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SAUER DUMP SITE
DUNDALK, BALTIMORE COUNTY, MARYLAND

Response Action Plan – Revision 2 (Final)

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Sauer Dump Site Coalition

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1.0 Introduction

This Response Action Plan (RAP) is being submitted, on behalf of the Sauer Dump Coalition, in accordance with the United States Environmental Protection Agency (EPA) Region III Administrative Order for Removal Response Action (EPA Docket No. CERC-03-2006-0239DC) dated August 18, 2006 (the "Order"). A copy of the Order is provided in Appendix A.

The RAP document has been revised to incorporate information provided during previous meetings and in previous correspondence as follows:

- The EPA letter stamp-dated October 26, 2006 which contained comments to the first draft RAP document dated October 13, 2006.
- EPA's comments provided during the October 27, 2006 meeting at Region III Headquarters.
- The Coalition letter dated November 3, 2006 which responded to the EPA letter stamp Dated October 26, 2006 and the second draft of the RAP document dated November 3, 2006.
- The EPA letter dated November 8, 2006.
- The topics discussed during the November 9, 2006 meeting at Region III Headquarters.
- The Coalition letter dated November 17, 2006 which responded to EPA issues discussed at the November 09, 2006 meeting.
- The EPA letter dated November 22, 2006 responding to the Coalition's November 17, 2006 letter and the written order to proceed as mentioned in Section 11.2 of the Order.
- A copy of the written correspondence referenced above is included in Appendix H of the RAP.

This RAP pertains to the Sauer Dump Site located adjacent to 4225 Lynhurst Road, Dundalk, Baltimore County, Maryland (the "Site"). Figure 1 provides the location of the Site. EPA alleges the Site was a former salvage yard/dump as described in the Order and previous remedial activities (ENSAT, 2002a; ENSAT, 2005). The Site is situated near a residential neighborhood and is partially bordered by the Back River (a tributary of the Chesapeake Bay). As indicated on the parcel map provided in Appendix A, the site is located primarily on Parcel 425 and may include portions of Parcels 464, 503, 295, 574, and 137. Figure 2 provides a detailed site map, including parcel locations.

In accordance with Section 8.3 of the Order, Malcolm Pirnie, Inc. (Malcolm Pirnie) has developed a RAP to implement an Extent of Contamination Study and Cleanup Goal Analysis to characterize the Site for the following constituents:

- Arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver;
- Semi-volatile organic compounds (SVOCs);
- Volatile organic compounds (VOCs); and
- Pesticides and polychlorinated biphenyl (PCBs).

This RAP incorporates the plans, schedule, and methodologies for implementation of the Extent of Contamination Study as outlined in the Order, including the following:

- A Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) for RAP activities;
- A Health and Safety Plan (HASP) for RAP activities; and
- A preliminary project schedule, on the execution of the major RAP tasks.

The following tasks are not addressed in the RAP at this time and would be part of the post-RAP activities:

- Obtain a Hazardous Waste Generation Identification Number. No waste will be generated per the proposed RAP tasks that require this identification.
- Provide a command post at the Site with office space for EPA (and contractor personnel) to oversee the work. Due to the nature of the work, which is short duration field characterization/investigation in nature, the Respondents believe it will be more appropriate to evaluate the need for the post following the completion of the RAP activities.

1.1 Conceptual Project Approach

A conceptual project approach has been developed for the Site and is presented in Figure 3. The major steps in this project approach include:

- Determining the future use for the Site;
- Developing a Conceptual Site Model (CSM);
- Performing a Cleanup Goal Analysis as part of the CSM;
- Outlining the data gaps defined from the CSM and Cleanup Goal Analysis;
- Conducting field activities to refine the data gaps; and
- Submit a final report to EPA that fully characterizes the Site and presents the proposed cleanup goals.

As shown on Figure 3, development of an accurate Conceptual Site Model (CSM) is paramount to the identification of which type of receptors (human health and ecological) are at risk, as well as the magnitude of the risk. Malcolm Pirnie recommends that the future-site use and potential off-site receptors (e.g. residents and wetlands) be identified and evaluate as part of an "up-front" cleanup goal analysis. This process will allow pertinent data collection tasks to be identified and executed via the Extent of Contamination Study. This report presents the preliminary RAP goals and objectives, a preliminary CSM, and an outline of the cleanup goal analysis intended to be conducted for the project.

At this point in time the respondents see the potential future use as passive recreation and/or common open space or open parks. It is highly likely that there will be deed restrictions and engineering controls placed on this property to prevent groundwater consumption. Additionally, access to the site would be controlled.

The upfront project tasks of defining project goals (which includes discussion of the potential Site future-use scenarios) as well as a strong understanding of the CSM is typically an "interactive" process between the regulator and respondents. Achieving a common understanding of the issues will be important to achieving a "focused" investigative effort (i.e., Extent of Contamination Study) and identifying appropriate removal action alternatives for consideration at the Site.

The overall scope of work included for the RAP is as follows:

- Development of an electronic database with GIS capability to document past investigative activities and laboratory analysis at the Site. This database will be the foundation for developing the CSM and will be expanded to include new data as it is collected.
- Development of a site-specific cleanup goal "analysis" that will support future-use scenarios at the Site and will be part of the revised comprehensive CSM. It is the intention of the Respondents that the cleanup goals developed under this Order will be comprehensive of all EPA removal and remedial action requirements for the Site. As part of the RAP document, an understanding of the chemicals of potential concern (e.g., PCBs and lead) as well as potential pathways for exposure is presented.
- Development of a preliminary Conceptual Site Model (CSM) which will be the basic building block for developing a Site understanding. This understanding will be used to direct both Site investigations (i.e., Extent of Contamination Study) and future Removal Action Alternative Evaluations. As data is collected during the Extent of Contamination Study, the CSM will be adjusted (if necessary).
- Conducting an Extent of Contamination Study as defined in Section 8.3 of the Order to fulfill the data requirements (and data gaps) defined via the CSM and the cleanup goal analysis.

1.2 Site Description and Location

The Site is an inactive privately owned salvage yard/dump. The site is currently heavily vegetated and was formerly a marsh, which was stabilized with artificial fill. EPA alleges that Mr. Sauer used the Site as a salvage/dump yard.

The Site is depicted on the United States Geological Survey (USGS) 7.5 minute series Middle River Quadrangle Map (Figure 1). The elevation of the Site ranges from approximately mean sea level to nearly 17 feet above mean sea level (AMSL). Figure 2 provides the 2002 topographic survey of the site conducted during Remedial Investigation Activities (ENSAT, 2005). A mounded area, present in the western and central portions of the Site, exhibits the irregular topography typically associated with dump sites. The topography along the eastern and southern portions of the Site is generally more level. (ENSAT, 2005)

The Back River, a tributary of the Chesapeake Bay, borders the Site to the south. A tidal wetland area is present along the southern border of the Site adjacent to Back River. Non-tidal wetland areas are present on adjacent properties along the northwestern, southwestern and southeastern borders of the Site (Figure 2). A pond is present in the non-tidal wetland area northwest of the Site (Figure 2). For the purpose of this RAP the wetland areas have been segregated into the following areas as shown on Figure 2: Pond Area, Southwest Finger, Back River Shoreline Area, and Southeast Finger. Additional discussion of these areas is presented in Section 4.0. The wetland areas are located not only on Parcel 425 but on the adjacent properties to the west, north, and east.

The Site is currently owned by Wittstadt Hunting Club, Inc. which acquired the property on January 16, 1997 (Reference: Maryland Department of Assessments and Taxation Internet Site). According to correspondence from the Baltimore County Department of Permits and Development Management, the Site is predominately zoned as RC 20 Resource Conservation (Critical Area). The Site is surrounded by residential and undeveloped properties. Residential properties border the Site to the northeast, east, and southeast (Figure 2). Undeveloped land borders the Site to the northwest, west, and southwest. A portion of the tax map, which shows the relationship between the Site and the adjacent properties, is included in Appendix A.

In 1984 the Baltimore County Department of Health conducted an initial inspection of the Site and found a large quantity of debris, some of which was partially buried. A series of further field inspections by Baltimore County, Maryland Department of Environment (MDE), and the EPA were performed from 1984 to 2005. These investigations included the collection and analyses of soil, sediment, surface water, and groundwater samples. Section 2 of the RAP provides a summary of the investigative activities performed at the Site. In addition to the field investigations, an aerial photo review and baseline risk assessment (Remedial Investigation and Focused Feasibility Study) of the site was conducted by the EPA in 2002. The results of these investigations are summarized in Section 3 as part of the CSM.

1.2.1 Current Site Conditions

The Site is land-locked (i.e., no direct access from public land). The Site can be accessed from Lynhurst Road via a driveway between 4225 and 4227 Lynhurst Road. Both of these residential properties are owned by descendants of the late Mr. Sauer. A gate extends across the driveway 40 to 50 feet northeast of the boundary between the Site and these residential properties. A garage structure on the 4227 Lynhurst Road property is located approximately 40 feet east of the property (Parcel 425) boundary. With the exception of the immediate area of the entrance to the Site, the Site is heavily overgrown with vegetation (primarily trees, scrubs, tall grasses, and reeds) and exhibits irregular surface topography. Portions of the Site continue to serve as storage space for large items (boats, vehicles, heavy construction equipment, and other large items) owned by Sauer family members. Accumulations of scrap metal are present in a number of areas on-site. Miscellaneous debris and domestic refuse, contained in a soil matrix, is present across most of the Site and extends off-site in some areas. Concrete construction demolition debris is present along the northern border of the Site, in the steep bank along the southwestern property line along the Southwest Finger, and in the Southeast Finger (ENSAT, 2005).

On or about December 8, 2005, EPA issued Administrative Order for Removal Response Action No. CERC-03-2006-0030DC (the "2005 Order") pursuant to Section 106 of CERCLA. The 2005 Order directed Respondents, among other things, to erect a fence at the Site to restrict access, install a temporary cover system atop contaminated areas to mitigate erosion of surface soils, and take steps to protect the shoreline from erosion. As a result of the 2005 Order, a chain link fence now restricts access to most of the Site, plastic nylon reinforced polyethylene sheeting of 6/1000 of an inch thickness covers a small area of the Site disturbed during the MDE's past remedial investigation, and coir (coconut fiber) logs have been installed at the shoreline to protect the Site shoreline from erosion.

1.3 Purpose of the Report

The purpose of this report is to provide a plan to conduct an Extent of Contamination Study as set forth in the Order. The work will be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan, as amended NCP, per 40 C.F.R. Part 30, and CERCLA.

The overall objective of the work within the RAP is to protect the public health and welfare and environment via conducting the following tasks:

- A CSM that accurately defines the Site setting and fate/transport mechanisms;
- Develop preliminary cleanup goal objectives for the Site (e.g., acceptable risk to human health/ecological) using good science and established precedents; and
- Conduct the Extent of Contamination Study to support the CSM and the future cleanup goals.

1.4 Report Organization

A summary of the organizational format of the RAP report is provided as follows:

- Section 1.0 addresses the Introduction to the report, provides background information including the Site description and setting and overall goals/objectives of the RAP.
- Section 2.0 presents a summary of the previous investigations and the environmental data base established for the Site.
- Section 3.0 presents a summary of the past Baseline Risk Assessment Datascreen (BRAD) and Site-specific constituents of potential concern.
- Section 4.0 presents the preliminary overall CSM (fate and transport mechanisms) and proposed data gaps for the Site.
- Section 5.0 presents the "outline" of the cleanup goal analysis that will be implemented during the Extent of Contamination Study. The Removal Action goals would be presented as part of the future cleanup goal analysis.
- Section 6.0 presents the scope-of-work for Extent of Contamination Study for the Site.
- Section 7.0 presents the project schedule to implement the tasks within the Extent of Contamination Study.
- Section 8.0 presents the references used to generate the RAP.

2.0 Previous Field Investigations and Existing Site Data

A review of the previous investigations at the Site and surrounding properties is integral to providing a reliable Conceptual Site Model, and facilitating the development of a comprehensive Response Action Plan. The following sub-sections provide a summary of the former site investigations and the abundance of analytical and geospatial data sets generated from these previous investigations.

2.1 Previous Field Investigations and Assessment Activities

A summary of the previous environmental field investigations at the Site is provided below. The summaries are based on a review of the Remedial Investigation Report (ENSAT, 2005), Remedial Investigation and Focused Feasibility Study (ENSAT, 2002), Baseline Risk Assessment Datascreen (ENSAT, 2002b), and the Order (Appendix A). The extensive laboratory data sets collected and recorded as part of these activities by the EPA and MDE have been compiled into an Access™ database as described in Section 2.1.2. The location and depth of these samples has been maintained in a Geographic Information System (GIS) as described in Section 2.1.3. The summary for each event described below includes a list of the media sampled, parameters analyzed, summary of reported results within the site database, general conclusions of the reporting agency, and other site specific information.

Samples have been collected in the medias of groundwater, surface water, surface soil, subsurface soil, and sediment as part of past field activities. The samples have been analyzed for a variety of parameters including PCB compounds, including the PCB aroclors and PCB congeners, inorganic metals (both total and dissolved analyses for aqueous media and total analyses for solid media), pesticide compounds, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). Table 1 and 2 provide a summary of the samples collected as part of the previous field activities described below.

2.1.1 1985 – 1986: MDE and EPA Site Investigations

MDE conducted a preliminary assessment and EPA conducted a site investigation at the Site in response to initial concerns identified by the Baltimore County Health Department (BCHD) in 1984. Soil, sediment, and surface water samples were obtained in 1985 for VOCs, SVOCs, total metals, pesticides, and PCBs. As indicated on Table 1, a total of 1,659 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. MDE and EPA reported that impacts to soil, sediment, and surface water were detected above risk-based screening levels. (See Section 3.0)

Salvage and dump operations were observed at the Sauer facility during the site investigations. The site was observed as being relatively flat with mounds of dumped domestic and construction debris, burned paint waste, and charred areas. Observed salvage items included scrap metal, empty tanks and drums, abandoned trucks, open roll-off bins, construction equipment, concrete conduit, wood chips, and abandoned automobiles. Oily sheen areas were observed on-site and in adjacent wetland areas. Mr. Sauer was ordered by the Baltimore County Health Department (BCHD) to close the dump in 1984. By September of 1985 most of the material was removed as required by BCHD. With the exception of the perimeter slopes, the site was graded and contained little remaining debris.

2.1.2 1990: MDE Site Investigation

MDE collected surface soil samples and sediment samples for analysis of VOCs, total metals, pesticides, and PCBs. As indicated on Table 1, a total of 332 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. The surface soils and sediments were reported by MDE to be impacted by metals and PCBs above risk-based screening levels. (See Section 3.0)

2.1.3 1991 – 1994: EPA Expanded Site Inspection

The EPA conducted an Expanded Site Inspection (ESI) at the former Sauer Dump between 1991 and 1994. Soil, sediment, and surface water samples were collected in 1992 and analyzed for VOCs, SVOCs, total metals, pesticides, and PCBs. As indicated on Table 1, a total of 5,262 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. EPA reported impacts to soil, sediment, and surface water above respective risk-based screening levels. (See Section 3.0)

In February of 1991, EPA reported that a large portion of the site had been covered with about 10 feet of fill consisting of soil and debris. Observed site debris during the ESI included a tractor-truck trailer, concrete, bricks, rebar, tires, drums, furniture, a curing oven, broken asphalt, empty 55 gallon drums, and a 1,000-gallon storage tank. Oily sheens were observed on-site and in adjacent wetlands.

2.1.4 1996: MDE Continued Site Investigation

MDE collected soil, sediment, and surface water samples for analysis of total metals and PCBs. As indicated on Table 1, a total of 396 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. Impacts to soil, sediment, and surface water were detected above respective risk-based screening levels. (See Section 3.0)

MDE determined that surface water was not impacted as previously reported from 1985 - 1994 due to excess turbidity in these earlier samples. The turbidity likely gave a false positive for contaminants of concern. The locations of these earlier sampling events are not reported in site surveys or previous RI summary reports (i.e., 2002 or 2005 ENSAT reports) performed by MDE; however, the data is maintained in the analytical database discussed in section 2.2. This data is flagged as suspect.

2.1.5 1999: MDE Continued Site Investigation

MDE collected soil, sediment, groundwater, and surface water samples for analysis of VOCs, SVOCs, total metals, dissolved metals, pesticides, and PCBs. As indicated on Table 1, a total of 3,825 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. MDE reported impacts to soils, sediment, and surface water above risk-based screening levels. (See Section 3.0)

2.1.6 2001: MDE Continued Site Investigation

MDE collected soil, sediment, and groundwater samples for analysis of VOCs, SVOCs, total metals, dissolved metals, pesticides, and PCBs. A topographic survey of the site and surrounding lands was conducted. Five shallow groundwater monitor wells were installed (Figure 2). As indicated on Table 1, a total of 5,985 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. MDE reported impacts to soils, sediment, and groundwater above risk-based screening levels. (See Section 3.0)

2.1.7 2002: MDE PCB Hot-Spot Delineation and Groundwater Investigation

MDE collected soil samples for laboratory analyses of PCBs and performed several field based screening assays for PCB hot-spot delineation. A wetland survey was performed to define the extent of the wetland areas at and near the site. The survey results are included in the site GIS. Water level monitoring was performed in the five on-site groundwater monitoring wells, the Back River, and the pond to the northwest of Parcel 425. As indicated on Table 1, a total of 350 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. Field based screening data for total PCBs is not included in the database. MDE defined the extent of PCB hot spots at two locations above 100 mg/kg in the southeast and south-central portion of the site (Figure 4). MDE also collected five surface water samples and five groundwater samples that were analyzed for PCB congeners. This data is discussed in greater detail in section 2.2.3.

Groundwater level monitoring data collected in 2002 at the site monitor wells were interpreted to indicate a mixed tide within the Back River. The tide was reported to influence the groundwater elevation in the on-site monitor wells (with the exception of monitor well MW-5) and the pond (located northwest of Parcel 425). Precipitation events are reported to have an effect on the water level within the monitor wells and the pond. General groundwater gradient at the site was interpreted to flow to the south toward the Back River.

2.1.8 2004: MDE Data Gap Sampling

MDE collected soil samples for analysis of total metals, SVOCs, pesticides, and PCBs. As indicated on Table 1, a total of 1,286 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. The purpose of this sampling event was to fill data gaps identified from previous investigations primarily in the PCB hot spot areas.

2.1.9 2005: MDE Data Gap Sampling

MDE collected soil samples for analysis of PCBs. As indicated on Table 1, a total of 728 analytical results are observed for this sampling event and are contained in the analytical database discussed in Section 2.2. The purpose of this sampling event was to fill data gaps identified from previous investigations primarily in the PCB hot spot areas.

2.2 Analytical Database and GIS

A Microsoft Access™ database containing analytical laboratory results from the previous site investigations was constructed for the site. Access™ is a development environment used to create computer databases for the Microsoft Windows operating system. It allows for the construction of relational tables that warehouse data and provides a series of tools to mine the data. A project Geographic Information System (GIS) was compiled to link the analytical data to sample locations and provide a base reference for the conceptual site understanding. ESRI's ArcGIS™ is the GIS platform used to display and link the site information. A description of the analytical database, GIS, and observed data variances with previous reporting activity is provided below.

2.2.1 Analytical Database

The database includes laboratory analytical data collected during the site investigations discussed above for soil, sediment, groundwater, and surface water. Over 360 samples, not including QA/QC samples such as blanks, are contained in the database. Table 2 provides a summary of the sample IDs, analyte groups evaluated for each sample, and dates collected. Table 1 provides the number of reported results for the samples summarized by analyte group and sampling event (year collected). Combined, over 19,000 analytical results for various PCBs, pesticides, inorganics (total and dissolved metals), VOCs, and SVOCs are recorded in the database. Both detect and non-detect data are reported in the database. Non-detected data is reported as the reporting limit and is flagged.

The analytical database was constructed using the following methodology:

1. The Excel file "Analytical Database - Sauer Dump - Summary Sections update June 2005" was provided to Malcolm Pirnie by EPA Region III on September 7, 2006. The excel file contained analytical laboratory results for the soil, sediment, groundwater, and surface water samples collected at the site from 1985 to 2005. This database was originally developed by ENSAT, an environmental contractor to MDE, to record their Remedial Investigation sampling activities and to compile historic

analytical results. This database is herein referred to as the MDE data set.

2. This MDE data set was re-formatted into a series of tables that were input into an Access database in order to facilitate the review, tabulation, and assessment of the analytical data. Each of the tables was compiled into a master analytical results table within the Access database.

3. The analytical data was checked for duplicate results, duplicate sample nomenclature, and consistency with analyte and analytical method nomenclature. Additional information was appended to the table which flagged QA/QC samples such as blanks, identified analytical group type (e.g., VOCs, SVOCs, and PCBs), and identified non-detect vs. detected values. This additional information was appended to the data to assist with the tabulation and review of the database.

4. The data was checked for consistency with previous reporting activities at the Site including the 2002 Remedial Investigation and Focused Feasibility Study (ENSAT, 2002) and 2005 Remedial Investigation (ENSAT, 2005). The data verification included comparing the results presented in the RI reports to the data contained in the database. No major inconsistencies were observed between the database and these previous investigation reports. Section 2.2.3 discusses the data variances that were observed between the database and previous reports.

5. Sample location information (x,y coordinates) was added to the database as a separate table. The locations of the samples are discussed in greater detail in Section 2.2.2. Depth information (feet below ground surface) for sediment and soil samples was obtained from the original sample ID where available and previous reporting activities including the 2002 Remedial Investigation and Focused Feasibility Study (ENSAT, 2002) and 2005 Remedial Investigation (ENSAT, 2005). Additionally a look up table was generated to provide a consistent sample ID that accounted for duplicate IDs that were used over several sampling events.

The database in its current state is believed to represent an unbiased majority of analytical information collected at or near the Site since 1985. Data that may be discovered from on-going State, County, and Federal file reviews may supplement or refine the information within the database.

2.2.2 Geographic Information System (GIS)

The project GIS consists of the following base files primarily obtained from Baltimore County geospatial services:

- United States Geologic Survey 7.5 Minute Series Topographic maps,
- Ortho-rectified color air photos with 1 meter resolution covering all parcels listed in the Order,
- Road centerlines and road polygons,
- Stream centerlines and polygons for the sub-watershed,
- Buildings,
- Baltimore County Assessor's parcel boundaries, and
- Wetland areas and pond.

Additionally, original survey data was obtained from the surveyor who conducted an assessment of the property boundary, site topography, and sample locations as part of the remedial investigation activities reported by ENSAT, 2005. Locations of samples that were not surveyed were obtained by geo-referencing existing site figures produced by ENSAT, 2005, and ENSAT, 2002. Over 184 unique sample locations (not including depth specific samples) were confirmed for the site. For example a single location may have several samples collected at multiple depts. Figure 5 provides the location of all environmental samples obtained from the site survey or geo-referenced maps from the 2002 Remedial Investigation and Focused Feasibility Study (ENSAT, 2002b) and 2005 Remedial Investigation (ENSAT, 2005).

2.2.3 Known Database and GIS Limitations

A comparison of the project database and GIS to existing site reports, including the 2002 Remedial Investigation and Focused Feasibility Study (ENSAT, 2002a), Baseline Risk Assessment Data screen for the Site (ENSAT

2002b), and 2005 Remedial Investigation (ENSAT, 2005), show the following potential limitations:

- The location of twenty-eight (28) surface water samples could not be confirmed. Twenty (20) of the twenty-eight (28) unknown surface water sample locations were identified by ENSAT, 2002a to be un-usable based on high turbidity levels. On-going review of State, County, and Federal files may assist with the accurate location of these samples. The laboratory results of these samples are maintained in the database, but are not used in the discussion of the surface water quality. The locations of the remaining eight surface water samples with unknown locations are maintained in the database. One of these surface water samples is described as "Background." The results of these 8 Samples are presented in Section 4.0 and are used in the discussion of the sites general environmental condition. A list of the 28 surface water samples as well as the parameters analyzed for these samples is provided in Table 3.
- PCB Congener analyses (Method 1668a) were conducted on the five (5) surface water samples with known locations and five (5) groundwater wells. There is an inconsistency in the data set (excel file) obtained from EPA and the summarized results reported in the ENSAT, 2005 RI. On-going review of State, County, and Federal files to obtain the original laboratory report and field notes should clarify the inconsistency. The results of the homologue analyses are not currently used in our discussion of the sites general environmental condition; however, based on the low concentrations observed in this data, resolution of the inconsistencies associated with this data is not anticipated to change the interpretations within the CSM.
- The locations of three (3) soil and one (1) sediment samples could not be confirmed. The laboratory results of these samples are maintained in the database. These samples are not included in the discussion of the sites soil or sediment quality. On-going review of State, County, and Federal files may assist with the accurate location of these samples. A list of these samples as well as the parameters analyzed for these samples is provided in Table 3.
- As defined in the original MDE data set, several soil locations are identified as being collected from the surface or subsurface; however, the exact depths for these locations are not defined. These samples have

been flagged in the database. On-going review of State, County, and Federal files may assist with the identification of the exact sample depth.

- There is a discrepancy between the 2001 surveyed parcel boundaries (conducted as part of the 2002 RI) and the parcel boundaries provided by the County of Baltimore. This discrepancy needs to be resolved; however, for the remainder of this report, the 2001 surveyed parcel locations have been used based on a visual analysis of the data sets, consistency with past reporting activities, and consistency with parcels as defined in the Order.

3.0 Constituents of Potential Concern

A relatively good understanding of the site's Constituents of Potential Concern (COCs) exists due to the significant amount of prior characterization activity conducted by EPA and MDE, including a Baseline Risk Assessment Datascreen (BRAD) conducted in 2002 (ENSAT, 2002b). The initial analysis presented by MDE, as well as our review of the BRAD indicate that Lead and PCBs are the principal potential human health risk drivers at the Site and are the primary COCs. The results of the investigation as well as our analysis are provided in the subsections below.

Three additional COCs arsenic (soil and sediment), chromium, and iron will warrant additional evaluation as part of the Cleanup Goal Analysis (Section 5) in the context of more appropriate site specific but protective assumptions. Additional data collection for these three COCs will not be necessary in the Extent of Contamination Study and will not be discussed as part of the CSM (Section 4.0).

Site-related potential receptors have not yet been fully identified and are pending the development of a comprehensive Conceptual Site Model and cleanup goal analysis. The "comprehensive" CSM will include the preliminary CSM (as discussed in Section 4.0) as well as supplemental data collected as part of the extent of contamination study. The comprehensive CSM will be provided in the Final Report.

3.1 Previous Baseline Risk Assessment

The following sub-sections provide a summary of MDE's BRAD (ENSAT, 2002b) for the site as well as our analysis of this study.

3.1.1 Baseline Risk Assessment Summary

MDE's BRAD evaluated both detected and non-detected concentrations of VOCs, SVOCs, PCBs, numerous pesticide and herbicide compounds (PESTs), and metal species (metals). The compounds screened in the BRAD include those compounds identified in the Order (Appendix A).

The BRAD consisted of a conservative multi-tiered screening approach that compared maximum detected and non-detected concentrations of COCs in soil, sediment, ground water, and surface water to state and federal guidance on acceptable concentration limits for human exposure. These guidance limits included the EPA's Region III Risk-Based Concentrations (RBCs) and the MDE's Soil and Groundwater Cleanup Standards, Interim Final Guidance (SGCLs).

The RBCs are not cleanup levels as indicated in the EPA's regional guidance for selecting exposure routes and COCs (EPA, 2006b). Alternatively, the MDE SGCLs are designed as cleanup levels and specifically provide for the use of risk-based cleanup levels. The SGLC guidance states the intent of the SGCLs is to:

- "Provide uniform and consistent human-health based numerical Cleanup Standards for the most frequently encountered hazardous substances encountered in the soil and groundwater media at properties within the state;
- Identify the conditions for requiring remedial action at a property, or the conditions for not requiring further investigation or remedial action at a property;
- Describe the general requirements for applicants conducting environmental assessments at properties with hazardous substances; and
- Provide detail and specificity on the important elements of remedial actions, including the responsibilities of persons who use this guidance and the Department."
- "Notwithstanding the information conveyed in this document, persons must also adhere to all applicable federal and state environmental laws and regulations. Persons may also use the United States Environmental Protection Agency (EPA) Risk Assessment Guidance document (EPA/540/1-89/002) to conduct a property specific risk assessment. If this option is chosen, then the risk assessment must include an evaluation of the risk at the property to the Department's upper end risk threshold for carcinogen compounds of 10^{-5} or, a non-cancer Hazard Quotient of 1.0 " (MDE, 2001).

The BRAD compared the maximum detected and non-detected COCs concentrations to the RBC residential soil ingestion concentrations (for site soils, both surficial and subsurface, and sediments) and tap water ingestion concentrations (for groundwater and surface water). The maximum detected and non-detected concentrations of non-carcinogenic COCs were compared to modified RCB values by dividing by a factor of ten to account for the possibility of additivity of systemic effects (ENSAT, 2002b). The BRAD also compared the maximum detected and non-detected concentrations of COCs to the SGCLs, using the soil SGCLs for sediment screening and the groundwater SGCLs for surface water screening. To account for potential risks posed by exposure to soil and groundwater volatile contaminants, the BRAD employed the Johnson and Ettinger vapor intrusion model as defined in EPA, 1997.

The exposure assessment presented in the BRAD evaluated four receptor scenarios that included recreational/intermittent visitors of various ages as well as a construction worker profile. As indicated in the BRAD, the exposure scenario assumptions utilized in calculating risk to these populations were consistent with recommendations provided by EPA and MDE (ENSAT, 2002b).

The BRAD results show potentially elevated risks for several COCs. The COCs retained for further "non-carcinogenic" endpoint evaluation in the BRAD are the PCB aroclors 1016 and 1254, and the metals arsenic, chromium, and iron. PCB aroclor 1254 in sediment and soil and arsenic in groundwater were retained for further "carcinogenic" endpoint evaluation.

3.1.2 Evaluation of Baseline Risk Assessment

The BRAD retained aroclor 1254 in soil and sediment and arsenic for further "carcinogenic" endpoint evaluation. aroclor 1254 posed potential risks for most receptors through the ingestion and dermal contact pathways for surface and subsurface soils exposures. Arsenic showed elevated risk to the Youth Visitor via the groundwater "ingestion" pathway. As defined in Section 1.1, deed restrictions and or engineering controls are anticipated to be employed relative to future use of the site. Therefore the groundwater ingestion pathway for arsenic will not be a viable pathway for consideration in the CSM. PCBs in soil media will be evaluated in the future cleanup goal analysis (Section 5.0) and also as part of the CSM fate and transport discussion in Section 4.0.

Relative to "noncarcinogenic" risk the retention of arsenic, chromium and iron appear to be "artifacts" of the BRAD's conservative assumptions. These three metals presented potential "non-carcinogenic" risks to some human receptors. In the case of chromium, the Child Visitor receptor failed on the basis of dermal exposure to the maximum concentration found in subsurface soils. The calculated Hazard Index (HI) was 5. Given the screen's use of the maximum detected concentration, an order of magnitude increase in toxicity and the assumption of 100% bioavailability, it is likely that further evaluation of this COC will eliminate it as a source of unacceptable risk at the site. Arsenic (subsurface soil ingestion and ground water ingestion) and iron (groundwater ingestion) were similarly implicated by the BRAD with an HI of 2 to 3 for the Child and Youth Visitors. These COCs will be further evaluated as part of the future cleanup goal analysis (see Section 6.0) in the context of more appropriate site-specific but protective assumptions. Based upon the foregoing, additional data collection (i.e., during Extent of Contamination Study) will not be necessary for chromium, iron, or arsenic.

Lead is a site COC not evaluated by the exposure scenarios in the BRAD. The discussion of lead was limited to the observation that "[t]he EPA has issued a directive that recommends a soil screening level of 400 mg/kg for residential scenarios at RCRA facilities and CERCLA sites; the 400 mg/kg screening level was used in this evaluation." Exceedences of the 400 mg/kg residential screening value for lead in soil exit at the site. While the 400 mg/kg concentration for lead in soils served as useful screening value for the limited purposes of the BRAD, subsequent guidance and regulation will require that lead values for the site be revisited. Lead in the soil media and sediment media will be evaluated in the future cleanup goal analysis (Section 5.0) and CSM fate and transport discussion in Section 4.0.

In addition to screening site COCs against acceptable concentration levels for human exposure, the BRAD included a brief comparison of detected and non-detected sediment COCs with two types of National Oceanic and Atmospheric Administration (NOAA) levels, Effects Range Median (ERMs) and Screening Quick Reference Table (SQUIRTs) Probable Effects Level (PELs). The BRAD cited PCB concentrations as a potential "... threat to ecological receptors within the wetland." (ENSAT, 2002b). PCBs in sediment will be evaluated in the cleanup goal analysis (Section 5.0) and CSM fate and transport discussion in Section 4.0.

The BRAD serves as an important resource and basis for focusing the design and execution of the Extent of Contamination Study and risk evaluation activities (i.e., cleanup goal analysis) for this RAP. The extensive suite of COCs screened by the BRAD allows most of the site's COCs to be eliminated as significant potential risk drivers. For those COCs retained (principally PCBs and lead) as potential significant risk contributors, the BRAD provides direction as to which potential exposure pathways are of greatest concern.

The RAP will utilize the BRAD as a point of departure for further PCB and lead assessment at the Site. Absent additional information that reasonably suggests a need to revisit COCs screened out by the BRAD, the RAP's site characterization efforts (Extent of Contamination Study) will focus on these two COCs. This approach is further justified and supported by recent EPA Region III memoranda citing lead and PCBs as the site's COCs requiring action (EPA, 2005a and EPA, 2005b).

3.2 Site Specific Constituents of Potential Concern

The preceding discussion of the site's characterization to date allows the RAP to focus on two COCs; lead and PCBs. Therefore lead and PCBs will be the primary COCs that will be discussed in the following section for the CSM.

COCs, including chromium, iron and arsenic in soil and sediment will be evaluated as part of the cleanup goal analysis only. The combination of specific COCs data with the elements of site fate and transport allows the development of a preliminary CSM. The following Section 4.0 discusses fate and transport issues pertinent to the site. Section 5.0 provides the proposed "outline" of the cleanup goal analysis that will be completed as part of the Extent of Contamination Study and the results provided in the Final Report.

4.0 Preliminary Conceptual Site Model

A preliminary Site-wide conceptual site model (CSM) has been developed to provide a baseline understanding of the environmental condition of the Site and a framework to develop the proposed data gap sampling and Response Action Plan discussed in Section 6.0. This preliminary CSM is based on the available data for the site obtained from the original project analytical database, survey information and GIS data acquired from Baltimore County, the 2002 Remedial Investigation and Focused Feasibility Study (ENSAT, 2002a), the Baseline Risk Assessment Datascreen for Sauer Dump (ENSAT, 2002b), and 2005 Remedial Investigation (ENSAT, 2005). The primary components of this preliminary CSM include the following:

- Primary COCs (previously discussed in Section 3.0),
- Site geology and hydrogeology information (discussed in Section 4.1),
- Potential Fate and Transport Mechanisms (discussed in Section 4.2),
- Potential data gaps to address any issues in the CSM components (discussed in Section 4.3), and
- Cleanup Goal Analysis (discussed in Section 5.0).

The Preliminary CSM has been developed around the primary COCs as discussed in Section 3.0, which include lead and PCBs. A comprehensive CSM will incorporate a cleanup goal analysis and new data collected as part of the Extent of Contamination Study. This Comprehensive CSM will be presented in the Final Report.

4.1 Physical and Physiographic Setting

The site is located in Baltimore County, Maryland, approximately 5 miles east of Baltimore (Figure 1). The Site is located primarily on Parcel 425 and may include portions of Parcels 464, 503, 295, 574, and 137. It is surrounded on the east, north, and west by private, residential lots; and on the south by the Back River (Figure 2). The site is an inactive, privately owned, un-permitted, dump that is located on previously marshy land which was stabilized with fill material. EPA alleged that Mr. Sauer used the site as a salvage/dump yard.

Contamination at the Site has been reported in the soils, groundwater, surface-water, and sediments (ENSAT, 2002a; ENSAT, 2005).

Figure 1 shows the location of the Site on the Middle River United States Geologic Survey (USGS) 7.5-minute-series topographic map. The elevation of the Site ranges from approximately mean sea level to 17 feet above mean sea level (amsl). A mounded area, present in the western and central portions of the Site, exhibits irregular topography typically associated with dump sites (Figure 2). The topography along the eastern and southern portions of the Site is generally more level. A tidal wetland area is present along the southern border of the site. Non-tidal dominated wetlands are present on adjacent properties along the northwestern, southwestern, and southeastern borders (Figure 2).

As of August, 2006, the Site was observed to be heavily vegetated with tall grasses, reeds, trees, and scrub bushes. Accumulations of miscellaneous debris are observed across the site. The site is currently encompassed by a chain link fence to limit access.

4.1.1 Geology

The geology at the site and surrounding areas is mapped as unconsolidated Quaternary age (recent) sedimentary deposits belonging to the Lowland Deposits Unit (MGS, 1968). This unit is characterized by inter-bedded gravels, sand, silt, and clay which vary in thickness from 0 to 150 feet and belong to the Coastal Plain Physiographic Provenance. Although no bedrock outcrops are observed at the former dump, the Site is likely underlain by Cretaceous age Potomac Group sedimentary bedrock and lies to the east of the Fall Line. Locally, the Site contains a significant amount of fill material. Section 4.1.3 discusses the fill progress at the site. Fill activities continued at the site until the late 1970s and early 1980s at which point the site appeared to be 100% filled. Section 4.1.3 discusses the fill progress from previous air photo reviews conducted at the site.

4.1.2 Hydrogeology

Groundwater contour maps generated from on-site monitor wells indicate a groundwater flow from the central portions of the site toward the Back River and adjacent wetland areas (Figure 6). As seen in previous investigations the groundwater levels appear to be influenced by tidal variations, especially in wells closer to the Back River. Precipitation events appear to have a marked effect on the water levels of the more upland monitoring points and the pond.

The surface water and wetland areas observed at or near the site have previously been described as the Pond Area, Southwest Finger, Back River Wetland Area, and Southeast Finger (Figure 2). Two distinct wetland areas were identified during Remedial Investigation activities (ENSAT, 2005), which encompass these surface water features. Wetland #1 was defined as a small isolated non-tidal wetland, 0.7 acres in size, which is centered around the pond. Wetland #2 was defined as a larger wetland area, 1.39 acres in size, which encompasses the Southwest Finger, the Shoreline Area, and the Southeast Finger. Wetland #2 is comprised of both a tidal wetland area along the shoreline (i.e., below the high water mark) and non-tidal wetland areas in the Southwest Finger and the Southeast Finger (i.e., above the high water mark). For the purposes of this investigation, the original definition of the wetland areas as the Pond Area, Southwest Finger Area, and Back River Wetland Area, and Southeast Finger Area. These wetland areas are primarily located outside of Parcel 425 on adjacent property parcels. For site assessment activities these areas have been subdivided into areas of concern as discussed in Section 4.2.

The Back River, along the southern border of the study area, has a tidal variation which was observed in previous site investigations to be as large as 2.6 feet. The river flows toward the southeast and ultimately terminates into the Chesapeake Bay. Aerial photographs of the site show that shallow sediment extends approximately 100 feet south of the high tide water line along the southern boundary. Depending on wind direction and speed, low tide can extend to 80 to 100 feet offshore (ENSAT, 2005).

4.1.3 Aerial Photo Review (ENSAT, 2002)

A historic aerial photo review was conducted by ENSAT and originally reported in the 2002 Remedial Investigation and Focused Feasibility Study. A copy of the original aerial photo review is provided in Appendix B. The following is a summary of their observations:

- 1938 – Fill activities had not been initiated at Parcel 425 as of 1938. The southern portion of the Parcel 425 appeared to be mostly low-lying marshy land with several small streams or tidal channels north of a cove on the Back River. A wooded area was present in the central and western portions of Parcel 425. Undisturbed marshy land was adjacent to Parcel 425 to the west. Wooded land was present to the north and west. The land to the southeast of the property (present Parcel 137) appeared as an undeveloped and unfilled area containing a "foot-shaped" sand bar extending southward into the Back River. There were no residences or structures adjacent to Parcel 425.

- 1954 – Fill activities had not been initiated at Parcel 425. Fill activities were initiated at Parcel 137 to the southeast of the property. The fill covered the existing land and extended westward into the cove, but had not yet covered the foot-shaped sand bar. Residences and structures were observed adjacent to the northeast portion of Parcel 425.
- 1957 - Fill activities appeared to have encroached onto a small portion of parcel 425 from the adjacent properties to the northeast. The southeast area of the Parcel 425 was underwater. The land to the west of Parcel 425 appeared unchanged from previous years. Fill activities continued to the southeast of Parcel 425 on Parcel 137.
- 1960 – Parcel 425 site conditions, as well as areas to the west and northeast of Parcel 425 appeared unchanged from the previous air photo.
- 1961 & 1966 – Parcel 425 site conditions and surrounding properties appeared relatively unchanged from the previous air photo. A tidal channel near the southeastern corner of Parcel 425 was visible in the 1961 photograph.
- 1968 – Fill activities had been initiated at Parcel 425. Approximately twenty five percent of Parcel 425 had been filled. Properties surrounding Parcel 425 appeared unchanged.
- 1970 – Fill activities continued at Parcel 425. Up to forty percent of Parcel 425 had been filled. Properties surrounding Parcel 425 appeared unchanged.
- 1971 – Fill activities continued at the Parcel 425. Up to sixty percent of Parcel 425 area had been filled. A straight dirt road was observed in the central portions of Parcel 425. Properties surrounding the Parcel 425 appeared unchanged.
- 1972 – Fill activities continued at Parcel 425. Up to eighty-five percent of Parcel 425 had been filled. The southern extension of the fill began to push the tidal channel (which was originally observed in 1961) eastward toward Parcel 137, the current location of the southeast finger. The fill in

central and western portion of the Parcel 425 appeared to extend slightly off-site to the west onto Parcel 574. Properties surrounding the Parcel 425 appeared unchanged except for a garage constructed on a property to the southeast of Parcel 425.

- 1974 – Fill activities continued at Parcel 425. Up to ninety percent of Parcel 425 had been filled. The fill activities continued to push the tidal channel to the southeast toward its current location in the southeast finger. Fill activities to the west extended into the tree line. Possible charred areas, vehicle-sized objects, and possible wood material was observed on Parcel 425. Properties surrounding the site appeared unchanged.
- 1977 & 1979 – Fill activities continued at Parcel 425 and appeared to fill the entire parcel. The tidal channel adjacent to the southeast corner of the site was observed to occupy the approximate location of the southeast finger. The southwest finger began to develop as a marshy area between along the western boundary of the property. The pond area northwest of Parcel 425 began to form as of 1979 and was observed to have standing water. Properties surrounding Parcel 425 appeared unchanged.
- 1980 & 1982 – The marshy area to the southwest of Parcel 425 had continued to develop and by 1982 the pond area, southwest finger, and southeast finger were distinctly visible on adjacent properties.

The aerial photos reviewed by ENSTAT, 2002a, were not available as part of this investigation. The original copies of these photos may improve our understanding of the site history and would be incorporated into the site GIS.

4.2 Areas of Concern (AOCs)

Figure 7 displays the various areas of concern (AOCs) for the Site. The objective of creating the AOCs is to break-out various segments of the Site for further characterization discussion. The AOCs are broken out by parcel ownership when possible; however, the "wetland" AOCs are within specific parcels. Figure 7 illustrates the parcel boundaries in relationship to the wetland area AOCs. The AOCs as follows:

- Each of the five (5) surrounding residential parcels including parcels 137, 295, 464, 503, and 574;
- Parcel 425 (the Sauer Dump);
- The Pond Area (within Parcel 574);

- The Southwest Finger Area (within Parcel 574);
- The Back River Wetland Area (within the southern portions of Parcel 425)
- The Southeastern Finger Area (within Parcel 137).

4.3 Distribution of Constituents of Potential Concern.

The following sub-sections provide a summary of the distribution of COCs and are organized by media and AOC. This data was summarized from the 2002 Remedial Investigation and Focused Feasibility Study (ENSAT, 2002a), the Baseline Risk Assessment Datascreen for Sauer Dump (ENSAT, 2002b), and 2005 Remedial Investigation (ENSAT, 2005). Although the data included in these reports are extensive, additional data from ongoing review of the site documentation from State, County, and Federal agencies may supplement our site understanding. As defined in the previous sections, the COCs for the Site include PCBs and lead in soil and sediment.

4.3.1 Soil

Figure 5 provides an overview of the surface and sub-surface soil samples collected at the Site. As can be seen in the figure, the majority of the soil samples were collected on Parcel 425; however, both surface and subsurface soil samples soil samples were collected in the Southeast Finger Area (western corner of Parcel 137) adjacent to Parcel 425. This location was previously identified as a PCB-Hot Spot area by ENSAT, 2002a and ENSAT, 2005 (see Section 2.1.7). The following sub-sections discuss the total PCB (aroclor) and lead (total) laboratory analytical results for soil. Surface samples are defined as all samples collected from zero to two feet below ground surface (bgs). Subsurface samples are defined as all samples collected below two feet bgs.

- Total PCBs

Figure 8 shows the analytical results for surface soils (from 0-2 feet bgs) samples for total PCBs. Figure 9 shows the analytical results for sub-surface soil samples (greater than 2 feet bgs) for total PCBs. The total PCBs represent the sum of the detected aroclor analytes. If the results of the laboratory analyses for each aroclor are non-detect, the highest method detection limit is used for the value presented on the Figure 8 and 9. The range of values for the sample results on both of the figures is half-log. The intention of this scale is to illustrate where relative concentrations of total PCBs are elevated. The total PCB results for individual samples, as well as for the aroclor species, are provided in Table 4. Figures presented in Appendix C illustrate the sample ID, depth collected, result, and laboratory qualifier.

As illustrated in Figure 8, the surface distribution of soil sample locations for total PCBs is dispersed consistently across Parcel 425. A dense grid of sample locations is located along the southeastern boundary of Parcel 425 and the Southeast Finger Area in the area that was previously defined as a "Hot Spot" (ENSAT, 2005). Total PCB concentrations appear to be consistent on Parcel 425, ranging from 0 to 32 mg/kg, except for the southeast corner of the site. In the southeast corner of parcel 425 and extending onto the Southeast Finger Area, total PCB concentrations range from 0 to >100 mg/kg. The laboratory results appear to denote the eastern most extension of the relatively elevated concentrations. Additional amino-assay field tests for total PCBs were used by ENSAT, 2005 (see Section 2.1.7) to help define the extent of elevated PCBs. Figure 10 provides the results of these investigations and illustrates the eastern most extent of PCB impacted soil >100 mg/kg. The elevated concentration of PCBs appears to be confined to an eastward dipping slope towards the drainage ditch that is part of the Southeast Finger area (Figure 8).

As illustrated in Figure 9, the sub-surface distribution of soil sample locations for total PCBs is dispersed across portion of Parcel 425 and 137. A dense grid of sample locations is located along the southeastern boundary of Parcel 425 and the Southeast Finger Area in the area that was previously defined as a "Hot Spot" (ENSAT, 2005). Total PCB concentrations appear to be consistent on Parcel 425, ranging from 0 to 32 mg/kg, except for the southeast corner of the parcel and one sample location in the south-central portion of the parcel. In the southeast corner of parcel 425 and extending onto the Southeast Finger Area, total PCB concentrations range from 0 to >100 mg/kg. The sample located in the south-central portion of Parcel 425 is reported as >100 mg/kg.

- Lead (total)

Figure 11 shows the analytical results for surface soils samples for lead. Figure 12 shows the analytical results for sub-surface soil samples for lead (total). If the results of the laboratory analyses for lead are non-detect, the method detection limit is used for the value presented on the Figure 11 and 12. The range of values for the sample results on both of the figures is half-log. The intention of this scale is to illustrate where relative concentrations of lead are elevated. The lead results for individual samples are provided in Table 5. Figures presented in Appendix C illustrate the sample ID, depth collected, result, and laboratory qualifier.

As is illustrated in Figure 11, the surface distribution of soil sample locations for lead (total) is dispersed consistently across Parcel 425. A dense grid of sample locations is located along the southeastern boundary of Parcel 425 and the Southeast Finger Area in the area that was previously defined as a "Hot Spot" (ENSAT, 2005). Lead concentrations appear to be consistent on Parcel 425, ranging from 0 to 1000 mg/kg, except for the southeast corner of the site. In the southeast corner of parcel 425 and extending onto the Southeast Finger Area, lead concentrations range from 320 to >1000 mg/kg. Additional sampling for laboratory analysis may be necessary to illustrate the easternmost extent of lead impacted soil in the Southeast Finger Area and other portions of Parcel 137. This may include collecting samples on Parcel 137, which according to the aerial photo review should be outside of the land occupied by Sauer Dump landfill material.

As is illustrated in Figure 12, the sub-surface distribution of soil sample locations for lead (total) is dispersed across Parcel 425. A dense grid of sample locations is located along the southeastern boundary of Parcel 425 and the Southeast Finger Area in the area that was previously defined as a "Hot Spot" (ENSAT, 2005). Lead (total) concentrations appear to be consistent on Parcel 425, ranging from 0 to 1000 mg/kg, except for the southeast corner of Parcel 425; and one sample location in the south-central portion of Parcel 425, and two samples along the western portion of Parcel 425. At these locations, samples are reported above 1000 mg/kg. Similar to the surface soil samples additional sampling for laboratory analysis may be necessary to delineate the easternmost extent of lead impacted soil on the Southeast Finger area and other portions of Parcel 137. This may include collecting samples on Parcel 137, which according to the aerial photo review should be outside of the land occupied by Sauer Dump landfill material. Additional delineation of sub-surface lead impacted soil at the locations on Parcel 425 is not recommended at this time. The determination of additional delineation on-site will be dependent on the proposed clean-up goal analysis discussed in Section 5.0.

4.3.2 Sediment

Figure 5 provides an overview of the sediment samples collected at the site. As can be seen in the figure, the majority of the samples were collected within the Southeast Finger Area (western portions of Parcel 137), within the Back River Wetland Area (southern portions of Parcel 425), within the Back River, the Southwest Finger Area (eastern portions of Parcel 574), and the southern portions of the Pond Area (eastern portions of Parcel 574). The following sub sections discuss the total PCB and lead (total) laboratory analytical results for sediment. Sediment samples were collected from a depth of zero to 2.5 feet below ground surface.

- Total PCBs

Figure 13 shows the analytical results for sediment samples for total PCBs collected at the site at a depth less than 2.5 feet below ground surface. The total PCBs represent the sum of the detected seven aroclor analytes. If the results of the laboratory analyses for each aroclor were non-detect, the highest method detection limit is used for the value presented on the Figure 13. The range of values for the sample results on both of the figures is half-log. The intention of this scale is to illustrate where relative concentrations of total PCBs are elevated. The total PCB results for individual samples, as well as for the aroclor species, are provided in Table 6. Figures presented in Appendix C illustrate the sample ID, depth collected, result, and laboratory qualifier.

As is illustrated in Figure 13, the distribution of sediment sample locations for total PCBs is dispersed in the Pond Area, the Southwest Finger Area, south of The Back River Wetland area, within the Back River, and the Southeast Finger Area. The majority of the samples within the Southeast Finger Area are located east of the "Hot Spot" area defined by ENSAT, 2005. Total PCB concentrations appear to be consistent in the Pond Area, the Southwest Finger Area, the Back River Wetland Area, and the Back River with concentrations ranging from 0 to 3.2 mg/kg. Two locations in the Pond Area show concentrations that range from 3.2 to 10 mg/kg. Concentrations within the Back River Wetland Area are < 1.0 mg/kg except for one sample near the mouth of the Southwest Finger which has a total PCB concentration of 2.1 mg/kg. It is important to note that the samples within the Back River are non-detect, except for one sample discussed previously near the Southwest Finger. This is illustrated in Figure C5 (Appendix C). Total PCB concentrations in the Southeast Finger Area, specifically near the Hot Spot area, appear to show relative elevated concentrations that range from 0 to >100 mg/kg. Additional sampling for laboratory analysis may be necessary to illustrate the southernmost extent of PCB impacted sediment within the Southeast Finger.

- Lead (total)

Figure 14 shows the analytical results for sediment samples for lead (total) collected at the site at a depth less than 2.5 feet below ground surface. If the results of the laboratory analyses for lead (total) are non-detect, the highest method detection limit is used for the value presented on the Figure 14. The range of values for the sample results on both of the figures is half-log. The intention of this scale is to illustrate where relative concentrations of lead are elevated. The lead results for individual samples are provided in Table 7. Figures presented in Appendix C illustrate the sample ID, depth collected, result, and laboratory qualifier.

As is illustrated in Figure 14, the distribution of sediment sample locations for lead (total) is dispersed within the Pond Area and Southwest Finger Area, the Back River, Back River Wetland Area, and within the Southeast Finger Area. The majority of the samples within the Southeast Finger Area are located east of the "Hot Spot" area defined by ENSAT, 2005. Lead concentrations in the Pond Area and Southwest Finger Area predominantly range from 0 to < 320 mg/kg. Three locations in this area, located north of Parcel 425, show concentrations that range from 320 to < 1000 mg/kg. Lead concentrations south of Parcel 425 and in the Back River range from 0 to < 100 mg/kg. Lead concentrations in the Southeast Finger Area range from 0 to > 1000 mg/kg. The highest concentrations observed are east of the "Hot Spot" area identified by ENSAT, 2005. Additional sampling for laboratory analysis may be necessary to illustrate the southernmost extent of lead impacted sediment within the Southeast Finger.

4.3.3 Surface Water

Surface water samples were collected prior to 2002 by various entities with analysis for PCBs via the conventional aroclor analysis (EPA Method 8082). While some sampling events reported detectable concentrations of PCBs in surface water, the viability of the data has been called into question by MDE because of the presence of sediments (i.e. turbidity) in the samples, which could influence the results. Subsequent sampling events by MDE for samples with currently unknown locations reported non-detect results for PCBs in surface water via the aroclor method (Method 8082).

A criticism EPA had of MDE's investigation of the Site was that MDE had not completed PCB congener analysis of surface water. Congener analysis provides quantitation of the 209 PCB congeners at very low detection limits and reporting values (parts per quadrillion). MDE completed the investigation of surface water using method 1668a for PCB congeners in August 2002, and summarized the results in ENSAT, 2005 as PCB homologues; however, the results of this data have not yet been correlated to the database supplied by EPA as discussed in Section 2.2, and investigation of the historic records to further address this issue is ongoing. However, due to the low detected values for these results (ENSAT, 2005) resolution of these issues is not anticipated to change our understanding of the surface water quality.

Historical lead data for surface water show the following:

- EPA collected numerous surface water samples in 1992. This data set was criticized by MDE because of the presence of sediment in the samples impacting the PCB results and this would have the same potential biasing effect for the lead data.
- The April 1996 MDE data reported ND (non-detect) for lead in five surface water samples with currently unknown locations with a detection limit of 0.25 ug/L.
- The 1999 surface water data reported non-detectable results at seven locations with currently unknown locations around the Site with a duplicate sample analyzed via a confirmation laboratory reporting a concentration of 1.3 B ug/L (ppb) [B indicates blank contamination].

The following is a summary of the results for the surface water COCs:

- Total PCBs (aroclor) were not detected above the laboratory detection limit at any of the viable surface water samples.
- Lead (dissolved) was not detected above the laboratory detection limit at any of the viable surface water samples except for SW-9, which is a duplicate for an unidentified sample.

4.3.4 Groundwater

Figure 15 provides an overview of the groundwater samples collected from the five monitor wells and two temporary well points located on Parcel 425. This figure presents the results of total PCBs, lead (total), and lead (dissolved). The groundwater results for all parameters are also presented in Table 9.

The following is a summary of the results for the groundwater COCs:

- Total PCBs (aroclor) were not detected above the laboratory detection limit at any of the monitor wells or temporary well points.
- Lead (total) was not detected at monitoring wells MW-2, MW-3, or MW-4. Lead was detected in monitor well MW-5 at a concentration of 0.012 mg/L. Lead was detected in the duplicate sample of MW-1 at a concentration of 0.015 mg/L; however it was not detected in the original sample. Lead was not detected at the temporary well points.
- Lead (dissolved) was not detected in any of the monitor wells above the laboratory detection limit during the 2001 sampling event.

A criticism EPA had of MDE's investigation of the Site was that MDE had not completed PCB congener analysis of groundwater. Congener analysis provides quantitation of the 209 PCB congeners at very low detection limits and reporting values (parts per quadrillion). MDE completed the investigation of surface groundwater using Method 1668a for PCB congeners in August 2002, and summarized the results in ENSAT, 2005 as PCB homologues; however, the results of this data has not yet been correlated to the database supplied by EPA as discussed in Section 2.2 and investigation of the historic records to resolve these issues is ongoing. However, due to the low detected values for these results (ENSAT, 2005) resolution of these issues is not anticipated to change our understanding of the groundwater quality.

4.4 Fate and Transport Mechanisms for COCs

The two COCs assessed in this fate and transport section include lead and PCBs.

Lead is present in the environment primarily as the result of anthropogenic activities. Lead's solubility in water depends on water quality parameters including: pH, hardness, salinity and organic matter (ATSDR, 2005). Because lead is strongly adsorbed to soil, it is generally retained in the upper soil layers, and thus unlikely to migrate to groundwater.

PCBs are a class of 209 possible compounds called congeners, and they contain 2-10 chlorine atoms attached to the biphenyl molecule. PCBs are present in the environment solely because of anthropogenic activities. In water, they are transported by current or diffusion, but they remain strongly sorbed to particles. Higher chlorinated congers are more likely to sorb, while lower chlorinated congeners are more likely to volatilize (ATSDR, 2000). Because, PCBs strongly sorb to soil particles they are unlikely to migrate to groundwater.

Overall, both lead and PCBs are preferentially sorbed to soil particles and thereby have limited ability to migrate to groundwater. The strong association with fine sediment particles suggests that these contaminants principally rely on sediment transport in order to move through the environment.

4.4.1 General Contaminant Transport in the Back River

Because the Site is adjacent to the Back River, and because the topography suggests that the subwatershed on which the Site is located slopes towards the River, it is important to assess the potential impact of transport of COCs (PCBs and lead) from the Site to the River. As discussed above, PCBs and lead are strongly sorbed to sediment particles and are primarily transported through sediment migration. Any significant inputs from the Site to the River could cause impairment in water and sediment quality in the Back River. Therefore, the potential fluxes of COCs to the Back River from the Site need to be evaluated within the relative context of the baseline contaminant fluxes transported within the Back River. Given the affinity of the COCs for soil/sediments, solids transport can serve as a surrogate for the COC transport.

Contaminant transport to the Back River can occur via several mechanisms, including surface water runoff, tidal exchange and groundwater. Only transport via surface water runoff and tidal exchange need to be addressed here; as groundwater transport to the Back River is not a significant mechanism. Although there are detection of PCBs (congener) and Lead (total concentrations and not dissolved) in groundwater the magnitude of this transport is insignificant relative to the fluxes within the Back River. The infilling (see Section 4.1.3) of the overall wetland at the Site has resulted in a significant reduction in the amount of free standing water through which sediment transport can take place. The transport of COCs from the watershed via surface runoff and tidal exchange occurs in the dissolved phase and as suspended matter. Suspended matter originates from the erosion of watershed soils and the re-suspension of sediments from the bed of streams and wetlands. The ultimate fate of the COCs transported in runoff is the Back River. The two COCs, PCBs and lead, have a tendency to partition strongly with the soil or sediments. As a result, solid phase transport is expected to be the dominant form of transport, orders of magnitude greater than dissolved phase transport. Soil erosion and sediment re-suspension depend on the erodability of the soils and sediments, the topography and bathymetry of the area, runoff volume, and vegetation cover. The key question in the analysis of the transport mechanisms to the Back River is to determine whether such transport can significantly impact the water quality in the Back River.

As part of Patapsco/Back River Watershed SWMM Model report, the MDE estimated the surface runoff and sediment transport from the Back River Watershed (MDE, 2002). The annual watershed runoff and sediment load were estimated as 23 million gallons/acre and 200 lb/acre, respectively. Based on topographic maps, the sub-watershed that contains the Site is roughly 350 acres and slopes down towards the Back River.

Note that the Site itself is less than 1% of its sub-watershed area. Based on these estimates, the total potential annual input of water and solids to the Back River from the sub-watershed is approximately 8,200 million gallons (MG) and 32 metric tons. Assuming for the sake of this discussion the Site is 2.49 areas in size (the area of parcel 425) and the sediment runoff characteristics of the Site behave consistent with the rest of the watershed, the potential annual input of water and solids from the Site to the Back River would be only approximately 57 MG and 0.22 metric tons. In addition, this is a worst case scenario due to the fact that the topography in the wetland of the Site may act like a sink minimizing sediment transport.

A review of local conditions further supports the small scale of potential transport from the site, particularly suspended particulate matter. The wetlands adjacent to the site generally serve as a sink for solids derived from the site. Similarly, the wetlands themselves are unlikely to yield solids to the

Back River. With the small watershed and accompanying small volume of runoff, water velocities within these wetlands will not be sufficient to re-suspend a significant mass of soils from the wetlands sediments. Water levels with the wetlands may be influenced to a limited degree by tidal exchange. However, the limited tidal range (approximately 2 ft) and the inherent structure of the wetland itself (broad areas with thick vegetative cover) limit the movement of solids from the wetlands to the Back River. It is expected that, in fact, the wetlands (Southeast Finger, Pond, and Southwest Finger) adjacent to the Site will be a sink for solids from the Back River.

The above discussion is supported by the existing recent sediment data collected from the Back River (ENSAT, 2005). In December 2001, a total of 18 samples were collected from two depths in the sediments of the Back River just south of the shore line of the Site. PCBS were non-detect in all samples (with detection limits generally less than 0.030 mg/kg). The maximum concentration of lead detected in these sediment samples was 68 mg/kg. This empirical data supports the conclusion that the Site, under its past and existing conditions, has not and is not negatively affecting the sediment quality of the Back River.

The small scale of any potential solids transport from the Site is further illustrated by a comparison to the total sediment transport in the Back River itself. An estimate of the solids load carried by the Back River requires information on the tidal characteristics, the channel geometry and suspended solids concentrations in the Back River. During water level monitoring in 2002, a maximum daily tide of about 2 ft was reported for the Back River. The average depth of the Back River at a cross section close to the Site is ~ 6ft. It is estimated that about 1,100 MG of water flows past the Site in the Back River on every tidal cycle. The MDE measurements of suspended solids in the Back River suggest that a median value of about 25 mg/L is a representative long-term concentration (MDE, 2005). Therefore, the total solids transported per tidal cycle past the Site is ~ 103 metric tons. On an annual basis, about 800,000 MG of water and 75,000 metric tons of solids flow past the Site via the Back River. The annual loads from the "sub-watershed area" containing the Site (8,200 MG and 32 metric tons) are insignificant compared to the tidal exchange that occurs in the Back River. The annual loads from the site (57 MG flow and 0.22 metric tons) are insignificant compared to the tidal exchange that occurs in the Back River. The sediment load from the site represents approximately only 0.0007% of the total sediment load being transported in the Back River. Furthermore, given the preference for sorbing to the particles, dissolved phase concentrations of COCs are orders of magnitude lower than particulate phase and given the small scale of runoff relative to the volume of water in the Back River, it is highly unlikely that surface water pathway represents an important source of contaminants to the Back River.

4.4.2 Site Specific Fate and Transport

While contaminant transport from the Site (including the Back River Wetland, Southwest Finger, Pond, and Southeast Finger) and adjacent wetland may be minimal, contaminants on the land-based portion of the Site and in the wetland itself are likely to remain accessible for receptors. This section describes the fate and transport mechanisms that are likely to affect or redistribute the COCs within the Site.

4.4.2.1 Soil and Sediment

Both lead and PCBs bind strongly to fine particles and the mechanisms that will affect the COCs distribution in the soils include erosion to adjacent areas, and volatilization in the case of PCBs. For PCBs, although photolysis from surface soils, as well as dechlorination, can occur, there are no processes that can significantly degrade it in soil and sediments.

Contaminated soils, at topographic highs are transported down-gradient, ultimately ending in the wetlands and the Pond Area. Surface soil lead and PCB maps indicate high concentrations of sediments in the wetlands, and in soils within the Parcel 137. These higher concentrations are likely the results of erosion and runoff transport down-gradient from within Parcel 425. For example, lead concentrations above 320 mg/Kg can be observed in a topographically high area (Parcel 425) close to the groundwater station MW-5, and Parcel 425 boundary. Concentrations of similar lead levels occur in the northernmost sediment sample in the Southwestern Finger area, and in the saddle connecting the Pond AOC and Southwest Finger area.

It has been documented that PCBs can be transported to the atmosphere by diffusive transfer from soils in the absence of water (ATSDR, 2000). However, such a mechanism will not result in a significant flux given the size of the site relative to exchanges reported for the larger Chesapeake watershed and is not considered further herein.

4.4.2.2 Surface Water

Because lead and PCBs sorb strongly to soils/sediments dissolved phase concentrations in the surface water are significantly lower than and generally non-detect. However, the movement of surface water through runoff does control the transport and redistribution of eroded soils.

Recent studies of PCB exchange across Baltimore Harbor and the Northern Chesapeake Bay, suggest that air-water exchange has the potential to be a significant source of PCBs to the rural atmosphere (ATSDR, 2000). However, volatilization of PCBs from the Site is unlikely to represent a significant loss for the contaminated soils for the site itself as well as, relative to the rural impact of losses from Chesapeake Bay. This is because of (i) the expected low levels of PCB in the surface waters (based on the wetland sediment measurements), (ii) the fact that much of the wetland surfaces have been filled in resulting in significant reduction in the surface area for volatile PCB release and (iii) the trivial size of the wetland areas immediately adjacent to the site as compared to the surface area of Chesapeake Bay itself.

4.4.2.3 Groundwater

Because lead and PCBs sorb strongly to soils/sediments dissolved phase concentrations in the groundwater are significantly lower than and generally non-detect. This is confirmed by the existing groundwater data for the site.

4.5 Data Gaps

Based on our review of the existing data sets; reports; and State, Federal, and County information for the Site, the following data gaps have been identified and are organized by media and Area of Concern. Section 6.0 provides the detailed locations, and summary of proposed analyses of the recommended samples. A summary of the proposed sample locations is provided in Figure 16. A comparison of the existing soil and sediment sample locations to the proposed locations are provided in Figures 18 and 19 respectively.

4.5.1 Soil

The definition of the easternmost extent of PCB and lead impacted soil on Parcel 137, east of the Southeast Finger Area has not been clearly delineated. We recommend a north-south trending transect of sample locations, collecting surface and subsurface samples, east of the Southeast Finger area to accomplish the following:

- Establish if PCB impacted soils are found in the surface soil east of the Southeast Finger wetland.
- Determine if fill activities related to the Sauer Dump (i.e. PCB impacted soil) did not extend onto Parcel 137 east of the Southeast Finger area by sampling the sub-surface soil.
- Identify whether lead and PCBs are present in the sub-surface fill material.

An additional background investigation of the soil surrounding the site is recommended to establish if the COCs are observed in areas east of Parcel 425 where pre-Sauer Dump fill activities have been observed in the aerial photo review. This would likely included sampling on Parcel 137. Two additional surface soil samples for the COCs are recommended at the exit point from the property along the access road on Parcel 425.

During the November 9, 2006 meeting between EPA and the Sauer Dump Coalition, the EPA recommended several additional surface soil samples for lead and PCB analysis on Parcels 503, 464, and 295; and the relocation of five samples on Parcel 137. Additionally, in EPA's Letter to the coalition dated November 22, 2006, four samples were recommended by the EPA for analysis of lead and PCBs on Parcels 503 and 464. Appendix H provides the correspondence between EPA and the Coalition which documents the additional EPA recommended samples.

Section 6.0 provides the detailed locations and summary of proposed analyses of the recommended samples. Figure 18 provides the location of the proposed samples in comparison to the existing sample locations.

4.5.2 Sediment

Additional sediment sampling for lead and PCBs (four samples) is recommended along the southeastern most extent of the Southeast Finger Area as well as the northern most extent to fill potential data gap areas. Additionally, a data gap appears to exist within the Southwest Finger Area west of Parcel 425. One sample location (for PCBs) is recommended to fill this data gap. Within the Pond Area, two additional samples are recommended to fill data gaps (lead and PCBs).

Two additional sediment samples for lead and PCBS south of Parcel 425 near the Back River Wetland Area were recommended by EPA during the November 9, 2006 meeting between EPA and the Sauer Dump Coalition. Appendix H provides the correspondence between EPA and the Coalition which documents the additional EPA recommended samples.

Section 6.0 provides the detailed locations and summary of proposed analyses of the recommended samples. Figure 16 and 19 provide the location of the proposed samples in comparison to the existing sample locations.

4.5.3 Surface Water

Previous sampling results have consistently shown non-detect results for surface water. One sample is recommended in the Southeast finger, the location with the highest concentrations of lead and PCBs in sediment and soil, to confirm the previous results. Additionally, it is anticipated that the results of the PCB Homologue analyses on five surface water samples will be included in the Comprehensive CSM pending review of original laboratory reports and field notes as discussed in Section 2.2.3.

Two additional surface water samples for lead and PCBS south of Parcel 425 near the Back River Wetland Area were recommended by EPA during the November 9, 2006 meeting between EPA and the Sauer Dump Coalition. Appendix H provides the correspondence between EPA and the Coalition which documents the additional EPA recommended samples.

Section 6.0 provides the detailed locations and summary of proposed analyses of the recommended samples. Figure 16 and 19 provide the location of the proposed samples in comparison to the existing sample locations.

4.5.4 Groundwater

Additional groundwater sampling at the five monitoring wells on Parcel 425 is recommended to verify that total PCBs and lead are still non-detect. If the wells are found to be of unacceptable condition or can not be located as part of a pre-sampling site reconnaissance, EPA will be notified and appropriate actions will be proposed. It is anticipated that the results of the PCB Homologue analyses on the five groundwater wells will be included in the

Comprehensive CSM pending review of original laboratory reports and field notes as discussed in Section 2.2.3.

5.0 Proposed Cleanup Goal Analysis

The Site-specific cleanup goals for potential human health and ecological impacts will be derived through a streamlined risk-based approach that will meet both MDE/EPA levels of acceptable risks and current ARARs. This cleanup analysis will utilize data collected from the previous investigations (Section 2.0) and the future data collected as part of the Extent of Contamination Study (see Section 6.0). The methodology for conducting the cleanup goal analysis is provided in Appendix G. The results of the cleanup goal analysis will be presented to EPA during the development of the RAP.

6.0 Extent of Contamination Study

Additional sampling of soil, sediment, surface water, and groundwater are recommended to address the data gaps defined in the CSM (Section 4.0). These data gaps include:

- The definition of the eastern most extent of total PCB and lead impacted soil on Parcel 137. This area is east of the Parcel 425 and the Southeast Finger Area.
- A limited investigation of the surface soil to the east of the Site for total PCBs and lead on Parcels 137, 503, 464, and 295.
- Limited additional sediment sampling in the southern and northern portions of the Southeast Finger Area to fill potential data gap areas for total PCBs and lead.
- Limited additional sediment sampling in the Southwest Finger Area to fill potential data gap areas for total PCBs and lead.
- Limited additional sediment sampling in the Pond Area to fill potential data gap areas.
- Limited surface water sampling activities in the Southeast Finger Area to confirm non-detect results reported in previous investigations.
- An additional round of groundwater sampling to confirm non-detect results of total PCBs and lead.
- A property survey of parcels to the east of Parcel 425 to establish property boundaries and resolve potential discrepancies between the existing site survey and county assessor's parcel information.
- Limited surface water and sediment samples South of Parcel 425 in the Back River Area.

The following sub-sections discuss the proposed site activities to collect the information associated with the data gaps, quality assurance and quality control procedures (QAPP) that will be implemented, the site specific health and safety plan (HASP), investigative derived waste (IDW) management, and proposed reporting.

6.1 Proposed Field Activities

The following sub-sections provide the rationale as well as description of the proposed field activities that will be conducted to fill the identified data gaps. All proposed field activities will conform to the protocols outlined in the Field Sampling Plan (FSP), HASP, and QAPP. These documents are provided as appendices and discussed in greater detail in Section 6.3, 6.4, and 6.5, respectively. Figure 16 provides a summary of the proposed sample locations. Table 10 provides a summary of the proposed samples, sample depths, and analytical methods. Sediment and soil samples will be analyzed for lead and total PCBs using methods EPA Method 6010 and EPA Method 8082 respectively. Groundwater and surface water samples will be analyzed for lead and total PCBs. Lead will be analyzed using EPA Method 6010 for both dissolved and total concentrations. PCBs will be analyzed using EPA Method 8082 from unfiltered field samples.

The following AOCs, illustrated on Figure 7, are identified for additional sample collection:

- Parcel 425 (The Former Sauer Dump)
- The Pond Area (within Parcel 574)
- The Southwest Finger Area (within Parcel 574)
- Parcels 137, 295, 464, and 503
- Southeast Finger Area (eastern portions of Parcel 137)
- The Back River Area (south of Parcel 425)

Access agreements will be negotiated with the property owners of parcels outside of Parcel 425 by the respondents. Once access is granted, and pending EPA approval, Malcolm Pirnie will perform a pre-sampling site reconnaissance to confirm sample locations and identify physical obstructions prior to mobilization of sampling personnel and equipment.

A summary of the proposed sampling activities organized by Area of Concern and media is provided in the following sub-sections.

6.1.1 Parcel 425

Additional sampling of the five groundwater monitoring wells is recommended to fill the data gaps identified in the CSM. Groundwater samples collected from the wells will be analyzed for total PCBs and lead. Table 10 provides a summary of the proposed samples. Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

Parcel 425 will require an inspection of the five wells to determine their integrity and functionality. Physical access to all wells will be created by clearing and grubbing. Damage from clearing to the existing vegetation will be kept to a minimum and will be performed only for the purposes of gaining temporary access to the wells. An on-site well condition survey will be conducted to document the exterior condition of the existing monitoring wells, measure the well depths to determine if the wells are obstructed, establish the amount of silt accumulated within the wells, and determine if the wells are viable to produce sufficient volumes of water. Upon conclusion of this activity, the wells will be determined fit for sampling, or a recommendation will be presented indicating if individual wells should be repaired, replaced, permanently abandoned, or utilized for the investigation. This recommendation will be presented to EPA in the form of a RAP Addendum in letter format. Detailed procedures for all planned well purging, field screening and groundwater sampling from the existing monitoring wells will be performed in accordance with EPA sampling protocols. Details on groundwater monitoring and sampling of the monitoring wells are provided in the FSP and QAPP as Attachments D and E, respectively.

Two additional surface soil samples at the unpaved access road entrance to Parcel 425, adjacent to Parcels 464 and 295 are recommended to establish if residential ATV and other activity may have tracked contamination off of Parcel 425 and onto adjacent private properties. The surface samples will be three point composite samples of the top 6 inches of the access roadway. The soil samples collected will be analyzed for total PCBs and lead. Table 10 provides a summary of the proposed samples. Figures 16 and 18 show the location of the proposed soil samples. Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

6.1.2 Parcel 137

Additional sampling of soil is recommended to fill the data gaps identified in the CSM for Parcel 137. Malcolm Pirnie will collect five soil samples along a north-south trending transect, collecting surface and subsurface samples (ten samples total), east of the Southeast Finger Area. The samples will be analyzed for total PCBs and lead. Figure 16 provides the proposed locations for the samples. Figure 18 provides the location of the proposed soil samples and the existing samples. Table 10 provides a summary of the samples, sample depths, and analytical methods. A pre-sampling field reconnaissance will be conducted to verify the location of the proposed samples. A Global Positioning System (GPS) will be used to establish the actual horizontal location of the soil sample. Details on soil sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

In addition to the transect, three (3) background soil sample locations (surface and subsurface) are proposed to establish the quality of soil that was used to fill the peninsula prior to Sauer Dump activities as described in the aerial photo review. These samples will be analyzed for the COCs, lead and total PCBs. Figure 16 provides the proposed locations for the samples. Table 10 provides a summary of the samples, sample depths, and analytical methods. The surface soil locations will be collected as three point composite samples. Subsurface samples will be discrete samples. Details on soil sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

Five additional surface soil samples will be collected on Parcel 137 as recommended by the EPA during the November 9, 2006 meeting between the EPA and the Sauer Dump Coalition. These samples were relocated, as suggested by EPA, from previous sample locations originally proposed by the Coalition. The samples will be analyzed for lead and PCBs and will each be three point composite samples of the top 6 inches of soil. Table 10 provides a summary of the proposed samples and Figures 16 and 18 show the locations of the proposed soil samples.

6.1.3 Southeast Finger Area

Additional sediment sampling for lead and PCBs is recommended in this area. Four additional sediment samples are recommended to fill the data gap. Figure 16 provides the proposed locations for the samples. Figure 19 provides the location of the proposed sediment samples as well as the location of the existing samples. Table 10 provides a summary of the samples, sample depths, and analytical methods. A pre-sampling field reconnaissance will be conducted to verify the location of the proposed samples. A Global Positioning System (GPS) will be used to establish the actual horizontal location of the sediment samples. The samples will be analyzed for lead (total) and PCBs. Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

A surface water sample is also proposed for the Southeast Finger area to confirm previous non-detect sampling activities for surface water in unknown locations. This location has been chosen because the Southeast Finger area has the highest observed concentrations of COCs in sediment and soil. Figure 16 provides the location of the proposed sample. The sample will be analyzed for lead and PCBs as described on Table 10. Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

One additional surface and subsurface soil sample is recommended in the northwest corner of the finger area. Figure 16 provides the proposed locations for the sample. Figure 18 provides the location of the proposed sample location as well as the existing soil sample locations. Table 10 provides a summary of the samples, sample depths, and analytical methods. A pre-sampling field reconnaissance will be conducted to verify the location of the proposed sample. A Global Positioning System (GPS) will be used to establish the actual horizontal location of the sediment sample. The samples will be analyzed for lead (total) and total PCBs. Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

6.1.4 Southwest Finger Area

A data gap appears to exist within the Southwest Finger Area west of Parcel 425 for sediment. One sediment sample location is recommended to fill this data gap and will be analyzed for total PCBs. Figure 16 provides the proposed location for the sediment sample. Figure 19 provides the location of the proposed sediment sample as well as the location of the existing samples. Table 10 provides a summary of the sample, sample depths, and analytical methods. A pre-sampling field reconnaissance will be conducted to verify the location of the proposed sample. A Global Positioning System (GPS) will be used to establish the actual horizontal location of the sediment sample.

Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

6.1.5 Pond Area

Several sediment samples have been collected along the southeastern portions of the pond area. It is recommended that one sample is collected from the center, or deepest location of the pond area. An additional sample is recommended in the southern tip of the pond area near a steep topographic gradient towards the former land fill. Figure 16 provides the proposed locations for the sediment samples. Figure 19 provides the location of the proposed sediment samples as well as the location of the existing samples. The samples will be analyzed for lead and total PCBs as described in Table 10. A pre-sampling field reconnaissance will be conducted to verify the location of the proposed samples. A Global Positioning System (GPS) will be used to establish the actual horizontal location of the sediment samples. Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

6.1.6 Parcels 503, 464, and 295

A total of sixteen additional surface soil samples will be collected on Parcels 503, 464, and 295 as recommended by the EPA during the November 9, 2006 meeting between the EPA and the Sauer Dump Coalition and EPA's letter to the Coalition dated November 22, 2006. Four of the samples will be collected from Parcel 503, six of the samples will be collected from Parcel 464, and six of the samples will be collected from Parcel 295. The samples will be analyzed for lead and PCBs and will each be three point composite samples of the top 6 inches of soil. Two of the sample locations on Parcel 503, recommended by EPA in their letter dated November 22, 2006, will be confirmed by on-site EPA personnel. Two of the sample locations on Parcel 295, recommended by EPA in their letter dated November 22, 2006, will be confirmed by on-site EPA personnel. Table 10 provides a summary of the proposed samples, and Figures 16 and 18 show the locations of the proposed soil samples. Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

6.1.7 Back River Area (South of Parcel 425)

A total of two additional sediment and surface water samples will be collected south of Parcel 425 in the Back River Area as recommended by the EPA during the November 9, 2006 meeting between the EPA and the Sauer

Dump Coalition and EPA's letter to the Coalition dated November 22, 2006. The location of these samples will be at the previous ENSAT, 2005 sample locations SW-1 and SW-2 as requested by the EPA in their letter dated November 22, 2006. Table 10 provides a summary of the proposed samples, and Figures 16 and 19 show the locations of the proposed sediment and surface water samples. Due to the close proximity of the sample locations to the shore line, the surface water samples will be collected closely after the peak of high tide (during ebb tide) to minimize the disturbance of the river bed and potential entrainment of sediment in the surface water sample. The exact sample time will be determined based on the tidal charts of the sampling day for the Back River. The sediment sample will be collected after the surface water sample has been collected. A Global Positioning System (GPS) will be used to establish the actual horizontal location of the sediment and surface water samples. Details on sampling procedures are provided in the FSP and QAPP as Attachments D and E, respectively.

6.1.8 Pre-sampling Field Reconnaissance

Malcolm Pirnie will perform a site reconnaissance survey to evaluate access issues to the proposed soil, sediment, and surface water samples. The on-site groundwater monitor wells will also be assessed to determine their condition. If the condition of the wells is determined to be unsuitable for sampling, Malcolm Pirnie will provide a recommendation action (e.g. installation of a new monitor well) to EPA in the form of a RAP Modification Letter. Modifications to sample locations based on access issues (physical obstructions) will be verbally confirmed with EPA and noted in the Final Report.

6.2 Additional Survey

A survey of the parcels to the east of Parcel 425 by a certified surveyor is recommended to resolve discrepancies between the county assessor's parcel information and the existing site survey. The locations of the proposed samples are assumed to be within the parcels as described in Table 10. The survey will be conducted during the pre-sampling Field Reconnaissance as described in Section 6.1.6.

6.3 Investigative Derived Waste (IDW)

IDW will be segregated and placed in 55-gallon drums, labeled, dated, and temporarily stored in an approved area of the Site unless specified as below.

Upon the completion of the investigation activities, one or more composite sample(s) will be collected and analyzed for appropriate disposal parameters, as required by an appropriately permitted facility. Decisions on waste disposal will be made using the results of the investigation samples and disposal characterization sample(s), as appropriate. IDW generated at the site includes water and sediment generated from decontamination of sampling equipment and soil cuttings and purge water from borings collected outside of Parcel 425.

Purged groundwater generated from the redevelopment and rehabilitation of wells on Parcel 425 during RAP activities will be discharged to the ground adjacent to the monitor well. Purged groundwater generated during sampling activities on Parcel 425 will be discharged to the ground adjacent to the monitor well. The purged groundwater on Parcel 425 will be run through a five gallon filter containing carbon media at the discharge point. The carbon media will be disposed as IDW and placed in a 55 gallon drum for off-site disposal.

For soil sample locations on Parcel 425, soil cuttings and excess sample material will be returned to the sample hole or boring for backfill purposes immediately after completion of sampling. Soil cuttings generated outside of Parcel 425 will be containerized and temporarily stored in the approved area on Parcel 425 before proper disposal as discussed above.

Used gloves, core liners, and any other disposable sampling equipment or personal protective equipment will be double bagged and disposed of off-site as non-hazardous waste.

6.4 Quality Assurance/Quality Control

A Quality Assurance Project Plan (QAPP) has been prepared for this project that provides all Quality Assurance and Quality Control measures that will be adhered to for the scope of work presented in this RAP. This QAPP establishes function-specific responsibilities and authorities for data quality and defines procedures to ensure site investigative activities will result in the generation of reliable data. Inherent in the quality assurance (QA) program is the implementation of quality control (QC) measures. These measures provide assurance that the monitoring of quality-related events has occurred, and that the data gathered in support of the project are complete, accurate, and precise. The implementation of the QAPP will help ensure the validity of the data collected and will establish a firm foundation for decisions regarding environmental investigations performed at the Site. The QAPP is provided in Appendix E.

6.5 Field Sampling Plan

The Field Sampling Plan (FSP) outlines the general methods and activities which will be followed by the field personnel performing the Extent of Contamination Study. The FSP is provided at Appendix D.

6.6 Health and Safety Plan

A Health and Safety Plan (HASP) for actions to be performed at the Site is provided in Appendix F. The HASP is provided to protect the health and safety of workers, other personnel, and the public from the hazardous substances and work-related health and safety hazards during the Extent of Contamination Study. The HASP provides, as appropriate, for proper decontamination of personnel and equipment, monitoring and control of the migration of hazardous substances during the performance of activities at the Site and protection of public health from exposure to hazardous substances during the conduct of activities at the Site.

6.7 Final Report

The Final Report will be prepared which summarizes the Extent of Contamination Study. This report will include at a minimum:

- A revised Conceptual Site Model that incorporates any new data collected as part of the Extent of Contamination Study with the original data sets for the Site.
- A summary of the data collection activities and validation of laboratory results. The final laboratory reports, soil borings, well logs, and other data collected during site activities will be provided as appendices.

Additionally, based on recent correspondence with EPA, the Cleanup Goal Analysis will be conducted during the development of the RAP and therefore may not be included with the final Extent of Contamination Study Report.

7.0 Project Schedule

The anticipated schedule of the RAP activities for the Site is presented in Figure 17. As the proposed schedule indicates, implementation of the RAP scope of work is contingent upon finalization and EPA approval of the RAP report. Upon approval of the RAP and site access, implementation of the pre-sampling Site reconnaissance task (ID number 2 on Figure 17) will be implemented within 20 business days (4 weeks). Any significant changes observed during the field reconnaissance to the RAP proposed sampling plan, will be conveyed to EPA via a modification letter. The field work (ID number 4 on Figure 17) will commence approximately 5 business days following the field reconnaissance task, and will be completed in approximately 15 business days (3 weeks) following the commencement of the field work. Associated laboratory analyses are expected to take approximately 20 business days (4 weeks). Validation of the data is expected to take approximately 15 business days (3 weeks). The submittal of the Final Report (ID number 7 on Figure 17) to EPA is preliminarily scheduled to be 20 business days (4 weeks) following completion of the data validation task (ID number 6 on Figure 17).

In accordance with recent discussions with the OSC and counsel for USEPA, the Coalition also intends to undertake and present to USEPA an evaluation and analysis of appropriate remedies for the Site. It is anticipated that this supplemental analysis will be submitted to USEPA for its review within 12 weeks of the submittal of the RAP report.

The schedule is contingent upon receipt of regulatory approvals, Site access, and other required approvals, permits, licenses, etc. Delays due to regulatory issues, inclement weather, unforeseen Site conditions, or other circumstances beyond control of the Respondents are not included as part of the schedule. In the event significant change(s) to the schedule is projected, the EPA will be notified and a revised schedule will be developed.

8.0 References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.ENSAT, 2002a. Remedial Investigation and Focused Feasibility Study, Sauer Dump, MD-181, 4225 Lynhurst Road, Baltimore, Baltimore County, Maryland, Volume I. July 2002.

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological profile for lead. (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

ENSAT, 2002a. Remedial Investigation and Focused Feasibility Study – Sauer Dump, MD-181, 4225 Lynhurst Road, Baltimore, Baltimore County, Maryland. Volume I and II, July 24, 2002.

ENSAT, 2002b. Baseline Risk Assessment Datascreen for Sauer Dump – Dundalk, Maryland. ENSAT Project No. C01-1490. Environmental Service and Technology Corporation. 8840-D Washington Boulevard, Jessup, Maryland 20794. July 24, 2002.

ENSAT, 2005. Remedial Investigation, Sauer Dump, MD-181, 4225 Lynhurst Road, Baltimore, Baltimore County, Maryland, Volume I and II. August 2005.

EPA, 1997. User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion Into Buildings. September 1997.

EPA, 2005a. Development of Lead and PCB Sediment Clean Up Levels, Draft Action Memorandum; Sauer Dump; Baltimore, Maryland. Memorandum from Bruce R. Pluta, Coordinator Biological Technical Assistance Group to Richard Rupert (3HS31) Eastern Response Branch. USEPA, 1650 Arch Street, Philadelphia, Pennsylvania 19103-2029. August 30, 2005.

EPA, 2005b. Action Memorandum - Request for Removal Action and Exemption from the $2 Million Statutory Limit at the Sauer Dump Site, Baltimore County, Baltimore. MD. Memorandum from Richard Rupert, On Scene Coordinator Eastern Removal Response Section (3HS31) to Abraham Ferdas, Director Hazardous Sites Cleanup Division (3HSOO), UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION III, 1650 Arch Street, Philadelphia, Pennsylvania 19103-2029. September 26, 2005.

EPA, 2006a. Sauer Dump Site: Administrative Order for Removal Response Action. EPA Docket No. CERC-03-2006-0239DC). August 18, 2006.

EPA, 2006b. Human Health Risk Assessment - Updated Risk Based Concentration Table Cover Memo. U.S. Environmental Protection Agency, REGION 3, 1650 Arch Street, Philadelphia, Pennsylvania 19103. April 2006 Update.

Janssen RPT, Peijnenburg WJGM, Posthuma L, et al. 1997. Equilibrium partitioning of heavy metals in Dutch field soils: I. Relationship between metal partition coefficients and soil characteristics. Environ Toxicol Chem 16(12):2470-2478.

Maryland Geological Survey, 1968. Geologic Map of Maryland. Scale 1:250,000.

Maryland Department of the Environment (MDE, 2001). State of Maryland, Department of the Environment – Cleanup Standards for Soil and Groundwater, August 2001 Interim Final Guidance (Updated No. 1).

Maryland Department of the Environment (MDE) 2002. Patapsco / Back River Watershed SWMM Model Report.