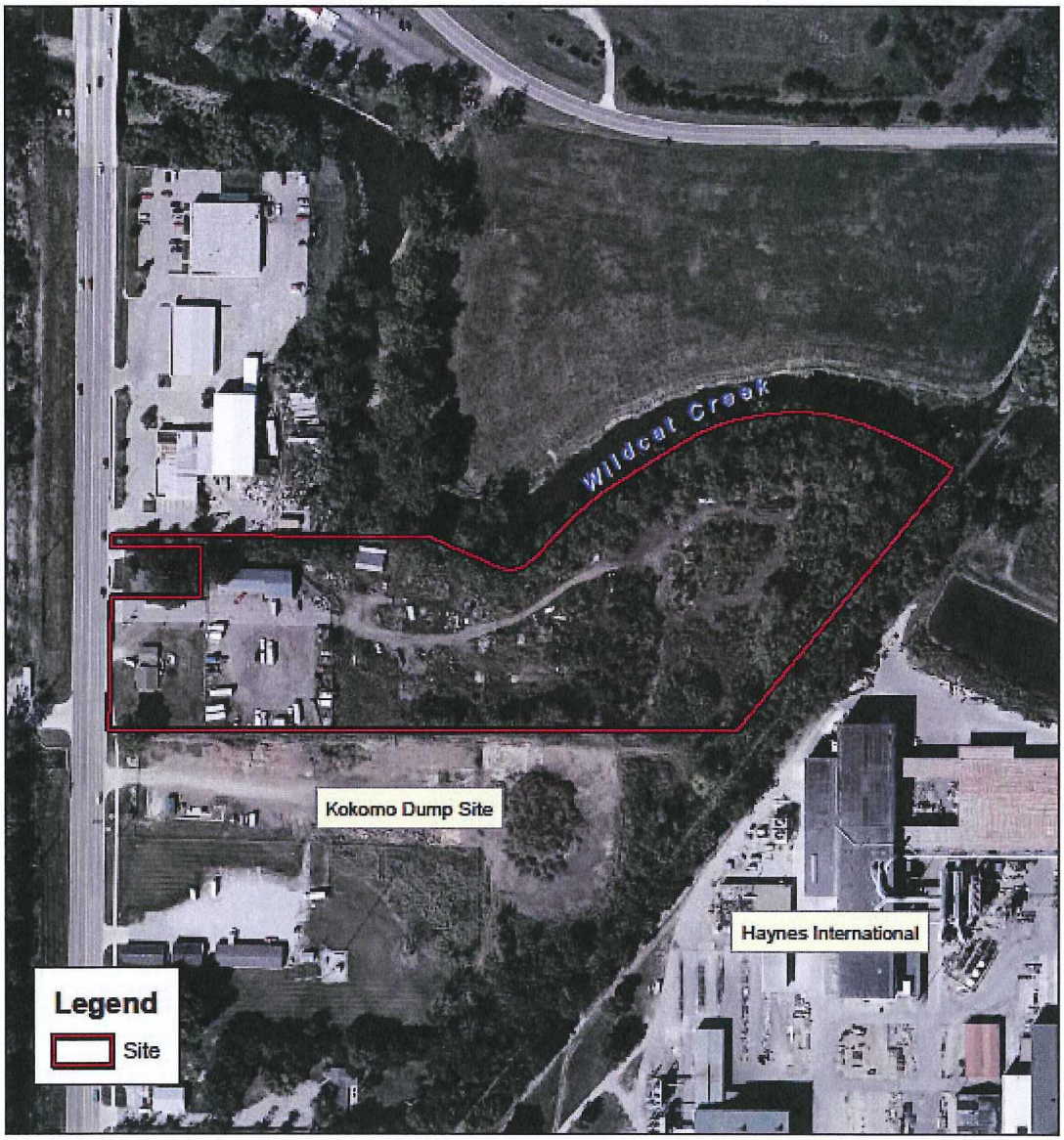


FIGURE 2
SITE LAYOUT MAP
DIXON ROAD SITE
1114 S. DIXON ROAD
KOKOMO, HOWARD COUNTY, INDIANA

(c) 2009 Microsoft Corporation
and its data suppliers
http://www.bing.com/maps
Samples locations were determined
using EPA's Visual Sample Plan.

1:2,500
0 100 200
Feet

FIGURE 3

SAMPLE LOCATION MAP

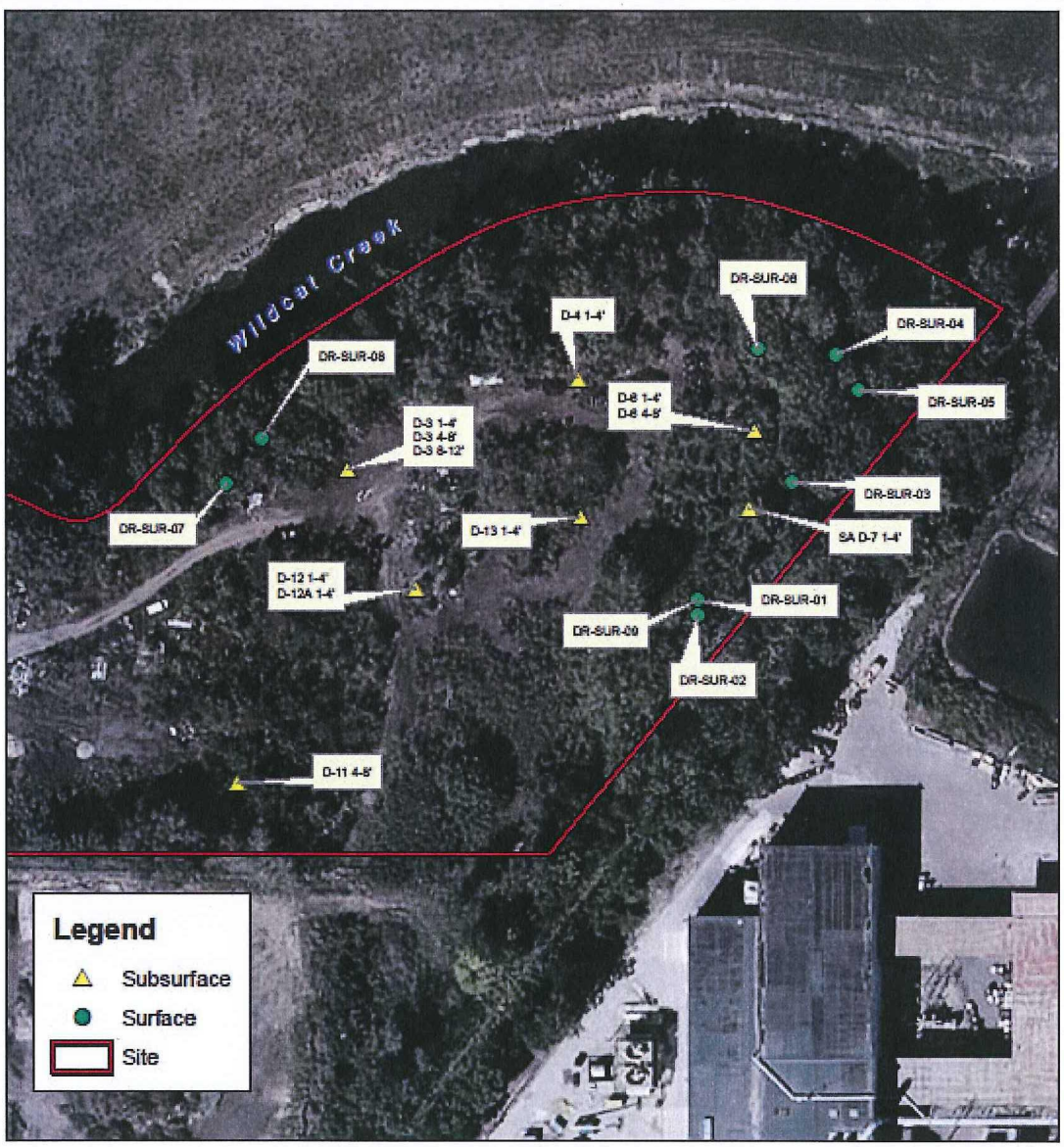


FIGURE 3
SAMPLE LOCATION MAP
DIXON ROAD SITE
1114 S. DIXON ROAD
KOKOMO, HOWARD COUNTY, INDIANA

(c) 2009 Microsoft Corporation
and its data suppliers
http://www.bing.com/maps
Samples locations were determined
using EPA's Visual Sample Plan.

1:1,200

0 100 200 Feet

TABLE 1
SURFACE SOIL LABORATORY ANALYTICAL RESULTS
DIXON ROAD SITE

Analyte	EPA Screening Level[1]	IDEM Screening Level[2]	Sample ID								
			DR-SUR-01	DR-SUR-02	DR-SUR-03	DR-SUR-04	DR-SUR-05	DR-SUR-06	DR-SUR-07	DR-SUR-08	DR-SUR-09
Polychlorinated Biphenyls (PCB)[3] (mg/kg)[4]											
Aroclor 1248	**100**	**7.4**	**8.6**	2.1	2.3	1.6	3.7	5.7	0.22	**19**	**9.7**
Aroclor 1254	**44**	**7.4**	**12**	1.9	1.6	0.6	1.5	2.5	0.099	**16**	**15**
All other Aroclors			ND[5]	ND	ND	ND	ND	ND	ND	ND	ND
Pesticides (ug/kg)[6]											
All Pesticides			ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals - mg/kg											
Arsenic	**300**	**24**	14	14	21	23	23	19	1.1	15	21
Barium	**650,000**	**100,000**	610	530	650	1,400	1,500	470	16,000	480	730
Cadmium	**3,000**	**800**	35	41	26	37	39	36	1.7	260	96
Chromium, total	**No value**	**No value**	210	420	160	380	450	210	5,500	370	140
Lead	**800**	**800**	**2,000**	**1,400**	**16,000**	**3,700**	**3,500**	**3,600**	**32,000**	**10,000**	**3,000**
Selenium	**18,000**	**5,100**	1.5 J[7]	1.5 J	1.4 J	1.2 J	1.4 J	1.3 J	0.33 J	0.9 J	1.9 J
Silver	**18,000**	**5,100**	5.9	6	3.7	7.8	13	7.7	0.4 J	20	9.6
Mercury	**120**	**3.1**	0.97	0.81	0.44	0.047	0.087	0.42	**13**	0.74	0.87
Chromium, Hexavalent	**630**	**56**	0.63 U[8]	0.59 U	0.54 U	0.78	4	0.62 U	**1,100**	0.62 U	5.6

TABLE 1
SURFACE SOIL LABORATORY ANALYTICAL RESULTS
DIXON ROAD SITE

Analyte	Regulatory Limit [9]	Sample ID								
		DR-SUR-01	DR-SUR-02	DR-SUR-03	DR-SUR-04	DR-SUR-05	DR-SUR-06	DR-SUR-07	DR-SUR-08	DR-SUR-09
TCLP [10] Metals - mg/L [11]										
Arsenic	**5**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Barium	**100**	0.81	1.2	0.27	1.2	0.41	0.93	1	0.88	0.98
Cadmium	**1**	0.33	0.15	0.12	0.083	0.13	0.19	0.016	**2.3**	0.2
Chromium	**5**	0.0081 J	0.0049 J	0.003 J	0.0051 J	0.035	0.0038 J	0.051	0.0037 J	0.0021 J
Lead	**5**	0.55	0.39	**5.4**	3.3	0.69	1.5	**19**	**8**	4.5
Selenium	**1**	0.0046 J	0.02 U	0.0042 J	0.02 U	0.005 J	0.0047	0.0048 J	0.0042 J	0.0062 J
Silver	**5**	0.00028 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Mercury	**0.2**	0.00016 J	0.00016 J	0.00014 J	0.00013 J	0.00013 J	0.0001 J	0.00019 J	0.00017 J	0.0012 J

Notes:
1. EPA screening levels from Removal Management Levels for industrial soil (June 2014).
2. IDEM screening levels from IDEM's Remediation Closure Guide for commercial/industrial direct contact soil exposure (2014).
3. PCB - Polychlorinated Biphenyls
4. mg/kg - milligrams per kilogram
5. ND - Not detected
6. ug/kg - micrograms per kilogram
7. J - Estimated value
8. U - Not detected
9. Regulatory limit established in 40 CFR 261.24.
10. TCLP - Toxicity Characteristic Leachate Procedure
11. mg/L - milligrams per liter
12. Shaded values indicate that concentrations exceed EPA screening levels or regulatory limits.
13. Bolded values indicate that concentrations exceed IDEM screening levels.

TABLE 2
SUBSURFACE SOIL LABORATORY ANALYTICAL RESULTS

Analyte	EPA Screening Level[1]	IDEM Screening Level[2]	Sample ID/Depth										
			D3 1-4'	D3 4-8'	D3 8-12'	D4 1-4'	D6 1-4'	D6 4-8'	D7 1-4'	D11 4-8'	D12 1-4'	D12A 1-4'	D13 1-4'
Polychlorinated Biphenyls (PCB)[3] (mg/kg)[4]													
Aroclor 1248	**100**	**7.4**	2.8	**93**	**14**	1.2	3.3	1.4	**13**	1.4	**95**	**43**	**25**
Aroclor 1254	**44**	**7.4**	1.2	**28**	4.1	0.53	1.9	0.59	**9.1**	1.2	**23**	**12**	**15**
All other Aroclors			ND[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pesticides (ug/kg)[6]													
All Pesticides			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals (mg/kg)													
Arsenic	**300**	**24**	21	17	**25**	22	**27**	16	21	23	22	23	18
Barium	**650,000**	**100,000**	700	460	440	910	600	730	570	270	520	460	640
Cadmium	**3,000**	**800**	46	92	23	30	25	23	30	6.6	71	75	34
Chromium	**No value**	**No value**	150	230	280	73	140	64	170	56	210	220	170
Lead	**800**	**800**	**2,500**	**1,900**	**970**	**2,300**	**1,800**	**1,500**	**1,600**	**910**	**2,400**	**1,800**	**2,100**
Selenium	**18,000**	**5,100**	1.3 J[7]	1.2 J	0.9 J	1.3 J	1.6 J	1.2 J	1.3 J	2.1	1.4 J	1.4 J	1.4 J
Silver	**18,000**	**5,100**	5.9	27	20	11	8	4	5.7	0.75 J	16	18	6.6
Mercury	**120**	**3.1**	0.41	1.6	0.31	0.36	0.27	0.15	0.49	**4.2**	0.61	0.99	0.8
Chromium, Hexavalent	**630**	**56**	0.7 U[8]	0.61 U	0.65 U	0.6 U	0.6 U	0.61 U	0.6 U	0.55 U	0.58 U	0.58 U	0.63 U
Semivolatile Organic Compounds (SVOC)[9] (mg/kg)													
Bis(2-ethylhexyl)phthalate	**16,000**	**1,200**	NA[10]	4.9 J	NA	NA	NA	NA	NA	1.5 J	NA	NA	NA
Di-n-butyl phthalate	**250,000**	**62,000**	NA	0.55 J	NA	NA	NA	NA	NA	0.21 J	NA	NA	NA
Pyrene	**68,000**	**17,000**	NA	0.41 J	NA	NA	NA	NA	NA	0.38	NA	NA	NA
2-Methylnaphthalene	**9,100**	**2,200**	NA	ND	NA	NA	NA	NA	NA	0.28 J	NA	NA	NA
Benzo(a)anthracene	**290**	**21**	NA	ND	NA	NA	NA	NA	NA	0.32 J	NA	NA	NA
Benzo(a)pyrene	**29**	**2.1**	NA	ND	NA	NA	NA	NA	NA	0.82	NA	NA	NA
Benzo(b)fluoranthene	**290**	**21**	NA	ND	NA	NA	NA	NA	NA	0.51	NA	NA	NA

TABLE 2
SUBSURFACE SOIL LABORATORY ANALYTICAL RESULTS

Analyte	Regulatory Limit[11]	Sample ID/Depth										
		D3 1-4'	D3 4-8'	D3 8-12'	D4 1-4'	D6 1-4'	D6 4-8'	D7 1-4'	D11 4-8'	D12 1-4'	D12A 1-4'	D13 1-4'
TCLP[12] Metals (mg/L)[13]												
Arsenic	**5**	0.01 U	0.01 U	0.008 J	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Barium	**100**	0.87	0.75	1	1.1	0.54	0.51	0.77	1.2	1.5	1	1.2
Cadmium	**1**	0.12	0.054	0.002 U	0.099	0.49	0.19	0.15	0.071	0.93	**2.2**	0.15
Chromium	**5**	0.0023 J	0.0018 J	0.00098 J	0.001 J	0.0009 J	0.003 J	0.0032 J	0.0032 J	0.0019 J	0.0043 J	0.0066 J
Lead	**5**	0.47	0.14	0.0082 J	1.8	0.34	0.87	0.33	0.13	1	1.2	0.61
Selenium	**1**	0.02 U	0.02 U	0.02 U	0.005 J	0.0062	0.0057 J	0.0063 J	0.0056 J	0.007 J	0.0067 J	0.02 U
Silver	**5**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00037 J	0.005 U
Mercury	**0.2**	0.00014 J	0.00022 J	0.00078 J	0.00014 J	0.00014 J	0.00014 J	0.00014 J	0.0002 J	0.00017 J	0.00015 J	0.0020 UJ
TCLP SVOC (ug/L)		NA	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA

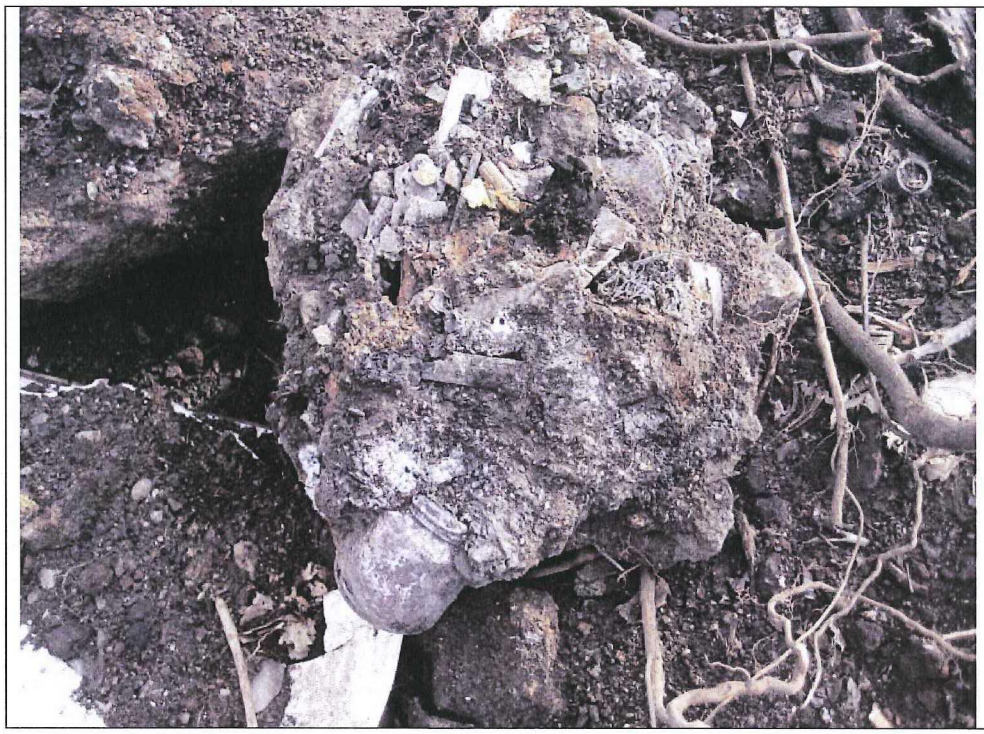
Notes:

1. EPA screening levels from Removal Management Levels for industrial soil (June 2014).
2. IDEM screening levels from IDEM's Remediation Closure Guide for commercial/industrial direct contact soil exposure (2014).
3. PCB - Polychlorinated Biphenyls
4. mg/kg - milligrams per kilogram
5. ND - Not detected
6. ug/kg - micrograms per kilogram
7. J - Estimated value
8. U - Not detected
9. SVOC - Semivolatile Organic Compounds
10. NA - Not analyzed
11. Regulatory limit established in 40 CFR 261.24.
12. TCLP - Toxicity Characteristic Leachate Procedure
13. mg/L - milligrams per liter
12. Shaded values indicate that concentrations exceed EPA screening levels or regulatory limits.
13. Bolded values indicate that concentrations exceed IDEM screening levels.

ATTACHMENT I
SITE PHOTO LOG

Number: 1
Photographer: Shelly Lam
Date: 12/3/2012
Description: Dixon Road Site with Kokomo Dump Site in background

Number: 2
Photographer: Shelly Lam
Date: 12/3/2012
Description: Drum exposed on banks of Wildcat Creek
Number: 3



Photographer: Shelly Lam
Date: 12/3/2012
Description: Waste discovered on-site

Number: 4
Photographer: Shelly Lam
Date: 12/3/2012
Description: IDEM and START examining waste pile

Number: 5
Photographer: Shelly Lam
Date: 12/3/2012
Description: Surface waste pile

Number: 6
Photographer: Shelly Lam
Date: 12/3/2012
Description: 55-gallon drum on ground surface

Number: 7
Photographer: Shelly Lam
Date: 12/3/2012
Description: 55-gallon drum on ground surface

Number: 8
Photographer: Shelly Lam
Date: 12/3/2012
Description: Waste exposed above Wildcat Creek

Number: 9
Photographer: Shelly Lam
Date: 12/3/2012
Description: START collecting soil sample

Number: 10
Photographer: Shelly Lam
Date: 12/3/2012
Description: START examining soil boring

ATTACHMENT II

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
DIXON ROAD SITE
KOKOMO, HOWARD COUNTY, INDIANA
APRIL 17, 2014

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	912281	01/01/76			Table Listing Howard County Dumps	1
2	904874	02/00/01	ATSDR	File	ToxFAQs Fact Sheet: Polychlorinated Biphenyls	2
3	907381	03/00/01	ATSDR	File	ToxFAQs Fact Sheet: Metallic Mercury	3
4	907375	08/00/07	ATSDR	File	ToxFAQs Fact Sheet: Lead, CAS #7439-92-1	2
5	912279	08/00/07	ATSDR	File	ToxFAQs Fact Sheet: Arsenic, CAS #7440-38-2	2
6	907376	09/00/08	ATSDR	File	ToxFAQs Fact Sheet: Cadmium, CAS #7440-43-9	2
7	907377	09/00/08	ATSDR	File	ToxFAQs Fact Sheet: Chromium, CAS #7440-47-3	2
8	907382	07/09/12	IDEM	File	Remediation Closure Guide	222
9	437114	08/13/12	Lam, S., U.S. EPA	Karl, R., U.S. EPA	Action Memorandum re: Determination of Threat to Public Health and the Environment and Selection of Time-Critical Removal Action at the Kokomo Dump Site **(PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)**	27
10	907378	12/28/2012	Yeary, S., IDEM	Lam, S. U.S. EPA	IDEM E-mail re: Request for Further Assistance at Dixon Road Site	1
11	907379	02/19/13	Nardulli, S., OTIE	Lam, S. U.S. EPA	Site Assessment Report for Dixon Road Site	168

12	907380	03/28/13	Lam, S., U.S. EPA	Osborn, R., IDEM	Request for Applicable or Relevant and Appropriate Requirements for the Dixon Road Site	2
13	912280	04/04/13	Ramsey, R., IDEM	Lam, S., U.S. EPA	Letter re: Request for Applicable or Relevant and Appropriate Requirements for the Dixon Road Site	3
14		00/00/00	Lam, S., U.S. EPA	Karl, R., U.S. EPA	Action Memorandum re: Request for Approval and Funding for a Time-Critical Removal Action at Dixon Road Site (**PENDING**)	