REPORT

Project Management Plan

68th Street Landfill Site
Rosedale, Maryland

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August 28, 2006

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ERM Project No.: 0049608

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1.0 INTRODUCTION

Environmental Resources Management, Inc. (ERM) has been retained by the 68th Street Sites Coalition (the "Coalition") to perform the Remedial Investigation and Feasibility Study (RI/FS) at the 68th Street Landfill Site (the "Site") located in Rosedale, Maryland. ERM has prepared this Project Management Plan (PMP) in accordance with the Administrative Settlement Agreement and Order on Consent (ASAOC, CERCLA Docket No. CERC-03-2006-0051 RF), dated April 27, 2006, and the Statement of Work thereto attached.

The Coalition and the United States Environmental Protection Agency (USEPA) voluntarily entered into the ASAOC, which became effective May 30, 2006. The ASAOC was executed in the context of the Superfund Alternative Site (SAS) Process, as set forth in the USEPA OSWER Directive No. 9208.0-18, dated June 17, 2004. The SAS Process is intended to facilitate the RI/FS equivalent to that of similar sites without listing the Site on the National Priorities List (NPL), including the potential for parceling the Site investigation activities and implementation of re-use opportunities.

The PMP has been prepared pursuant to Section IX and Appendix C – Statement of Work, Part 3 of the ASAOC. The PMP presents the project organization and overall management structure to be employed during the conduct of the RI/FS at the Site. The organizational structure of the PMP is outlined below:

- Section 1 – Introduction;
- Section 2 - Site Description;
- Section 3 – Overview of the ASAOC;
- Section 4 – Project Approach;
- Section 5 – Project Team; and,
- Section 6 – Schedule.

2.0 SITE DESCRIPTION

The Site, which is an aggregation of five (5) former landfills with adjacent wetland areas and surface waters, is located immediately south of the Rosedale Industrial Park in Rosedale, Maryland. The aggregation of waste disposal areas occupies approximately 150 acres, with approximately 88 percent of the area located within the physical limits of Baltimore County, and the remaining approximately 12 percent located within the City of Baltimore. The Site is transected in a north-south direction by Interstate 95 (I-95) near its western boundary, and bounded by a railroad to the north, Herring Run and a railroad to the south, and Redhouse Run and Herring Run to the east. The Site is predominately vegetated with a surrounding land use of industrial properties to the north, south, and west, and residential properties to the east (Rosedale Terrace) and northwest (Maryland Manor). A Site location map is presented on Figure 1.

In accordance with the ASAOC, the Site is comprised of five Source Areas, each of which coincides with the former landfills. These areas are referred to as follows:

- Source Area 1: the Original Landfill (approximately 68 acres, and including the Colgate Pay Dump and the Rob Tyler Landfill);
- Source Area 2: the Horseshoe Landfill (approximately 15 acres);
- Source Area 3: the Island Landfill (approximately 6 acres), which was connected to Source Area 5 at one time;
- Source Area 4: the Redhouse Run Landfill (approximately 4 acres); and,
- Source Area 5: the Industrial Enterprises and Unclaimed Landfills (approximately 60 acres).

These areas are not contiguous as various surface-water features separate each Source Area, including Herring Run, Moores Run, and Redhouse Run. These streams flow predominately eastward, discharging to the headwaters of the Back River, and subsequently into the Patapsco River and ultimately the Chesapeake Bay. Herring Run discharges into the Back River approximately 1,500 feet downstream of the eastern-most Site property. Site vegetation includes trees, scrub brush, and wetland vegetation (including *Phragmites* and cattails). There are no paved roads or structures on the entire

site, with the exception of the support footers for the I-95 overpass that transect the property from north to south along the western margin, and one active and several abandoned warehouse-type buildings west of Redhouse Run, which constitutes an operating recycler.

The elevation of the Site varies considerably from an elevation of near mean sea level (msl) to greater than 80 feet msl in the area of the former Colgate Pay Dump (Source Area 1) on the western portion of the site. Upon the cessation of waste disposal activities, cover soil was placed over many of the landfilled areas; today, vegetation, soil cover and some surface debris is present across the Site. The Site is not fenced to restrict access. There is evidence of trespassing; however, in addition to limited roadway access and dissection by streams, much of the property is densely wooded, which appears to have limited trespassing to off-road vehicles and pedestrian traffic.

The Site is adjacent to two CERCLIS sites and within a 5-mile radius of seven other CERCLIS sites. The Baltimore Galvanizing Company Site and the Eastern Stainless Steel Company Site are approximately 300 feet and 350 feet, respectively, from the nearest 68th Street Landfill Site boundary. The Sauer Landfill Site, located along the Back River, is approximately 3.5 miles downstream of the Site. The Back River Sewage Treatment Plant, owned and operated by the City of Baltimore and serving both jurisdictions, is located approximately 2,600 feet downstream of the confluence of Herring Run and the Back River. Other industrial facilities, such as the former Bethlehem Steel-Sparrows Point Works, are also located along the Back River in the vicinity of the Site, creating potential upgradient and downgradient contaminant migration and commingling within the current overall study area.

2.1 SITE OWNERSHIP AND HISTORY

The Site is comprised of numerous parcels, with various corresponding property owners, upon which disposal activities were conducted at various times. In general, however, Site-wide waste disposal activities occurred between the late 1940s and the early 1970s, and involved the disposal of solid and liquid municipal, industrial, and commercial wastes. During and subsequent to Site operations, several of the properties have transferred ownership on one or more occasions. Historical Site ownership information is summarized by Source Area in the ASAOC. Parcels and property owners at and adjacent to the Site are presented herein on Figure 2.

The Site was initially proposed for listing on the NPL in January 1999 as a result of the Hazard Ranking System (HRS) Scoring Package prepared by Roy F. Weston on behalf of USEPA. Due to the extensive comments received from the proposed listing, the Site was not listed. Rather, USEPA conducted further investigations of the Site and again proposed listing the Site on the NPL in April 2003. Subsequently, the Coalition and the USEPA voluntarily executed the current ASAOC. Within the boundary of the Site defined by the ASAOC, the following disposal and industrial facilities were operated: Colgate Pay Dump (Parcel 213 East), Robb Tyler Landfill (Parcel 340), 68th Street Dump (Parcel 151), Island Area Landfill (Parcel 151), Horseshoe Landfill (Parcel 405), Permit 19 Area (Parcel 16), Industrial Enterprises Landfill (No Ownership), Unclaimed Landfill (No Ownership), and The Thirteen Sixty Broadcasting Company (WEBB radio transmitter station) (Parcels 364 and 399).

2.2 SUMMARY OF PRIOR INVESTIGATIONS

Numerous investigations have been conducted at the Site, or on the individual Source Areas, with some of the investigations focusing on multiple Source Areas. A brief summary of the purpose of, and sampling conducted for each investigation is provided below.

2.2.1 Source Area 1, 2, 3 and 4 Investigations

Plans and reports associated with historical investigations of Source Areas 1, 2, 3 and 4, combined, include the following:

- Target Population Study: NUS Corporation, Inc., prepared for USEPA, dated May 2, 1986. The purpose of the study was to identify surface water and groundwater use and perform a geologic and hydrogeologic evaluation within a 5-mile radius of the site.

- Level I SI Prioritization: Available information was reviewed, a target survey was conducted, and potential contaminants of concern were identified. No sampling was conducted.

- Sampling Plan for a Phase I Expanded Site Inspection (ESI): Maryland Department of the Environment (MDE) WMA, dated June 1993. The plan proposed collecting groundwater, surface-water, sediment, and soil samples.

- Phase I ESI: MDE WMA for USEPA, dated May 1995. A total of 40 groundwater, surface-water, sediment, and soil samples were collected on June 2 and 3, 1993.

- ESI and SAS (Special Analytical Services) Report of Findings: Volume V, dated September 1994, was produced by MDE WMA. This report is not referenced in the table of contents for the final ESI as being included as part of the final report, but mimics the final Phase I ESI with the exception of a summary of a follow-up sampling event to the June 1993 Phase I ESI sampling event. "Additional sampling and analysis of the on-site soils and fish tissue was required in order to characterize the site and to assess the potential threat to human health and the environment" (USEPA, 1994).

2.2.2 *Source Area 2 and 3 Investigations*

Plans and reports associated with historical investigations of Source Area 2 and 3, combined, include the following:

- Site Inspection (SI): NUS Corporation for USEPA-Region III, dated May 9, 1986. The purpose of the investigation was to assess any possible surface contamination present at the site.

2.2.3 *Source Area 1 Investigations*

Plans and reports associated with historical investigations of Source Area 1, only, include the following:

- Preliminary Assessment (PA): Maryland Waste Management Administration (WMA) for USEPA-Region III, dated June 1985. The PA was conducted to address data gaps in the SI. Waste, soil, surface-water, and leachate samples were collected from various areas on the Site.

- PA of the Colgate Pay Dump: Maryland WMA for USEPA-Region III, dated June 1985. A preliminary review of the document at MDE indicated that one sample (01) was collected on April 8, 1985.

- SI of Colgate Pay Dump: Maryland HSWMA for USEPA-Region III, dated September 1989. Three shallow groundwater wells were installed and sampled, and three surface soil samples were collected. The samples were analyzed for metals, VOCs, SVOCs, PAHs, pesticides, and PCBs.

2.2.4 *Source Area 5 Investigations*

Plans and reports associated with historical investigations of Source Area 5, only, include the following:

- PA of Industrial Enterprises: Maryland WMA for USEPA-Region III, dated June 1985. Three sediment samples and two waste samples were collected on March 13, 1985.

- Sampling Plan for a SI of Industrial Enterprises: MDE Hazardous and Solid Waste Management Administration (HSWMA). The plan proposed collecting soil, sediment, and surface-water samples and conducting a metal detector survey to delineate areas of alleged buried drums and debris. The plan also references three monitoring wells (B/MW-I through B/MW-3) which were to be sampled.

- SI of Industrial Enterprises: MDE HSWMA for USEPA-Region III, dated September 1989. A total of 19 surface soil, surface water, sediment, and groundwater samples were collected on January 17 and 24, 1989.

2.2.5 *Site-Wide Investigations*

A site-wide sampling event was performed by contractors to USEPA-Region III during the calendar years of 2000 and 2001 in support of the 2003 Hazard Ranking System Documentation Record. Soil, waste, sediment, and surface water samples were collected during this site-wide event.

3.0 OVERVIEW OF THE ASAOC

3.1 GENERAL

The scope of services stipulated by the ASAOC is presented in the Statement of Work (SOW) and includes planning, implementation, and evaluation for the following major components:

1. Remedial Investigation (RI);
2. Human Health and Ecological Risk Assessments;
3. Site re-use; and
4. Feasibility Study (FS).

The RI activities are intended to collect data to characterize site conditions, determine the nature and extent of contamination, and gather information to support the risk assessments and the FS. The human health and ecological risk assessments evaluate the risks to human health and the natural environment posed by the Site, determine the constituents of concern (COC), and select the appropriate clean-up levels for specific media. Site re-use studies will be conducted to identify market potential and re-use opportunities that can be coordinated with the remedial actions considered in the FS. The FS will evaluate various technologies for remedial action at the Site in accordance with the criteria and potential alternatives described in the National Oil and Hazardous Pollution Contingency Plan (NCP) and under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The activities and outcome for each of these components will be coordinated such that the remedial alternatives and re-use opportunities are properly integrated in the FS.

In accordance with Section III of the ASAOC, the objectives of the ASAOC are:

- To determine the nature and extent of contamination and any threat to the public health, welfare, or the environment caused by the release or threatened release of hazardous substances, pollutants or contaminants at or from the Site by conducting a RI;

- To identify and evaluate remedial alternatives to prevent , mitigate or otherwise respond to, or remedy any release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site by conducting a FS; and,

- To recover certain future response costs incurred by USEPA with respect to the ASAOC.

3.2 DELIVERABLES

The activities and deliverables outlined in the ASAOC, specifically Appendix C – Statement of Work, will be undertaken by the Coalition and its consultants. All work will be conducted in a manner that will comply with the ASAOC, SOW, CERCLA, the NCP, and applicable USEPA guidance documents. The project deliverables to be submitted to the USEPA by the Coalition include:

1. Project Management Plan, including the Quality Management Plan
2. Site-Wide Program Management Plan
    a. Final Data Gap Analysis
    b. Regulatory Strategy
    c. Re-use Evaluation
    d. Preliminary Risk Evaluation
    e. Delineation of Parcels
    f. Project Schedule
3. Site-Wide Work Plan
    a. Field Sampling Plan
    b. Quality Assurance Project Plan
    c. Health and Safety Plan
    d. Risk Assessment Work Plan
4. Community Relations Support Plan
5. Parcel-Specific Work Plan(s)
6. Parcel-Specific Focused RI Report(s)
    a. Risk Assessment(s)
7. Parcel-Specific Focused FS(s)
    a. Memorandum on Remedial Action Objectives
    b. Applicable or Relevant and Appropriate Requirements (ARARs)
    c. Development of General Remedial Actions
    d. Memorandum of Development and Screening of Alternatives
    e. Assembly of Alternatives
    f. Screening and Assessment of Alternatives
8. Re-use Assessment(s)
9. Monthly Progress Reports

4.0 PROJECT APPROACH

4.1 OVERVIEW

The Site is comprised of five Source Areas, as defined by USEPA (discussed in Section 2.0). The planning and coordination of Site investigation and remedy selection activities is, therefore, critical to obtain the necessary data, perform the required analyses, and conduct the remedial evaluations in an efficient and timely manner. Project implementation must not only incorporate the four major components discussed in Section 3.1, but also include community relations support, regulatory involvement at all levels (federal, state and local), and communication with third-party stakeholders.

As described in the SOW and the Interim Data Gap Analysis (IDGA), a final Data Gap Analysis (DGA), will be prepared and used as a guide to develop the RI work plans. This approach considers the extensive database available for the Site as the foundation for understanding site conditions, and to ascertain the data collection requirements for each Source Area.

Additionally, due to the size and complexity of the Site, the Site will be parceled into Management Areas (MAs) in a logical manner that considers environmental conditions, risk, and re-use opportunities. The parcelization and corresponding prioritization of each MA will facilitate the Site investigation and remedy selection, enable focused activities, and allow portions of the Site to proceed through the appropriate regulatory approval process in an expeditious manner, allowing more complex areas to be concurrently addressed without delaying the characterization and re-use of other parcels. In accordance with the ASAOC, the MAs and priorities will be determined and presented in the Site-Wide Program Management Plan (SWPMP). The SWPMP will build upon the Interim Data Gap Analysis (IDGA) as incorporated in the ASAOC to understand the existing data, potential risks, and market opportunities, and further refine the project approach. The Conceptual Site Model discussed below presents the general technical and management approach for the Site, including the integration of the various components as discussed above.

4.2 CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) serves to synthesize and, during the course of the investigations, crystallize known information about a site such that pertinent decision-making requirements may be accomplished. Early in the process, the CSM will be developed by distilling information developed by others on and in the vicinity of the Site. The CSM, in turn, will then be used to identify the types and extent of information required in order to achieve the project goals. As a precursor to the CSM, the IDGA determined the types, number and quality of supplemental data required for risk-based decision-making at the Site. The IDGA applied the existing environmental database as a foundation, concurrently considering the requirements for incorporating a reasonable re-use concept for the Site. Using this "broad-brush" approach, the CSM can conceptualize the current Site setting, incorporate necessary data gathering to achieve characterization, and quantify the existing and potential risks imposed by the Site on humans and the natural environment. Finally, the CSM will allow consideration of remedial alternatives based on anticipated Re-Use Plans, as graphically depicted in Figure 3.

The relationship between contaminants, retention/transport media and receptors is schematically represented in Figure 4, which details the following four elements necessary for exposures to occur:

- A source and mechanism of constituent release (i.e., waste);
- A retention or transport medium (e.g., surface-water runoff);
- A point of potential contact of the human or ecological receptor with the contaminated medium (e.g., trespasser contact with surface water); and,
- An exposure route at the contact point (e.g., ingestion/dermal contact with impacted soil).

These relationships translate into the following potential contaminant transport pathways that will be further evaluated and refined throughout the Site investigation and risk assessment process:

- Waste materials in direct contact with surface and ground water;
- Surface-water run-off from the Site present during and after precipitation events;

- Surface-water transport mechanism for background constituents that may be entering the study area from upstream and downstream, and from buried storm sewers (Figure 4);

- Indirect contact with waste materials through groundwater discharge into the adjoining surface-water bodies;

- Direct exposure through groundwater usage, if any;

- Direct exposure to surface and subsurface waste materials;

- Vapor emissions from buried waste at the Site migrating from the subsurface into the atmosphere and potentially future Site buildings; and,

- Chemical uptake (e.g., PCBs, dioxins) and potential bioaccumulation in tissue of fish associated with human consumption.

Potential human and ecological exposure pathways for the Site are outlined in the IDGA. The CSM will be refined as part of the conduct of the Baseline Risk Assessment (BRA) for human health and the Baseline Ecological Risk Assessment (BERA). Upon completion of the BRA and BERA, the findings of these assessments will be considered along with the Re-Use Plan to establish the Site remedy (Figure 3). The overall conceptual model for Re-Use Planning is depicted on Figure 5, which outlines the sequencing of activities that ultimately result in parcel re-use.

4.2.1 Site-Specific Re-Use Considerations

Figure 6 highlights the USEPA-designated Source Areas that comprise the Site, as presented in the ASAOC. Utilizing the preliminary environmental constraint analysis conducted as part of the IDGA, the extent of developable land is prescribed. Using Figure 1 of the IDGA as the basis, the SWPMP will refine the re-use opportunities and corresponding areas. When the re-use opportunities, preliminary risk results, and new data from the data gaps assessment are identified and initially integrated, the MAs can be specified and prioritized. Throughout the process, the collection of information may require the further refinement and/or subdivision of MAs or priorities.

Market research studies will be conducted as a critical element of the Re-Use Planning for the Site, as well as for dividing the Site into logical parcels that can be studied, evaluated, remedied and redeveloped in a prioritized sequence and at a rate that can be acceptable to the market. The Site will therefore be divided into parcels, designated as to priority for

redevelopment, and proceed through the process at potentially different rates. This process will expedite both re-use and regulatory review and approval.

The prioritization of the parcels will occur based on the risk posed by each parcel, market demand and long-term planning for reuse. Parcels which require a longer lead-time to address these issues will advance on a separate pathway. The result will be a staged process of conducting Site investigations and remedy selection throughout the project, yielding certain portions of the Site available for remediation and redevelopment concurrently with investigations on other parcels.

4.2.2 Environmental Restoration And Mitigation

The information gathered from habitat surveys, including observations on wetlands and aquatic communities, will be used as input to the environmental restoration and mitigation considerations. At a minimum, the reference entitled *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, June 5, 1997*, and EPA OSWER Directive 9285.7-28P *Issuance of final Guidance: Ecological Risk Assessment and Risk Management Principles for Superfund sites*, October 7, 1999 will be used as guidance. The Site-Wide Program Management Plan (SWPMP) will provide a more comprehensive discussion of the Ecological Risk Assessment (ERA) methodology.

Natural resource issues identified by the Natural Resource Trustees (the National Oceanographic and Atmospheric Administration [NOAA], the U.S. Fish and Wildlife Service [USFWS] and the State of Maryland, Department of the Environment [MDE] and Department of Natural Resources [MDNR]) will be addressed through a Collaborative Assessment within the context of the ERA. Based on discussions with the Natural Resource Trustees, it should be possible to address these issues by identifying restoration opportunities that can be integrated into the overall Re-Use Plan. This combined assessment and remedial approach can be effective in identifying potential opportunities for restoration that diminish the need for a formal and separate NRD assessment. A "watershed-based approach" which includes both aquatic and terrestrial exposure pathways is tentatively proposed for use in performing the ERA. The SWPMP will describe the various spatial units; i.e., various upland areas as well as the lowlands, for discrete evaluation. These include parcel or Source Area-specific, as well as local and watershed evaluations. The scale of each evaluation will be based on grouping areas exhibiting similar characteristics.

The ERA will be used to identify restoration opportunities and will be incorporated into the overall Site investigations and evaluations. Included will be a habitat survey for the parcels identified at the Site, a Screening Level Ecological Risk Assessment (SLERA) for the upland areas of the Site, as discretely defined, and a Baseline Ecological Risk Assessment (BERA) for the aquatic area (Herring, Moores and Redhouse Runs) of the Site. Information on the nature of existing wetlands and resident wetland plants will be used to judge current conditions and opportunities for enhancement.

The results of the SLERA and BERA will be presented in a manner that can support decisions concerning the development and management of the various parcels as well as address natural resource issues. Potential enhancements at the Site relative to ecological conditions will be the thrust of restoration.

4.2.3 Stakeholder Engagement

As an USEPA-lead site, there are three levels of regulatory agencies that will have some jurisdiction or involvement in the site: 1) USEPA as the federal agency; 2) the MDE as the state lead agency; and, 3) local municipal government. Because portions of the Site are located in the City of Baltimore and Baltimore County, both the City and County will have involvement as local regulatory bodies. Furthermore, other stakeholders have an interest in the Site; e.g., USFWS, NOAA, community groups and others. The primary stakeholders include the following:

- USEPA and MDE. These agencies represent the regulatory enforcement component of the Site efforts. USEPA will assume the lead role in directing, overseeing and ultimately selecting the environmental remedy to be implemented at the Site. Their actions are driven by CERCLA and its amendments, the implementing regulations (i.e., NCP), and the various guidance documents. The MDE is charged with assuring compliance with the State of Maryland laws, regulations and guidance, and providing project support to the USEPA. While the USEPA will lead the regulatory program, the MDE will have review and acceptance authority as well. The USEPA will also play an active role in the comprehensive assessment of the re-use potential of the Site, taking this potential into consideration in developing and selecting the final remedy.

- National Oceanographic and Atmospheric Administration (NOAA) and the U.S. Fish and Wildlife Service (USFWS). The Natural Resource Trustees for the Site include these two federal agencies and the State of Maryland. The role of these trustees is to assure that the

environment has not been damaged and to mitigate any damage identified to the extent possible through the assessment of Natural Resources Damages. At this Site, a Collaborative Assessment involving the regulatory agencies, the Trustees, and the Coalition was initiated at the outset in order to permit the incorporation of environmental restoration opportunities into the overall plan for the redevelopment of the Site.

- City and County of Baltimore. Both the City of Baltimore and Baltimore County have a direct interest and involvement in the Site redevelopment given that the Site is located partially in both jurisdictions. The location of the Site is in an urbanized industrial zone for which a long-term plan is not complete, but which exhibits potential for redevelopment as a portion of an area-wide planning effort. These entities therefore will have a direct involvement in the planning for the redevelopment at the Site to assure an integrated and effective use of the property. There are few other large parcels in the East Baltimore region with the potential and current zoning to permit such development. Further, the redevelopment of the property will have to comply with the regulations and standards in effect for any development within each jurisdiction. However, the benefits of such development will likely be encouraged by the jurisdictions as a furthering of the redevelopment of the region and enhancement of the tax base and employment opportunities.

- Property Owners. The Site is not under single-ownership, but rather multiple owners who are only in part participating with the Coalition in the Site investigation and remedy selection process at this time. In addition, a significant parcel is untitled with disputed ownership. The issues with ownership must be resolved before redevelopment of those parcels can proceed. Therefore, involvement of the property owners, and in particular, a determination of the ownership of the Industrial Enterprises Landfill and Unclaimed Landfill property must be initiated early in the process. This is particularly critical for the properties of unknown ownership since it is located in a likely early parcel for redevelopment within USEPA-designated Source Area 5.

  It should also be noted that since the Site is an aggregation of multiple landfills, the Source Areas designated by the USEPA are discontinuous, with potentially non-impacted property between. These "clean" parcels must be integrated into the overall Site Re-Use Plan. This may require the participation of additional landowners.

Given the configuration of the Site, bisected by I-95, Herring Run and Moores Run, and the bordering of the Site by active rail lines, cooperation will be required with the appropriate property owners and/or easement holders for such facilities to gain access to otherwise landlocked portions of the Site. It is understood that the Maryland Transportation Authority controls the right-of way for I-95, which was constructed through the Site by the State of Maryland and utilized on-site and off-site waste to construct access ramps and other roadway support. The existing access ramps to Moravia Road have stubs which end on the property, which may be an opportunity to gain access to landlocked Source Area 1 for both investigations and long-term access requirements. Alternatively, rail crossings/ bridging along the northern boundary may be possible for both access purposes. Access to parcels bordering the AMTRAK rail line along the southern boundary of Source Area 5 will likely be from the existing undeveloped roadway historically used for such access. It is understood that this roadway is also an easement for maintenance traffic for the AMTRAK rail line. Coordination with AMTRAK during redevelopment will therefore also be required.

- Community Associations/General Public. Community associations, whether representing a homeowner's group, a residential subdivision, a Chamber of Commerce or similar business group, or formed with a specific goal; i.e., environmental protection/ restoration, land planning or similar local interest, such as the Herring Run Watershed Association, have a stake in the process. The major vehicle for reaching these groups is through pro-active solicitation of involvement under the Community Relations Support Plan.

Periodic communication and coordination with each of these stakeholders will be conducted throughout the project. Communication will be performed through various means, including submittal of plans and reports, monthly progress reports, milestone and interim meetings, presentations and an interactive website.

4.2.4 Community Relations

It is understood that communities surrounding the Site are stakeholders in the project. Consistent with the NCP and the ASAOC, USEPA maintains the lead in implementing community relations activities for the Site; however, the Coalition will support USEPA where necessary.

4.2.5 Project Approach

The Site will be divided into multiple parcel groupings, herein termed Management Areas, to effect concurrent, overlapping and/or linear activities on each of the various parcels. The intent of staging the project in this manner is three-fold:

- To facilitate re-use by grouping parcels with common ownership, prior usage, or potential and interest for re-use;
- To accelerate particular parcels that exhibit limited contamination through the evaluation process;
- To effectively manage separate portions of the Site, rather than the entire Site at one time, including preparation of plans and reports, regulatory review, and implementation of RI and reuse activities.

These MAs will be delineated and further described in the SWPMP. Conceptually, specific considerations in sequencing the groupings include:

- Parcels which are more readily redeveloped should be initiated first. This may include those parcels which exhibit limited evidence of prior disposal activity and contamination and those that are readily served by infrastructure, including access roadways and standard water/wastewater, electric and gas service.
- Since the focus of the investigations is to address flux from the various Source Areas into the environment, and the waterways represent the primary receptor of concern, the stream corridor will likely require the greatest period of time to evaluate.
- Parcels which require extensive upgrades to utility service, access points and other services to be developable will require planning studies and other evaluations by outside agencies. Therefore, evaluation of these parcels could be delayed allowing more developable parcels to proceed through the regulatory approval process first.

5.0 PROJECT TEAM

5.1 GENERAL

This section identifies the key personnel, responsibilities, and organizational structure for the project implementation team. The activities prescribed by the ASAOC and SOW will be performed by the team presented herein. The organizational structure must be flexible to adapt to changing project needs and provide the ability to utilize the proper expertise to complete various work tasks, including investigations, risk assessments, feasibility studies, and re-use assessments.

Environmental Resources Management, Inc. (ERM) has included specialty professional firms on the project team to provide key expertise. ERM staff will work with the supplemental firms to assure continuity, full integration and completeness, and as quality assurance verification. The Project Organizational Chart is presented on Figure 7, and the Quality Management Plan is provided in Appendix A.

The specialty firms and subcontractors include:

- Menzie-Cura Associates, Inc. will provide ecological resources and risk assessment;
- ZHA, Inc. will perform economic and financial assessments;
- Lipman, Frizzell and Mitchell LLC is a local real estate consultant that specializes in the Baltimore area and is familiar with the market, future projects, and area-specific demands;
- The Wilson T. Ballard Company is a Baltimore-based transportation firm that will assess Site access and traffic issues; and,
- Other subcontractors will be required to provide specialty services, including the following:
    - Aerial photographic interpretation;
    - Aerial and land surveys;
    - Drillers;

- Geophysical surveys;
- Analytical testing; and,
- Geotechnical testing.

Other subcontractors added through the course of the project will be identified prior to incorporation into the team.

5.2 ORGANIZATION, POSITIONS AND RESPONSIBILITIES

The project will be coordinated and managed from the ERM office in Annapolis, Maryland. Many of the key ERM staff have prior experience at the Site and are already familiar with the project. The primary staff will be composed of personnel familiar with the anticipated activities, including investigation, engineering and design, risk, ecological issues, planning, and local real estate market assessments. A brief description of the key project team members is presented below; Curriculum vitae for key personnel are presented in Appendix B:

Project Coordinator - J. Lawrence Hosmer, P.E. Mr. Hosmer has more than 35 years experience in project conceptualization, planning, evaluation, design and implementation, and has served as Project Coordinator, Director, and Technical Advisor on environmental assignments primarily related to solid and hazardous waste management, including over 50 CERCLA sites. He has been an integral part of this project through execution of the ASAOC. As Project Coordinator, he will be responsible for all activities conducted at the Site by the Coalition, as required by the ASAOC. Mr. Hosmer will be the primary contact with the USEPA Remedial Project Manager, Mr. Christopher J. Corbett.

Partner-in-Charge - Gary Walters, CHMM. Mr. Walters has over 23 years of experience in environmental engineering, with an emphasis in hazardous waste management and site remediation. He has managed and/or directed numerous federal and State-lead Superfund projects within USEPA-Region III. As the Partner-in-Charge, Mr. Walters is responsible for the overall quality of the project and marshalling the resources necessary to ensure that all assignments are appropriately staffed and resourced to ensure successful completion.

Project Manager - Darren Quillen, P.E. Mr. Quillen offers 14 years of experience as a project manager, design engineer and construction manager for land disposal and redevelopment projects throughout the country. Mr. Quillen has managed or supported numerous solid waste projects located in USEPA – Region III. He has also been involved with the activities

supporting the execution of the ASAOC. As Project Manager, he is responsible for managing the project, coordinating staff and work activities, reviewing quality and performance for each task, and ensuring that the technical, financial, and scheduling aspects of the project meet the objectives. The Project Manager will report to the Project Coordinator and also serve as a point-of-contact and control for planning and implementing work tasks.

Remedial Investigation Task Leader - Jeffrey Flanzenbaum, P.G.
Mr. Flanzenbaum has 18 years of experience in environmental consulting, with an emphasis in site investigation, remediation and environmental due diligence. He has managed numerous site environmental investigation projects including several RCRA Facility Investigations (RFI), associated Corrective Measures Studies (CMS), and RI/FS at NPL sites. As the RI task leader, Mr. Flanzenbaum is responsible for preparing the Work Plans, overseeing the field activities, and preparing the RI reports.

Risk Assessment Task Leader - Charles Menzie, Ph.D. Dr. Menzie has over 30 years experience with a primary area of expertise in environmental fate and effects of physical, biological, and chemical stressors on terrestrial and aquatic systems. Dr. Menzie has conducted several human health and ecological risk assessments for sites in USEPA - Region III, including sites in Maryland. As the Risk task leader, Dr. Menzie is responsible for preparing risk-related Work Plans, overseeing the risk-related field activities, and preparing the Risk Assessments.

Re-Use Planning Task Leader - David Blaha. Mr. Blaha has 22 years of experience in environmental assessment, natural resource management, and land planning for local, state, regional, and federal governments in the United States and internationally. As the Re-Use Plan task leader, Mr. Blaha is responsible for preparing the Re-use Evaluation and Re-use Assessments.

QA/QC Manager. The ERM QA/QC Manager will be responsible for all QA/QC aspects of the project, including all QA/QC protocol in the field, office and laboratory. The QA/QC Manager will oversee the implementation of the Quality Assurance Project Plan, ensure that the internal QA measures are conducted, and will oversee the data validation process.

Health and Safety Manager. The ERM Health and Safety Manager will be responsible for the implementation of the Health and Safety Plan (HASP). The Health and Safety Manager will ensure that the appropriate personal protective and monitoring equipment is available and utilized by all field personnel, as well as, performing on-site safety audits, as necessary.

6.0 SCHEDULE

The schedule will be determined upon parceling the Site and prioritizing the parcels. This information and the corresponding schedule will be presented in the SWPMP. The schedule requirements specified in the ASAOC are presented below:

Deliverable	Deadline
Effective Date of ASAOC	May 30, 2006
Project Management Plan	July 14, 2006
Site-Wide Program Management Plan	90 days from USEPA approval of PMP
Site-Wide Work Plan	90 days from USEPA approval of SWPMP
Parcel-Specific Work Plans	Pursuant to schedule set forth in SWPMP
Parcel-Specific Focused RI Reports	Pursuant to schedule set forth in Parcel-Specific RI/FS Work Plans
Parcel-Specific Focused FS Reports	120 days from USEPA approval of RI Reports
Reuse Assessments	Pursuant to schedule set forth in SWPMP

It is the intent of the Coalition to accelerate the project to the extent possible.

7.0 REFERENCES

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Sections 104, 107 & 122 of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, 42 U.S.C. §§ 9604, 9607 and 9622, *CERCLA Docket No. CERC-03-2006-0051 RF*, executed April 2006.

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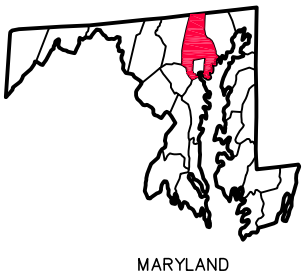
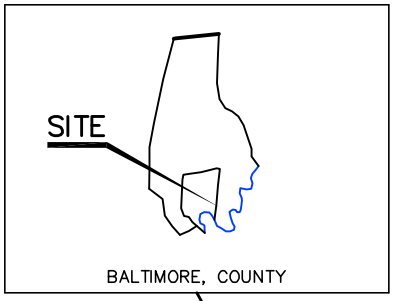
Figures

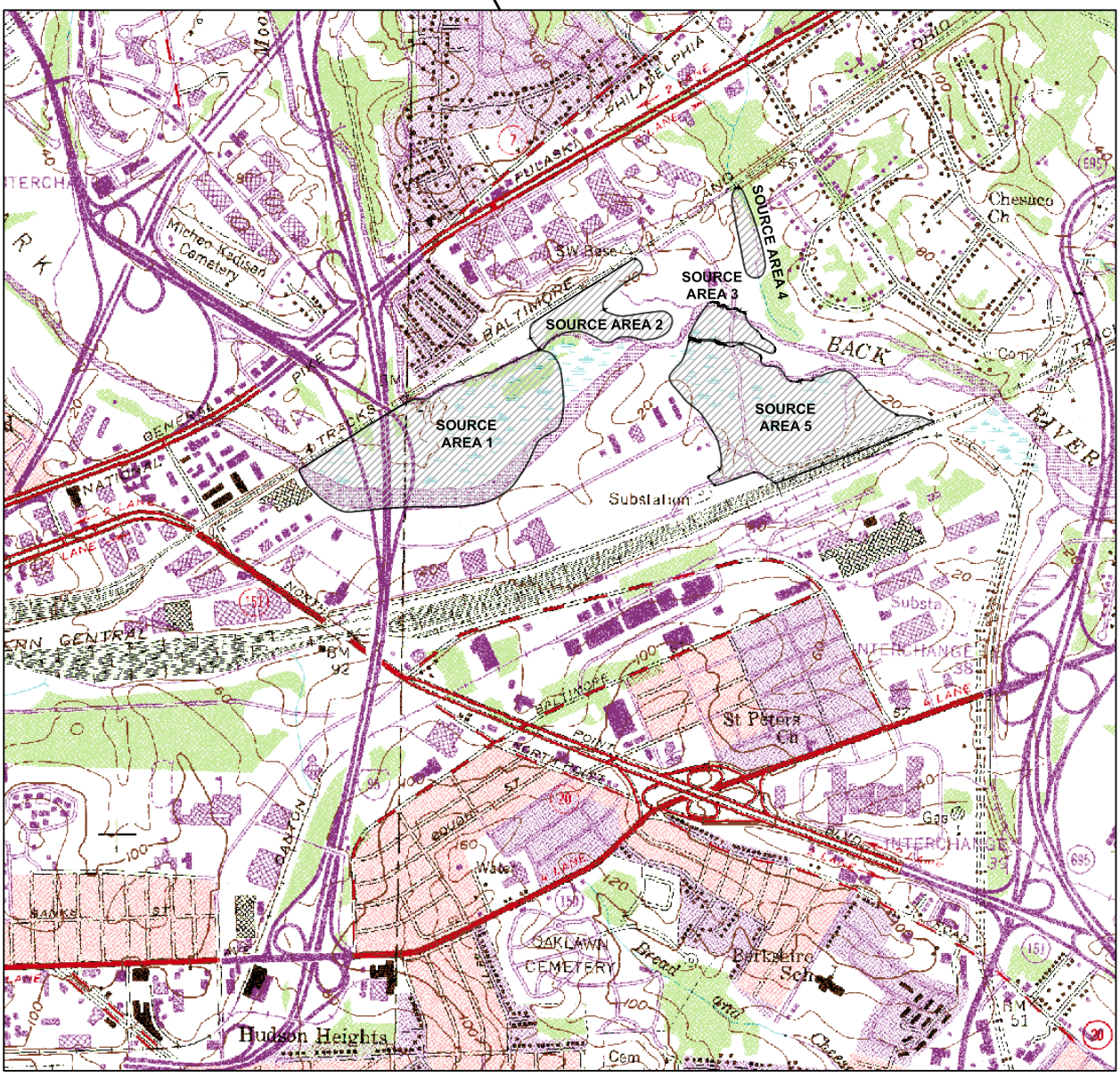




CITY OF ROSEDALE
BALTIMORE COUNTY
MARYLAND

0 2000

SCALE (IN FEET)



ADAPTED FROM USGS
BALTIMORE EAST/1953–PHOTOREVISED/1966/1974

REVISIONS ARE TO BE MADE ON THE CADD FILE ONLY

ERM®

SITE LOCATION MAP

68th STREET LANDFILL SITE
ROSEDALE, MARYLAND

Environmental Resources Management

CADD Review	
CHK'D	
0049608	
Drawn By GML 06/05/06	FIGURE 1

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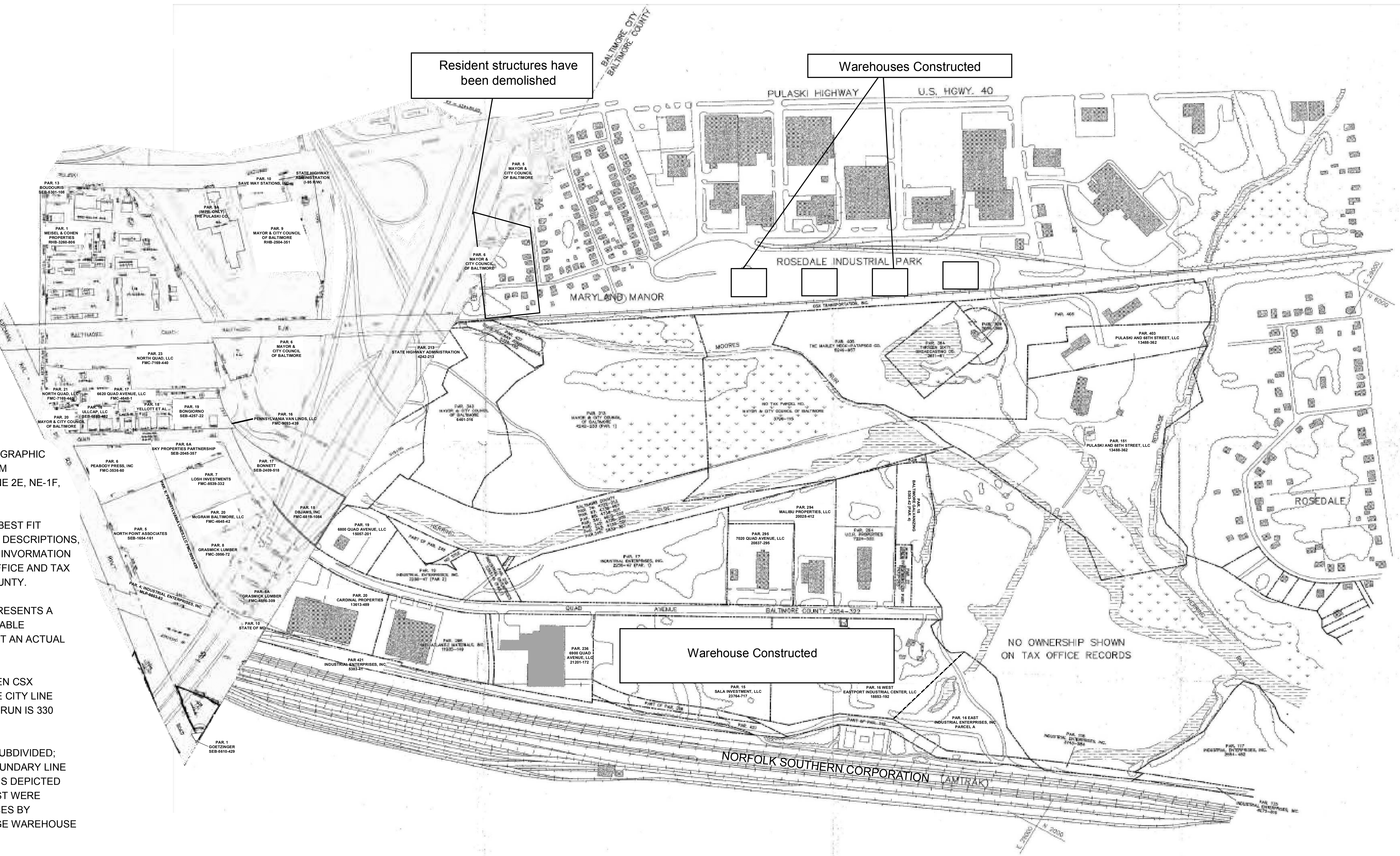


0 200 400 Feet

NOTES:

TOPOGRAPHY TAKEN FROM 1"=200' TOPOGRAPHIC MAPS DATED APRIL 1972. AVAILABLE FROM BALTIMORE COUNTY, MAP USED: NE-1E, NE 2E, NE-1F, & NE-2F.

PROPERTY LINES SHOWN REPRESENT A BEST FIT COMPOSITE PLOTTING OF RECORD DEED DESCRIPTIONS, PLATS, RIGHT-OF-WAY MAPS AND OTHER INVORMATION AVAILABLE FROM THE LAND RECORDS OFFICE AND TAX ASSESSORS OFFICE FOR BALTIMORE COUNTY.

THE INFORMAITON SHOWN HEREON REPRESENTS A COMPOSITE DRAWING USING BEST AVAILABLE INFORMATION AND DOES NOT REPRESENT AN ACTUAL FIELD SURVEY.

APPROXIMATE ACRAGE OF AREA BETWEEN CSX RAILROAD, AMTRAK RAILROD, BALTIMORE CITY LINE (I-95 R/W), AND EAST SIDE OF REDHOUSE RUN IS 330 ACRES.

SUBSEQUENT TO 1997, PARCEL 16 WAS SUBDIVIDED; THE APPROXIMATE LOCATION OF THE BOUNDARY LINE BETWEEN PARCEL16 EAST AND 16 WEST IS DEPICTED HEREIN. PARCELS 15 (PAR.5) AND 16 WEST WERE ACQUIRED FROM INDUSTRIAL ENTERPRISES BY TRAMMELL CROW COMPANY, AND A LARGE WAREHOUSE HAS SINCE BEEN CONSTRUCTED.

PARCEL 403, PAR. 2 & 3 HAS ALSO BEEN REFERRED TO AS PARCEL 151.

IN APRIL 2006, BALTIMORE GALVANIZING ACQUIRED PARCEL 15 (PAR. 4) FROM INDUSTRIAL ENTERPRISES.

Environmental Resources Management, Inc.

FIGURE 2
Site Ownership Map
68th Street Landfill Site
Rosedale, Maryland

Figure 3
Remedy Selection Process Model

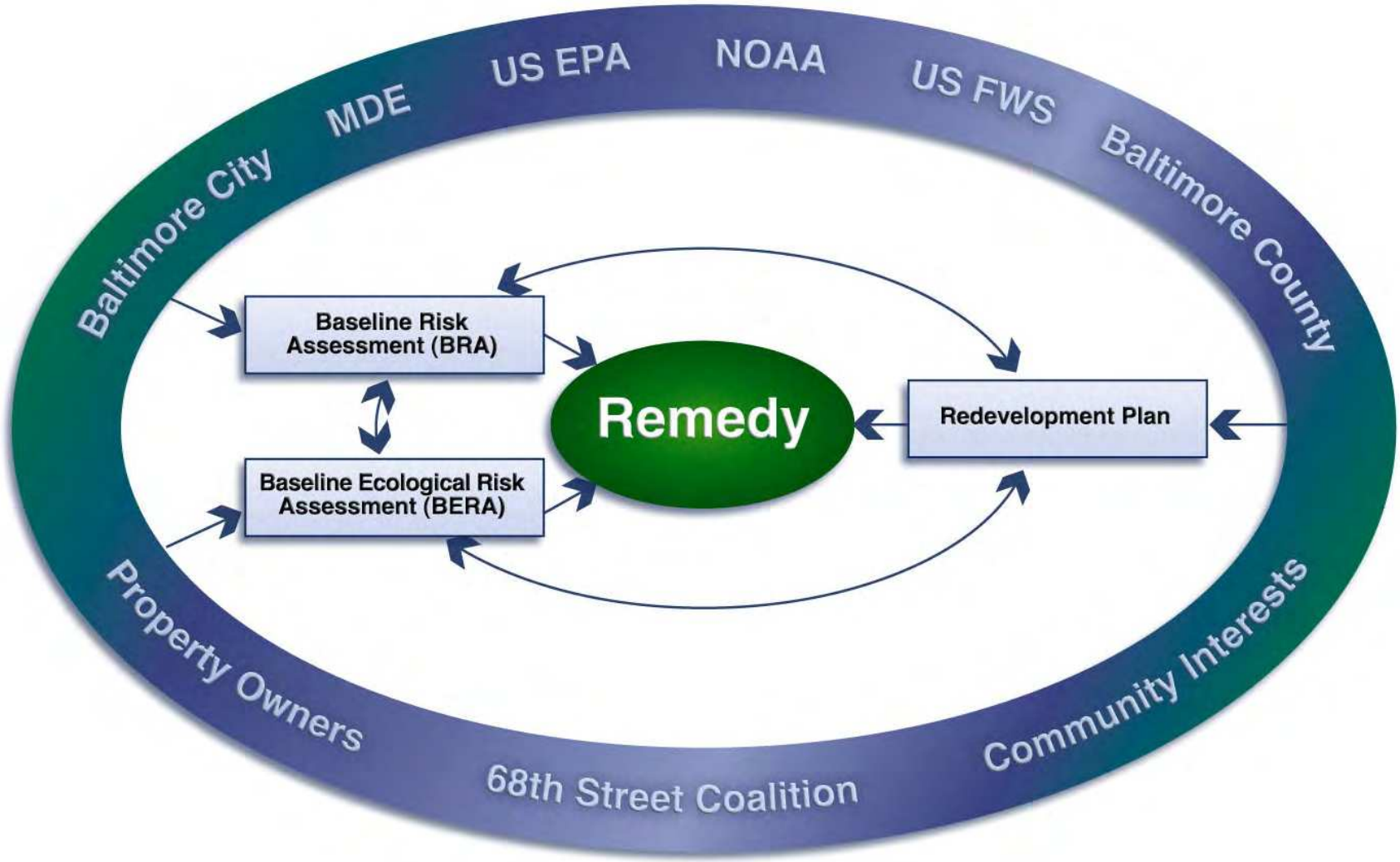


Figure 4
Conceptual Site Model
Human Health and Ecological Risk

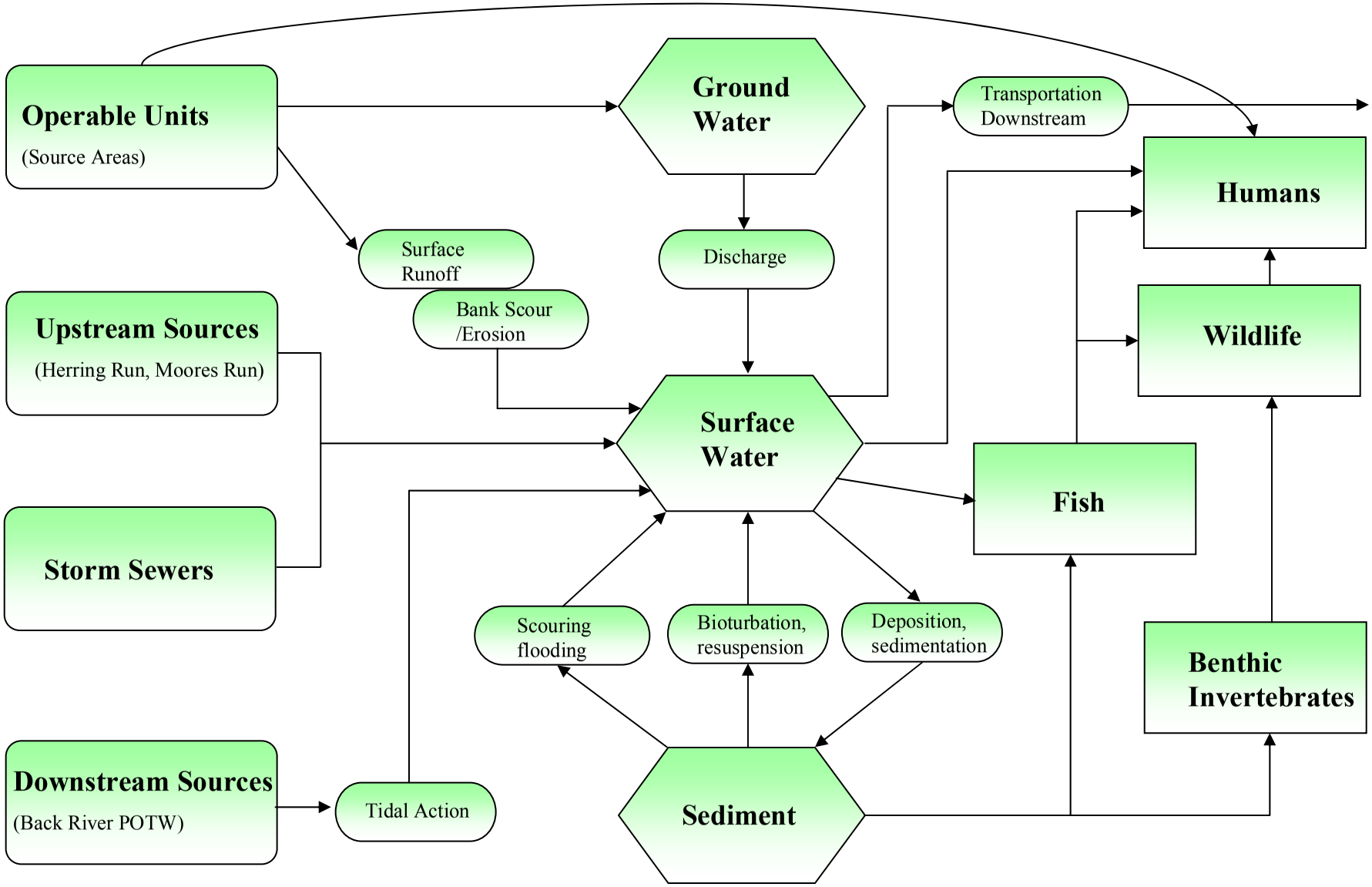
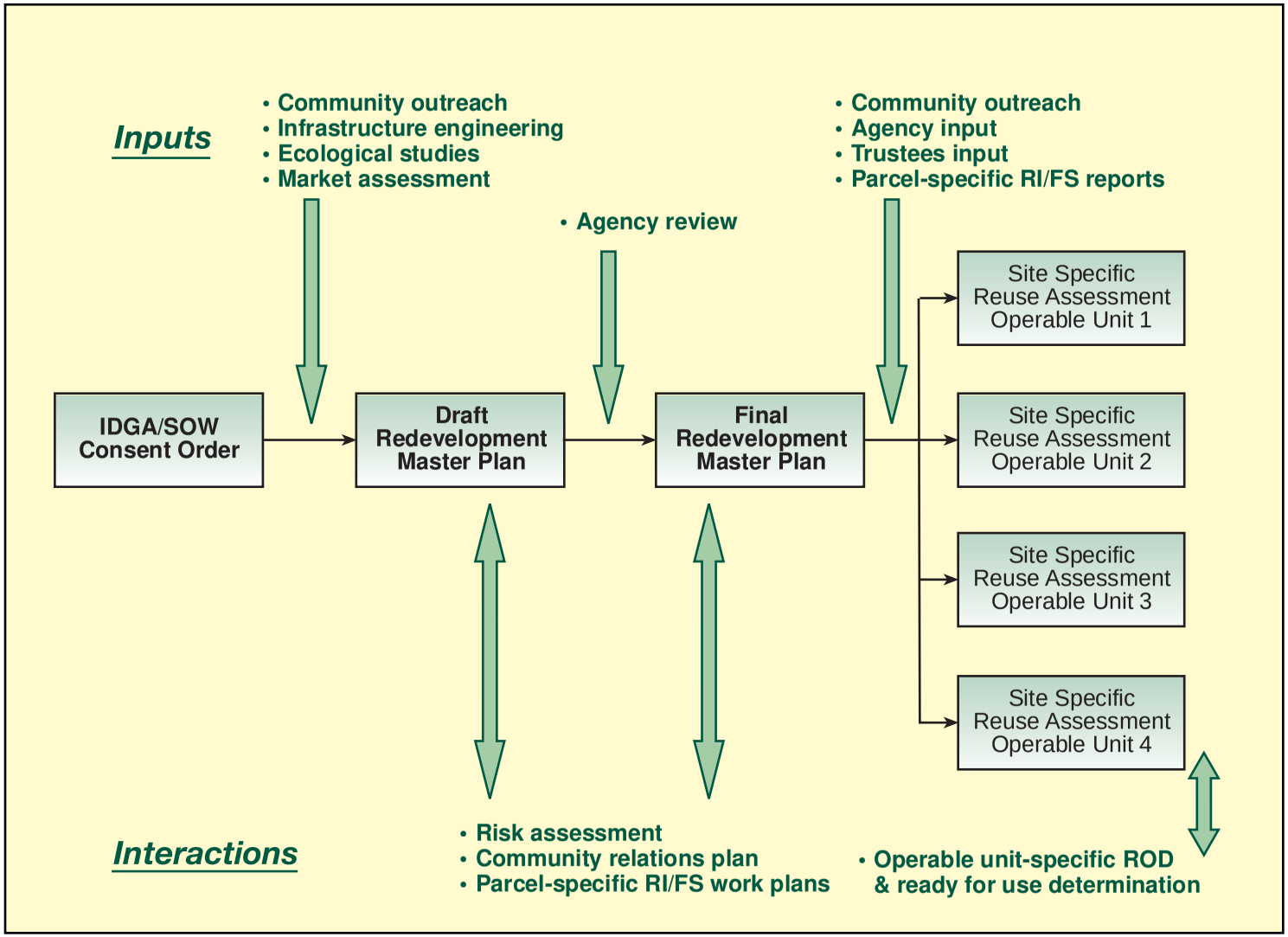


Figure 5
Conceptual Site Model
Redevelopment Planning



Environmental Resources Management, Inc.

N
W E
S

Scale in Feet
0 400 800
Feet

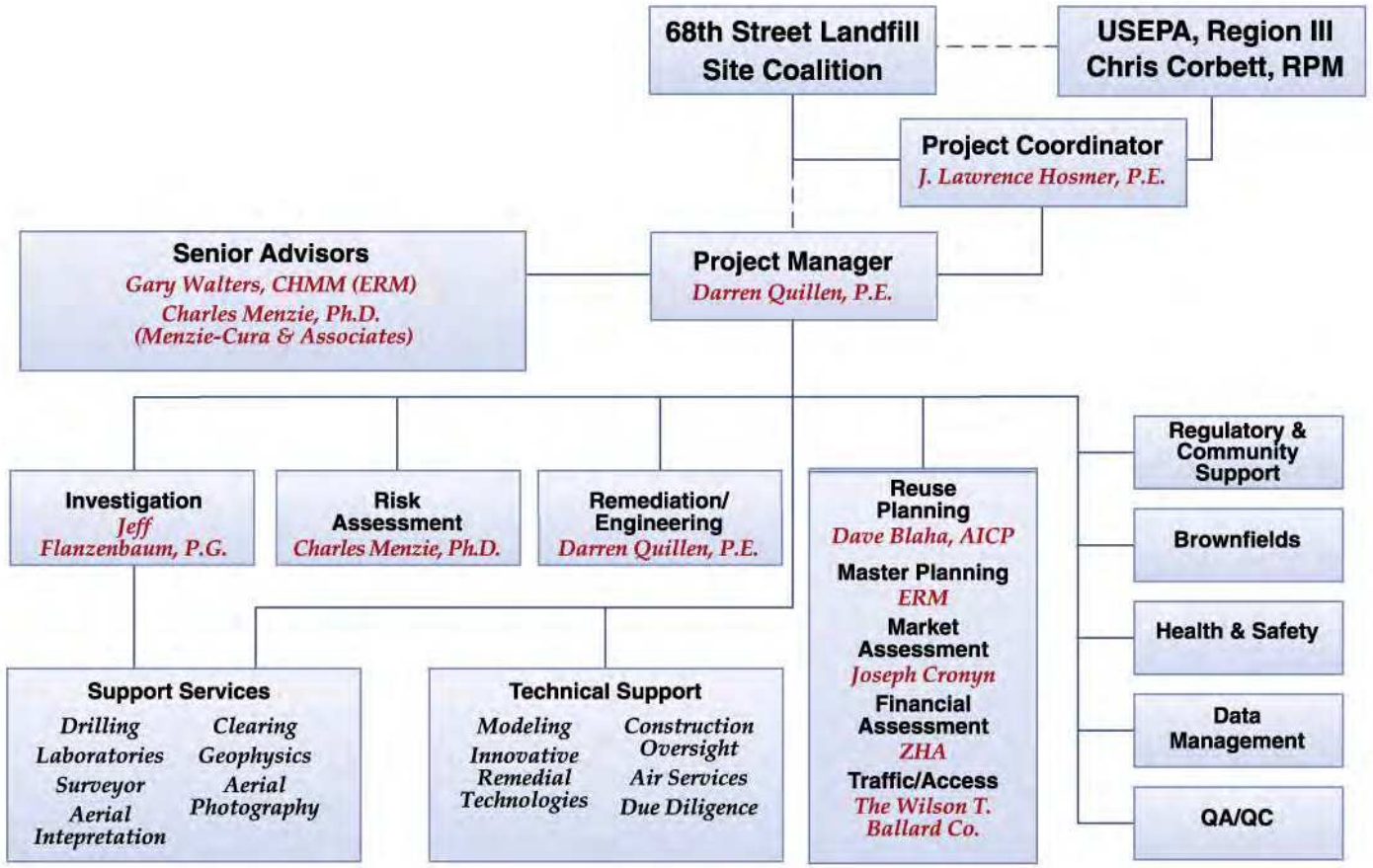
Legend

Existing Developed Land

EPA-Defined Source Areas

Figure 6
General Plan
68th Street Landfill Site
Baltimore, Maryland

Figure 7
Organization Chart



Appendix A
Quality Management Plan

REPORT

Quality Management Plan

68th Street Landfill Site
Rosedale, Maryland

Prepared for:
68th Street Sites Coalition
Lathrop & Gage L.C.
2345 Grand Boulevard
Suite 2800
Kansas City, Missouri 64108

Prepared by:
Environmental Resources Management, Inc.
200 Harry S Truman Parkway
Suite 400
Annapolis, Maryland 21401

August 28, 2006

Authorization

The following personnel have prepared, reviewed and/or approved this Quality Management Plan for accuracy, content, and quality of presentation. Further, these individuals have authorized the application of the contents of this plan to the referenced project.

_____

Darren Quillen, P.E.
Project Manager

_____

Gary Walters, CHMM
Partner-in-Charge

_____

J. Lawrence Hosmer, P.E.
Project Coordinator

August 28, 2006

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1.0 INTRODUCTION

Environmental Resources Management, Inc. (ERM) has been retained by the 68th Street Sites Coalition (Coalition) to perform Remedial Investigation and Feasibility Study (RI/FS) services at the 68th Street Landfill Site (the "Site") located in Rosedale, Maryland. This Quality Management Plan (QMP) has been prepared in accordance with the requirements of the Administrative Settlement Agreement and Order on Consent (ASAOC), which governs the performance of the RI/FS. The QMP establishes the baseline and control protocols for assuring that accurate, complete and high-quality documents are created and delivered throughout the conduct of the RI/FS.

The Coalition and the U. S. Environmental Protection Agency (USEPA) voluntarily entered into the ASAOC (CERCLA Docket No. CERC-03-2006-0051 RF), effective May 30, 2006. The ASAOC was executed in the context of the Superfund Alternative Sites (SAS) Process, as set forth in USEPA OSWER Directive No. 9208.0-18, dated June 17, 2004. The SAS Process is intended to facilitate the cleanup of the Site equivalent to that of similar sites without listing the Site on the National Priorities List (NPL), and includes the potential for parceling the Site for implementation of remediation and re-use opportunities.

The objective of this QMP is to describe the overall quality system employed by ERM, which will be applied to generating the project deliverables encompassed by the services of all members of the ERM team. The QMP is a management tool that documents a system for planning, implementing, documenting, and assessing the effectiveness of activities involving environmental information collection and evaluation, as well as, remedial technology development and design. As intended by the USEPA, the QMP is an over-arching "umbrella" document that sets the tenor and framework for quality services and products during the performance of individual projects. The contents of this QMP include quality policies and procedures, criteria for and areas of application, and associated roles, responsibilities and authorities.

The quality systems discussed in this QMP meet the quality objectives for the RI/FS components of the 68th Street Landfill Site project, and are consistent with Section VIII, Paragraph 27 of the ASAOC. In addition, this QMP meets the applicable requirements of the guidance document *EPA Requirements for Quality Management Plans* (EPA/240/B-01/002, March 2001; also referred to as *EPA QA/R-2*) and ANSI/ASQC E4-1994, *Specifications and*

Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs.

The approach and structure of this QMP is consistent with that specified in EPA QA/R-2, as outlined below:

- Section 1 – Introduction;
- Section 2 – Management and Organization;
- Section 3 – Quality System Components;
- Section 4 – Personnel Qualification and Training;
- Section 5 – Procurement of Items and Services;
- Section 6 – Documents and Records;
- Section 7 – Computer Hardware and Software;
- Section 8 – Planning;
- Section 9 – Implementation of Work Processes;
- Section 10 – Assessment and Response;
- Section 11 – Quality Improvement; and,
- Section 12 – References.

Throughout each section of the QMP, the foundation upon which ERM builds quality services and products, and implements quality management systems is reiterated. Specifically, the QMP documents the following goals, objectives and missions of ERM with respect to quality:

- The mission statement and policy of ERM with respect to quality performance;
- The specific roles, authorities, and responsibilities of management and staff, and the independent quality assurance network within the company and each project with respect to both quality assurance (QA) and quality control (QC) activities;

- The means by which effective communications between the personnel actually performing the work, and the quality assurance and control functions are assured;

- The processes used to plan, implement, and assess the work performed, the response mechanisms in place to adjust, modify or otherwise correct deficiencies identified in the assessment process;

- The process by which measures of effectiveness for QA and QC activities will be established and the frequency of effectiveness measurement; and,

- The commitment to continual improvement based on experience and "lessons learned" on on-going projects.

2.0 MANAGEMENT AND ORGANIZATION

The overall policy, scope, applicability, and management responsibilities for the ERM quality system are documented in this section.

2.1 MANAGEMENT APPROVAL

The approval of this QMP, applicable to the 68th Street Landfill Site project, is indicated on the signature page included herein. The ERM management and senior staff responsible for the project have personally indicated their commitment to quality and execution of the policies contained in this QMP by their signature.

2.2 QUALITY ASSURANCE POLICY

Quality is a culture that permeates the ERM organization, and the quality systems established firm wide establish guidelines and procedures for each operation as a vital link in the chain of project implementation. ERM consistently seeks to produce services of the highest quality and work products that exceed the basic requirements established by the industry standard of care, the project agreement with the client, and internal minimum standards. This requires each individual in the organization, regardless of position or contribution to a project, to understand their role and responsibilities, execute these in a professional manner, and consider independent evaluation of their performance a basic tenet of the project. Each member of the ERM team will provide quality communication and service on all projects, and will strive for continuous improvement. ERM management has made a commitment to institute and enhance a formal awareness, training, and measurement program to ensure quality at the individual, project and business unit levels throughout the organization.

ERM quality assurance/quality control (QA/QC) activities form the basis for the ERM quality system. The goals of the QA Policy are to ensure that environmental information collected by ERM and its subcontractors are of sufficient nature and quality for their intended use, and to ensure that ERM-led environmental remediation technologies are designed, constructed, and implemented in keeping with the remediation performance objectives established for the project.

For all of its projects, ERM assigns a Partner-in-Charge who has ultimate responsibility for the quality of project activities and deliverables. Where applicable, ERM designates additional QC personnel to provide independent, activity-focused QA/QC checks (e.g., construction quality assurance).

2.3 ORGANIZATION

From an internal operations standpoint, the ERM Group is organized as four operating regions around the globe - North America, Europe, Asia Pacific and Latin America. The North American component conducts activities and offers services through seven multidisciplinary environmental consulting operating companies. Each operating company offers regional services while having access to the resources of the entire ERM Group. ERM, Inc. is a legal entity that represents one of the seven North American operating companies and has primary responsibility for the development of business and the delivery of services in the mid-Atlantic and mid-West portions of North America. The ERM, Inc. organizational chart is presented on Figure 1. The 68th Street Landfill Site project is being conducted under the auspices of this entity, and represents a subset on this chart. The project-specific organizational chart is presented on Figure 2.

2.4 RESPONSIBILITIES

The designated ERM Partner-in-Charge has ultimate responsibility for all work products and services performed on a particular project. For the 68th Street Landfill Site project, ERM additionally has designated a group of QA Managers to provide independent QA/QC checks for project activities and deliverables. Multiple QA Managers are assigned to this project given its broad scope and multi-disciplinary nature, for which significantly different technical expertise may be required. Each QA Manager reports directly to the Partner-in-Charge, and at the same level as the Project Manager. Groups generating, compiling, and evaluating project data, and providing other services in a technical, administrative or support function, report directly to the Project Manager. Because the QA Managers do not report to the Project Manager, the QA Manager role is not influenced by the individual directing daily line activities. Furthermore, the QA Managers have direct access to the Partner-in-Charge, and thus can direct the project quality system and influence the project performance at the management level if required.

It is the Partner-in-Charge responsibility to ensure that all members of the project team are informed regarding the quality objectives of the project, and the quality procedures to be utilized. At the beginning of each project, the Partner-in-Charge, QA Manager and Project Manager chair a Project Kick-Off Meeting in which this quality discussion is executed, and the QA Manager role and authority is prescribed in detail.

2.5 PROJECT ACTIVITIES THAT REQUIRE QUALITY MANAGEMENT

Specific to this project, the tasks that require quality management include the following:

- Project planning and strategy development;
- Field activities, including measurements and sampling;
- Data collection, evaluation and reporting;
- Preparation of plans, reports, correspondence, and other documents or deliverables;
- Planning and market analyses, document preparation and communication;
- Engineering analyses, design and construction oversight;
- Coordination and community relations
- Health and safety maintenance;
- Subcontractor performance;
- Accounting procedures and invoicing;
- Administrative management, records management and control, and website management; and,
- Document and work product confidentiality and security.

2.6 COMMUNICATION OF QUALITY SYSTEM

At the onset of each major task, the objectives, schedule, budget, deliverables, health and safety, and quality issues are defined in one of two ways:

1. a project/task plan, or briefing, is prepared and disseminated among the personnel involved; and/or,

2. participation at a project/task kick-off meeting for which these items are conveyed.

Subsequent to the communication of these issues, the respective Task Leaders and Project Manager will implement the proper quality procedures and coordinate with the Partner-in-Charge and QA Managers, accordingly.

2.7 DISPUTE RESOLUTION

In the event that personnel do not concur regarding technical matters, QA/QC requirements and approaches, services and product requirements, arbitration will commence at the lowest level of management; i.e., Task Leader and Project Manager. The parties will attempt to resolve their differences through meetings and discussion, but in no case will the final resolution compromise the basic tenets of quality established by this QMP. If resolution is not reached, the Partner-in-Charge will become involved to facilitate the situation and resolve the matter in conjunction with the QA Managers.

3.0 QUALITY SYSTEM COMPONENTS

Documentation of the procedures and protocols utilized by ERM to manage its quality system, including responsibilities for implementing quality system components, is addressed in this section.

3.1 IDENTIFICATION OF QUALITY SYSTEM COMPONENTS

The major components of the ERM quality system include:

- Project planning;
- Management of change;
- Personnel training;
- Data management and data quality assessments; and,
- Quality documentation.

Project work plans are reviewed, approved, and fully supported by the Partner-in-Charge. The Partner-in-Charge and Project Manager orchestrate project planning and integrate QA/QC processes into project work plans. Management of change and personnel training are the responsibility of the Partner-in-Charge. Specifically, the Partner-in-Charge assigns resources to the project, manages the addition to or changes in project resources, and ensures that project resources are trained to perform their assigned roles in a manner compliant with project quality objectives.

The QA Managers have responsibility over their assigned technical expertise and areas of responsibility. As an example, the QA Manager responsible for data management and data quality assessments will assure that data storage, tabulation, and assessment activities are completed by staff resources, as are routine QC checks for calculations and data transfer operations. In general, the QA Managers will oversee QC checks and independently verify that appropriate QC measures have been undertaken. Furthermore, the QA Managers have overall responsibility for ensuring that QA/QC processes are documented for future use.

3.2 QUALITY SYSTEM TOOLS

The ERM tools for implementing the above-referenced quality system components include:

- This QMP;
- Project-specific Quality Assurance Project Plans;
- Project Kick-Off Meetings in which project QA and QC procedures are communicated to the staff;
- Project work plans; and,
- Quality training, including the communication of specific technical protocols.

4.0 PERSONNEL QUALIFICATION AND TRAINING

The procedures established to ensure that personnel performing work for the project have the requisite skills is documented in this section.

4.1 TRAINING POLICY

It is an ERM policy to provide both management and staff with training in administrative, managerial and technical skills to assure that they can effectively execute their project responsibilities. This training includes, at a minimum, technical training, health and safety training, and project management training. Training is conducted as a combination of external formal training at seminars, conferences and in classroom situations; internal formal (e.g., instructor or website based) and informal (e.g., "brownbag") training; and "on-the-job" training through project performance or auditing of other projects and apprenticeships with senior staff. In addition, ERM maintains a formal mentoring system for junior-level staff.

ERM technical personnel gain experience on a variety of projects directed by a variety of senior experienced staff and managers. To the extent practical, each member of the technical staff has been cross-trained in more than one area of expertise. This enhances their benefit to a variety of projects as well as their ability to respond on short notice when required to assist on demanding projects. Each professional employee is also provided the opportunity for continued training in areas such as, project management, ERM systems and controls, continuing college education in technical areas of expertise, and leadership.

4.2 TRAINING PROGRAM

ERM identifies and assigns certain skilled partners or senior staff as training directors to oversee and direct its training program. These training directors, with the assistance of support staff, maintain records of training for company staff, and coordinate routine training programs to ensure that the staff is trained in a timely fashion following the onset of employment.

New employees are trained through observation and assistance of senior employees performing related tasks, and will in turn be observed performing the same tasks. Formal instruction is also given by senior staff and managers to support on-the-job training. When knowledge deficiencies are discovered, training is provided to the staff member; if internal training is not suitable, external training presented by competent professionals is utilized.

For engineering projects, the Partner-in-Charge ensures that the projects are staffed with Registered Professional Engineer(s) with specific expertise in the engineering fields of interest. Similarly, for other specialized areas (e.g., wetland habitat creation), the Partner-in-Charge ensures that sufficient resources are assigned to the project or, if necessary, appropriate subcontractors are utilized to complete these specialized services.

Personnel qualifications and performance is reviewed under the ERM performance evaluation program. Performance evaluations are conducted, at a minimum, on an annual basis. These evaluations are instrumental in identifying particular areas where training may be necessary.

5.0 PROCUREMENT OF ITEMS AND SERVICES

The procedures for procurement of materials and services that can affect the overall quality of ERM project activities are documented in this section.

5.1 ROLES, RESPONSIBILITIES AND AUTHORITIES

The Project Manager oversees subcontract procurement and management of materials and project-related services. The selection of a particular vendor is determined by comparing each response, item by item, to the scope of services and to the activity-specific evaluation criteria issued with the procurement for products or services. Any deliverable that does not meet the specification outlined in the scope of services is deemed unacceptable, rejected immediately, and returned with the appropriate documentation for corrective action and re-submittal until the deliverable meets the requirements as outlined in the scope of services. If the final deliverable does not meet the required specifications as outlined in the respective scope of services, documentation detailing the rationale for non-compliance is forwarded to the Project Manager. The vendor thereafter receives notification from the Project Manager or QA Manager that they have failed to deliver the agreed-upon goods and services, and the appropriate contractual actions are initiated.

Technical reviews of the quality of services are conducted on a routine and continuous basis. These reviews draw upon the technical expertise of the Project Manager and the QA Managers to assess the completeness, accuracy, timeliness and overall quality of services being provided. The review will be conducted by the QA Manager who has the expertise to critically examine the work that is being performed. As an example, the QA Manager for data management will assure that the data evaluated includes documents, activities, and laboratory data, and will perform quality assurance reviews to verify that the analytical laboratory QC Manager has completed a review to validate the data for correctness, adequacy, completeness, and assurance that the data quality objectives (DQOs) have been met.

A comprehensive procurement record/file will be maintained on each project-related procurement action. Scope of services responses and selected vendors are maintained in the project file. Any changes to procurement documents

through addenda or change orders undergo a review by the appropriate QA Manager to ensure adherence to project objectives and this QMP. Decisions for modification of the procurement documents will be made by the Project Manager in concert with the Coalition. If modifications are not required, the original procurement process will be repeated for products and services.

The project work plan will require that any contractor conducting technical activities have a QA/QC plan in place and the description of such plan must be included in the corresponding project-specific Quality Assurance Project Plan (QAPP). If such a requirement is not addressed by a bidding contractor, that contractor will not be selected. Specific quality validation procedures must be included in the subcontractor QAPP that will assure conformance with the guidelines and methodologies presented in this QMP.

The examination of deliverables for acceptability is the responsibility of the Partner-in-Charge, as delegated to the specific QA Managers. Deliverables are examined when received on a continuous basis by appropriate project team members and issued only after a consensus is reached on the final product, which must meet all of the project quality objectives.

5.2 METHODS FOR QUALIFYING SUBCONTRACTORS

ERM maintains a stringent contractor pre-qualification and evaluation program that applies to all vendors as well as competitive bidding situations where ERM is providing bid solicitation services on behalf of clients. ERM typically initiates the process by developing a preliminary list of potential subcontractors and performing a subcontractor needs assessment. After the needs assessment is performed and the scope of services and requirements of the need are defined, each pre-qualified subcontractor is assigned one of three different status categories:

- Approved without conditions; acceptable for use; and requires no further evaluation;
- Approved with conditions; special conditions must be met in order to be used; and,
- Not recommended for use by ERM; use and conditions must be approved by the Project Manager, QA Managers, and Partner-in-Charge.

If a contractor has not been evaluated, they must execute the form provided in Attachment A.

ERM then submits a pre-qualification package to evaluate the candidate subcontractor technical strength, financial stability and performance, health and safety performance and experience, Workers Compensation Experience Modification Rate (EMR), and experience performing similar services at other sites. Once a subcontract is let, ERM reviews the subcontractor health and safety performance indicators and insurance coverage annually.

6.0 DOCUMENTS AND RECORDS

The procedures for maintaining controls for quality-related documents and records are documented in this section. Maintaining the proper document support serves is a valuable information source during and after the project, and can prove critical in the event of litigation.

6.1 DOCUMENT REVIEW

It is the ERM policy that all major project deliverables generated throughout the course of the project must be peer reviewed by independent third parties. It is the role of the Project Manager to assure that such peer reviews are conducted for each project. For the 68th Street Landfill Site project, QA Managers will perform peer reviews, to whom each deliverable will be directed as appropriate based on the subject matter. All documents and records must accurately reflect that the QA process has been implemented for completed work.

The ERM Management System includes three levels of QA review which are tracked and measured to ensure compliance with the system:

- Senior Level Review. Regardless of the experience or skill of a Project Manager, all significant project deliverables must be reviewed and approved by the Partner-in-Charge and evidence of such a review demonstrated in the project file. The Partner-in-Charge will perform the function of QA Manager for the project, or assign this function to a technical specialist in the area of expertise required;

- Internal ERM Audit. Project teams are audited internally by ERM Quality Assurance Managers to ensure adherence to firm wide requirements. Audit findings are recorded and corrective actions, if warranted, are identified and implemented. Thereafter, the QA Managers re-audit files to ensure that the Project Manager implemented the appropriate corrective action to address any deficiencies or non-compliance issues. The results of these audits become data points during annual personnel performance reviews;

- External Independent Audit. An independent registration body conducts random audits of project files every six months. It is this external accountability aspect that ensures that the ERM quality assurance program remains active and dynamic. Project confidentiality is maintained during both internal and external audits.

In addition, specific to the 68th Street Landfill Site project, a QA/QC program has been established that not only conforms to the ERM Management System described above, but also contains three subordinate elements within the Senior Level Reviews:

- Activity or Deliverable Review. Utilize senior staff to evaluate technical soundness and execution, compliance with regulatory requirements, and overall presentation;

- "Red-team" Review. Performed by senior staff and strategic resources at particular stages of the project to identify obstacles, conflicts, and issues associated with the "big picture", including redevelopment, community interests, real estate market drivers, planning and permitting authorities, financial incentives, infrastructure, and environmental interests; and,

- Project Reviews. Performed at particular milestones to evaluate technical performance, cost effectiveness, reliability, and risk management.

6.2 DOCUMENT PREPARATION AND CONTROL

The ERM approach to developing reports is to convene a Project Kick-Off Meeting at the outset to discuss objectives, report/closure goals, assign tasks, and communicate schedules and task budgets. The Project Manager, or Task Leaders then work closely with the staff for a short period of time to prepare a report outline, define tabulation structure and prepare draft drawings. The bulk of the draft deliverable is then prepared by the staff using the Task Leaders and Project Manager on an as needed basis to steer the report development in accordance with the goals of the project.

Depending on the nature and complexity of the reports, periodic team meetings or "brainstorming" sessions may be held during preparation to discuss key elements and reach a consensus on important issues. After an initial draft is completed, the Project Manager reviews the document for completeness, accuracy and appropriateness. Review comments are then

discussed with the staff so that methodologies are communicated and the basis for the revisions is fully understood. In the case of a complex report, more than one preparation and review cycle may be necessary before the deliverable is ready for final review by the Partner-in-Charge and/or QA Managers. Production of the final deliverable is coordinated between the technical staff that works closely with support staff to ensure the deliverable is accurately reproduced by the deadline. After reproduction of the deliverable is complete, the original documents are compared page by page (or drawing copy) with every copy that has been produced to ensure that pagination is correct and no pages or inserts are missing or duplicated.

The support staff then prepares shipping packages once all copies are proofed. Shipping packages are not sealed until the Partner-in-Charge or QA Manager has checked that the shipping package has the appropriate documents included, the correct number of copies and is addressed to the correct receiving party.

6.3 RETENTION

It is anticipated that a significant amount of documentation will be required in executing the 68th Street Landfill Site project. ERM will prepare and maintain formal project documentation in compliance with the ASAOC and contractual requirements, including the documentation of work performed and feedback on the quality processes employed to ensure quality in the delivered work products. For this project, ERM will maintain relevant project documentation for a minimum period of seven years following project completion. Hard copy documentation is maintained in off-site, secure storage facility; electronic documentation is maintained in project electronic storage files.

6.4 DATA MANAGEMENT

ERM has well-established procedures for data management and dissemination. Office data is managed primarily in electronic format using a network platform. All network users typically share information with team members through e-mail and document database links that allow access to both documents and data. The following standard software packages are available for use by ERM personnel on this project:

Full Microsoft Office software package, including Word, Excel, Access, PowerPoint, and Project;

- AutoCad;
- Autodesk Land Development Desk Top Release 2;
- ArcView, and Map Info GIS capabilities;
- Lotus Notes; and.
- Microsoft SharePoint.

Additionally, personnel associated with this project have Internet access to the project website; USEPA, Maryland Department of the Environment (MDE) and other regulatory agency websites and downloadable regulations; and the data and research available in the public domain.

ERM routinely uses a variety of commercially available data management software packages to manage environmental project requirements. The database and data handling protocol require data quality issues to be detected early in a project. To achieve this goal, ERM maintains database formats on file with several major analytical laboratory firms that allow quick input and evaluation. ERM has developed quality and quantity filters that are run at the time of electronic data deliverable (EDD) receipt. Additionally, individual databases can be established for various forms of project data, including documents and deliverables. ERM will utilize these inspection forms for certification reports where applicable to accelerate the reporting process. The Lotus Notes platform was developed with this methodology in mind.

The goal of the ERM approach to data management is to create a secure environment, maximize data functionality, and achieve ready access for all members of the project team. The format of any information shared with the project team members will be flexible and can be formatted to fit most any software. The database protocols include security functions that minimize the potential for loss due to accidents and mechanical failures. All database information is backed up nightly as part of the firm wide data security plan implementation. Copies of files are also stored in a secure location off site to facilitate system recovery, should it ever be necessary.

6.5 FIELD DATA MANAGEMENT

When field activities are initiated, all field activities, decisions, dimensions, site personnel, and any information pertinent to the fieldwork are documented in field log books. The information is recorded in a manner

that allows an uninformed party to reconstruct the activities in the absence of the person who logged the activities. The Project Manager or Task Leader reviews the field logs on a daily basis to ensure that the field tasks are executed according to the approved work plans and to modify procedures, if warranted, on a continuing basis.

Analytical data is typically transmitted via electronic formats that have been previously established with the subcontracted laboratories. When data are tabulated, an independent peer review is conducted to ensure that the data were entered correctly from hard copies, the comparison criteria (e.g., detection limits, MCLs, etc.) were entered at the correct value for the proper constituent, and exceedances are correctly identified.

6.6 CHAIN-OF-CUSTODY

Chain-of-custody documentation for environmental test samples is performed in accordance with mandated procedures provided by the USEPA, and other agencies regulating the shipment and transportation of samples. All details regarding chain-of-custody and chain-of-custody forms are provided in the project work plans or QAPP. Chain-of-Custody Forms are obtained from the USEPA or from the laboratory performing the sample analysis. It is the role of the Project Manager or Task Leader to review all chain-of-custody documentation to identify omissions and/or errors prior to receipt of the samples at the laboratory. When analytical reports are received from the laboratories, the data are immediately reviewed for completeness.

7.0 COMPUTER HARDWARE AND SOFTWARE

The procedures employed to ensure that computer hardware and software are sufficient to satisfy project objectives is documented in this section. During the course of the 68th Street Landfill Site project, ERM will use software for data management (e.g., database, GIS, or spreadsheet software), drawing production (e.g., computer-aided drafting software), and design simulation software (e.g., leachate models). As part of its quality system, ERM utilizes standard, industry-accepted software for these functions. Management and update of office production software (e.g., databases, spreadsheets) is the responsibility of the ERM information technology (IT) support staff. Management and update of specialized software (e.g., GIS, design simulation software) is the responsibility of the specialized professionals utilizing this software.

With respect to hardware, ERM supplies its employees with functional, up-to-date hardware. Computer hardware is typically replaced/updated on 3-year cycles to ensure functionality. This hardware is supported by the ERM IT support group.

7.1 PURPOSE

In order to ensure the efficient and reliable interchange of information between ERM and the client, computer software and hardware must be standardized and use industry compatible applications. Further, for internal use, it must be selected, installed, evaluated, and maintained by the ERM Information Technology (IT) department. The IT department has standardized on Dell Computer hardware. Each approved computer has been thoroughly tested with the ERM approved software. By testing the software and hardware together, the IT department can ensure the compatibility of the entire system; more specifically:

- The safety of data by requiring up-to-date virus software and scan;
- Rework reduction since each new application can build upon what has already been tested;
- Reduction in the requirements to validate new software on a system; and,

- Reduction of the time and cost training since each application has the same approved software.

By using approved software and hardware ERM can ensure that our client focus is maintained. Other hardware and software will be used if requested by a client or otherwise required by a specific project after being tested by the ERM IT department.

7.2 ROLES, RESPONSIBILITIES AND AUTHORITIES

It is the role of the ERM IT department to maintain a standard for the ERM computer network. The IT department develops, installs, tests, maintains, controls, and documents computer software and hardware used in environmental and engineering programs to ensure that they meet the technical and quality requirements and directives from management. All computer software and hardware purchases are routed through the IT department in order to ensure they meet user requirements.

Commercial software such as word processing, spreadsheet applications, presentation packages, and e-mail applied to projects must be either within the company list of supported software or meet a client's specific request. In the case of unsupported software at the request of a client, ERM will obtain a copy of the software to test with the existing hardware and software currently utilized on the ERM approved list. Once the testing is complete, the IT department will purchase and load the software as needed to complete the project. Specialized software used for other purposes such as numerical and environmental modeling, design, geospatial information systems, or data visualization/analysis, will be used in accordance with the developers guidance.

7.3 INFORMATION PROTECTION

All computers on the ERM network are required to be operating with adequate virus protection provided by the IT department. Regular scans and updates are performed automatically by the central anti-virus servers to maintain all ERM computers virus-free. All offices are protected by a company firewall. In addition, each notebook computer has a personal firewall installed to protect them when they are used outside of the office network.

8.0 PLANNING

The procedures for planning individual data collection operations to ensure that the data collected are of sufficient quality for their intended use is documented in this section.

8.1 PLANNING PROCESS

For data collection efforts, the ERM process adheres to the Data Quality Objective (DQO) approach utilized by the USEPA. DQOs are based on the concept that different data uses may require different data quality. The five categories of data quality include:

- DQO Level 1 - provides the lowest data quality but the most rapid results, and is used for purposes of site health and safety monitoring and initial site characterization of screening to define areas for further study.

- DQO Level 2 - provides rapid results but higher quality data. The analyses include some field generated data.

- DQO Level 3 - provides an intermediate level of data quality and may be used for site characterization, risk assessment, and engineering design development. Engineering analyses may include on-site laboratory generated data and standard commercial laboratory analyses without full Contract Laboratory Program (CLP) documentation.

- DQO Level 4 - provides the highest level of data quality for routine analyses and is used for purposes of risk assessment and engineering design. For analytical data, confirmation analyses at this level may require full CLP analytical procedures and documentation.

- DQO Level 5 - similar to DQO Level 4 except that certain analyses require the modification of existing analytical methods or the development of new methods.

The *Region 3 superfund Data Validation Policy,* dated August 16, 1995 advocates full data validation procedures to support Baseline Risk Assessments. However, the primary goal is to assure that data quality is adequate for the intended data use. The policy specifically states that: "For

uses of data other than quantitative baseline risk assessment, the degree or intensity of data validation may vary based upon the intended use of the data." Region III's "Innovative Approaches to Data Validation: Supports this concept." (USEPA, 1995). Therefore, during subsequent scoping of the requirements for data collection, the appropriate levels of data validation will be determined for the categories of data required to fulfill the identified data gaps and to establish limits fo rthe use of existing data.

The Project Manager is responsible for ensuring that data collection efforts are compliant with the Parcel-Specific Sampling and Analysis Plans which will outline environmental data collection activities and the associated data validation requirements which support the intended use of the data. In addition, a Quality Assurance Project Plan (QAPP) will be prepared as part of the Site-Wide Work Plan to detail the data quality requirements for the Site. The Project Manager will discuss the DQOs with the Task Leader and staff, and assure comprehension by the field personnel of the DQO measurement standards. Project personnel will document data collection activities in field logbooks, and/or on data collection checklists. These logbooks and checklists are reviewed by the Project Manager or Task Leader upon the completion of collection efforts to ensure that DQO adherence parameter values are acceptable.

8.2 ROLES, RESPONSIBILITIES AND AUTHORITIES

Planning is essential in order to conduct an efficient and organized project. The Project Manager responsibilities in this regard include:

- Determining detail, size, scope, and schedule of the project within the limits of the contract document;
- Determining the manpower requirements, including: managers, scientists, engineers, administrative support, technicians, and draftspersons;
- Expanding the general scope of services into a detailed plan of action that describes the objectives, tasks, budgets, schedule, and deliverables for each task;
- Maintaining liaison with the QA Managers and determining the QA and QC procedures to be implemented on the project; and,
- Correcting any deficiencies or inaccuracies throughout the term of the project, if detected.

The QA staff, which includes the Partner-in-Charge, QA Managers, and other staff supporting QA activities, is responsible for providing guidance and technical support for planning field activities, data collection, and evaluation.

8.4 PROJECT TEAMS

ERM uses a matrix-management approach for the assembly of project teams. Matrix management allows for the creation of a balanced, multi-disciplinary professional team representing areas of diverse expertise, such as an engineer, geologist, and chemist, which can directly meet the technical needs of the project. By design, matrix-management allows ERM to both provide company memory continuity while also allowing the introduction of new talent and expertise, as needed, in an efficient and effective matter. Matrix management ensures that the most appropriate Project Manager, based on expertise, is selected for a given project, but also ensures that the Project Manager is supported by an appropriately skilled, multi-discipline team. Multi-disciplined teams are critical to ensuring that solutions reflect a balanced and objective approach between engineering, earth sciences and life sciences, and are not biased or pre-disposed toward a particular discipline or outcome.

8.5 QUALITY ASSURANCE

Quality assurance is a key component of the ERM Management System. The ERM Management System contains the following in-process QA steps to ensure high quality deliverables:

- Periodic and systematic review of all significant input data such as laboratory reports, field notes, site information, background data, and subcontractor submittals;
- Routine review of project budgets;
- Documented team briefings detailing scope, schedule, and budget; and
- Partner-in-Charge/QA Manager review of all significant deliverables to the client.

8.6 QUALITY ASSURANCE PROJECT PLANS (QAPP)

Prior to data collection efforts, a Quality Assurance Project Plan (QAPP) will be completed to document the following:

- Objectives of the data collection effort;
- Intended use of the data to be collected;
- Plan (scope and schedule) for data collection activities;
- Procedures (field and laboratory) to be utilized;
- DQOs;
- Performance criteria to be measured for data collection efforts; and,
- QC samples to be collected, if any, to assess quality performance criteria.

A QAPP establishes procedures to ensure the integrity of all samples and measurements and the validity of all analytical data generated during the RI process. The QAPP is based on the USEPA most recent guidance, *USEPA Requirements for Quality Assurance Project Plans (QA/R-5, March 2001),* which addresses four major quality assurance/quality control elements, as follows:

- Project management;
- Measurement/data acquisition;
- Assessment/oversight; and,
- Data validation and usability.

Based on the four elements described above, a QAPP defines the general approach to program and data quality management in as much detail as is applicable to the diverse activities to be completed at a site. The QAPP will:

- provide project background information and describe project management, including data quality objectives and documentation requirements;
- describe the overall requirements for data measurement and acquisition with respect to sampling, laboratory analytical methods

(including instrumentation maintenance and calibration) and quality control requirements. This includes analytical detection limits, sample preservation requirements, specification of sample containers, and analytical holding times.

- prescribe the DQOs: quantitative and qualitative project-specific requirements that specify the quality of the environmental data required to support the decision-making process. This includes a discussion of precision, accuracy, representativeness, completeness, and comparability of the RI analytical data set;

- address assessment and oversight with respect to verifying conformance and rectifying non-conformance; and,

- describe the data validation and usability requirements. The QAPP details the data validation procedures to be employed to ensure data usability. The data validation is performed by ERM in accordance with USEPA protocols. Any suspect data is flagged accordingly, and is considered during the data evaluation process.

9.0 IMPLEMENTATION OF WORK PROCESSES

The procedures to establish work processes that will be implemented to ensure that data are of sufficient quality for their intended use is documented in this section.

9.1 WORK PROCESS PROCEDURES

The Partner-in-Charge works jointly with the Project Manager to identify those data collection activities that require modified or new procedures to be established. Once these procedures are identified, the QA Managers review the project scope and provide independent input regarding the procedures required. The Partner-in-Charge is responsible for attending internal kick-off meetings and other significant progress meetings where they independently determine whether the client needs are being met and that proper work process procedures are being applied.

On a day-to-day basis, it is the responsibility of the Project Manager and Task Leader to ensure that data collection activities are conducted in accordance with approved project procedures. Typically, these procedures are described in project work plans such as the QAPP, Sampling and Analysis Plans (SAP), Health and Safety Plans, etc. Where applicable, these plans will incorporate appropriate technical guidance documents and/or published methods. The Project Manager is also responsible for ensuring that work processes are performed in accordance with all project work plans, and that appropriate calculations, drawings/revisions and reviews are accommodated in the project schedules and budgets.

Work plans are designated as project control documents. These documents are dated and signed, and revisions to the documents will be made only upon approval from the Partner-in-Charge and QA Managers. Prior to mobilizing for data collection efforts, the Project Manager will verify that the most up-to-date version of the work plan is being utilized. Furthermore, the Project Manager will be responsible for collecting outdated versions of work plans and removing them from project team access.

9.2 MANAGEMENT OF PROJECT ACTIVITIES

The ERM approach to management of schedules, budgets, and scopes of work is to establish these items at the outset of the project for client review

and approval. From that time forward, ERM controls changes in the work by identifying changes in the project scope in a timely manner. ERM consistently strives to:

- Clearly state the understanding of the project goals;
- Carefully identify the tasks necessary to achieve the goals;
- State the assumptions upon which the scope of services has been developed; and ,
- Project the level of effort required to perform the tasks required to achieve the stated goals.

Changes in the scope of services are controlled using simple, yet effective project management techniques. Each team member is provided the budget and scope of services that clearly defines the level of effort required and the resources allocated to complete their assignment. The Project Manager and Task Leaders maintain close day-to-day interaction with the project team members to assure adherence to the agreed scope of services, budget, and schedule, and to offer guidance. Team members are equally responsible for providing routine status updates on their progress. It is routinely observed that projects that are behind schedule are inevitably over budget. Therefore, if a task begins to fall behind schedule, the project manager will immediately take corrective steps. In this manner, each Task Leader and project team member shares the responsibility to identify changes from project assumptions so that a change in scope, approach, schedule and/or budget can be addressed with the client at the earliest opportunity in a project assignment.

Should a change or delay arise, the Project Manager will meet with the Partner-in-Charge to review the impact of the change or delay on the overall execution of the project. In assessing the cost and impact of changes or delays, the Project Manager will consider, among other things:

- Ways to reduce or eliminate the impact on project costs and schedule;
- The effect of the change or delay on related tasks which have been completed or which are planned to follow;
- Options that exist for reducing scope or approach to maintain the budget or for changing the cost or schedule;

- Impacts on the project overall plan or design concept;
- Availability and skills of personnel necessary to execute the change;
- Deadlines imposed by regulatory requirements or enforcement orders;
- The need for additional information or guidance from the client, investigations, or other sources; and,
- A commitment of resources necessary to execute the change.

ERM personnel report to an administrative supervisor (i.e., functional Group Leader) who is responsible for assuring that each staff member's time is properly allocated, that no conflicts exist in the work schedule, and that the employee is being trained and utilized to the greatest extent possible. Where conflicts exist, the Partner-in-Charge will resolve the conflict with the aid of the QA Managers, if necessary. Using this approach, ERM allocated resources between projects such that technical personnel are fully committed to project work. At the same time, however, ERM eliminates scheduling inefficiencies and the over-commitment of individual personnel, allowing the routine and successful execution of multiple and complex projects.

10.0 ASSESSMENT AND RESPONSE

The procedures to assess the suitability and effectiveness of the ERM Management System and specifically the quality system are documented in this section.

10. 1 QUALITY STSTEM REVIEWS

ERM routinely reviews its quality system components to ensure that they remain appropriate and effective for their intended purpose. Reviews are typically conducted at the onset of each new project, in conjunction with the work plan development process. For projects extending over a period of one year, quality systems are reviewed at least annually to ensure that system components do not require adjustment to account for changes in project operations. Notably, the annual review process sets a minimum standard for reassessing the quality system components. As conditions change, ERM may reassess and revise the quality system components on an as-needed basis. Both the Project Manager and the Task Leaders have the authority to suspend operations that deviate from the QMP, QAPP, and work plan procedures when erroneous or compromised data or work products may be generated.

Quality system reviews are conducted by the Partner-in-Charge and/or QA Managers. The QA Manager documents findings in an assessment report. To ensure that the QA Manager is qualified to conduct the assessment, the Partner-in-Charge assigns the QA Manager role to an individual with extensive experience in the practice areas included in the project scope of services. As described previously, the QA Manager reports directly to the Partner-in-Charge, and is not responsible for the work to be completed in the project.

In order to ensure that the project QA system is being implemented and is adequate, the QA Manager conducts managerial reviews and audits as necessary. The adequacy of the project QA program and the degree of implementation is assessed through the application of the following tools:

- Project team member performance evaluations;
- Contractor performance evaluations;
- Data quality assessments; and,
- Corrective action response documentation reviews.

These reviews and audits are conducted as necessary to verify that the QMP and the QAPP(s) are being implemented, to detect and define problems so that immediate corrective action can be initiated, and assure that performance meets the client standards, needs and objectives.

Peer review of activities associated with the QAPP and project completion reports will be undertaken by project team members and other ERM staff involved with the 68th Street Landfill Site project. This process consists of reviewing the decisions and/or practices made by a single individual by others involved with the project to ensure that the QA objectives are being met. Additionally, the Coalition or the USEPA may conduct reviews or audits of the project to ensure that project objectives are met. These reviews would ensure that acceptable QA/QC activities and requirements are being implemented, that proper QA protocols were considered at the project inception, and that the project will produce quality work products and services. These reviews and audits would be scheduled and conducted with the Project Manager and the Task Leader whose task is to be reviewed.

Preliminary findings will be discussed with the Project Manager and Task Leader whose task was reviewed. A written report will be prepared by the personnel that conduct the review or audit, will be submitted to the QA Manager, the Partner-In-Charge and the Project Manager within 45 days unless a different time frame is agreed upon in advance. Any corrective actions demonstrated as necessary would be included in the report. The Task Leader must respond to the report and address any corrective actions within 45 days of receiving the report. If the review or audit findings indicate corrections are required, the QA Manager will also revise work processes and procedures as needed after consulting with the Partner-In-Charge, Project Manager and the Task Leaders as to appropriate corrective actions.

Any corrective actions recommended, and related follow-up, would be included in the quarterly USEPA report on the project. If the QMP requires major revisions as a result of significant recommended corrective actions, the QMP would be revised in a timely manner as specified by EPA QA/R-2 ; the revised version would be resubmitted to the USEPA for review and approval.

Following completion of a quality system review, the ERM Partner-in-Charge reviews the results and works with the QA Manager to implement necessary changes to quality system components. Upon completion of the post-review revisions, the Partner-in-Charge works with the Project Manager to communicate and implement these revisions.

11.0 QUALITY IMPROVEMENT

The process by which ERM effects improvement to its quality systems is documented in this section.

The ERM Partner-in-Charge is responsible for ensuring that conditions adverse to quality are identified as soon as reasonably practicable, and that these conditions are mitigated in a timely fashion. Furthermore, it is the Partner-in-Charge responsibility to ensure that the mitigation steps identified are monitored to completion, and are periodically reviewed to ensure that their implementation is being sustained.

ERM endeavors to provide and maintain environmental consulting and engineering services of the highest quality and, to that end, encourages its employees to communicate any and all ideas related to quality system concerns or improvements. ERM management maintains an open-door policy, thus facilitating open communications between staff and management.

11.1 QUALITY IMPROVEMENT PROCESS

Client goals and expectations are met through consistent application of the ERM Management System, which contains project management requirements that cover the three stages of client service delivery, including:

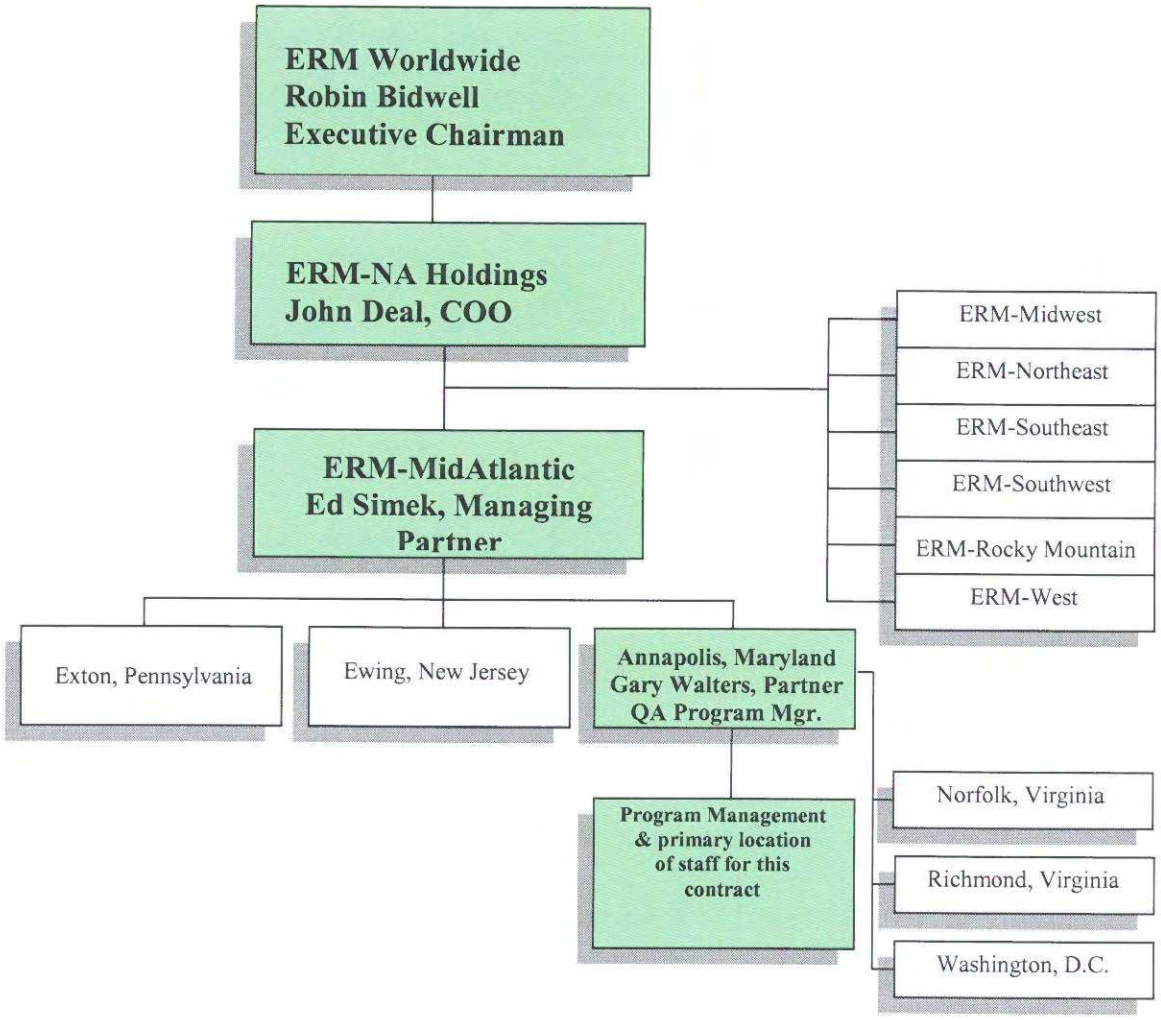
- Defining and understanding client needs and expectations at the project conceptualization stage;
- Managing the project agreed-upon scope of services, schedule and budget, including any mutually agreed scope changes; and,
- Measuring, at milestones, periodically and at completion, the performance level achieved and modifications appropriate to improvement.

The ERM Management System is implemented by experienced Project Managers trained in the company quality system in concert with peer review by the project Partner-in-Charge and QA Manager at appropriate milestones in the project. The result is a set of consistent project management behaviors designed to:

- Articulate and confirm the ERM understanding of client needs;
- Develop the scope of services, schedule, and budget elements, including the use of qualified vendors;
- Identify and address the nature and extent of any QA deficiencies, and immediately implement appropriate corrective actions, along with the proper documentation;
- Involve senior technical resources to provide QA and QC functions on the project to ensure that the optimal approach, project team and value to the client are being provided throughout the course of the project and prior to submittal of the project deliverable;
- Document that the ERM team, including subcontractors, has been trained and instructed on their individual responsibilities within the project;
- Provide routine project status reports summarizing progress in relation to the scope of services, schedule and budget; and,
- Consider quality as a critical element of a successful project.

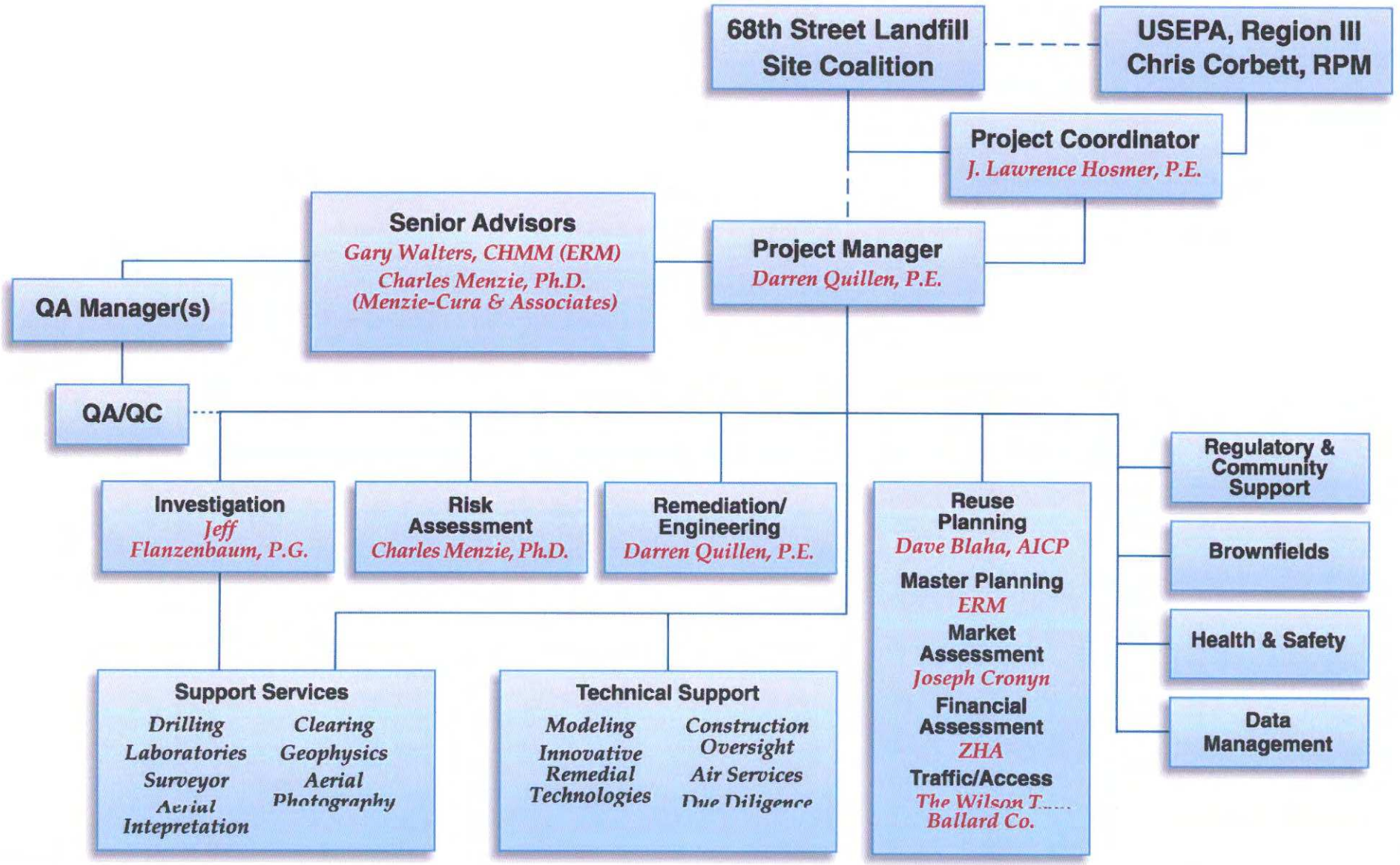
Figures

Figure 1
ERM's Corporate QA/QC Hierarchy



Note: Shaded boxes indicate hierarchical responsibilities for implementing ERM's Corporate QA/QC Program

Figure 2
Project Organizational Chart



Attachment A
Contractor/Supplier Questionnaire

Environmental Resources Management

Contractor/Supplier Questionnaire

ERM expects that contractors and subcontractors will be prepared, through training and experience, to conduct their work safely. A contractor's health and safety programs are one selection criteria for continuing a positive relationship with ERM.

Please answer the following questions completely, provide the requested information, and return to:

Leah Seace, CSP
Environmental Resources Management
350 Eagleview Blvd, Suite 200
Exton, PA 19341

If you have any questions or comments, please call your ERM project contact person.

Legal Name of Company:			
Street Address:		Mailing Address:	
Name and Phone # of safety contact:			
Fax Number:		Email Address:	
Type of Services Provided:			
SIC Code:			
Injury Illness Stats	2003	2004	2005
Number of Fatalities			
OSHA Incident Rate (a)			
OSHA Lost Workday Incident Rate (b)			
Workers Compensation Experience Modifier Rate (EMR) (c)			
Employee Hours Worked			
Name of ERM Contact Peron:			
Date Form Competed:			

1. *Attach OSHA Injury/Illness Logs for the last three years*, if not required to submit OSHA logs, please provide certification with specific injury/illness record for each of the last three years on company letterhead signed by a company official. (Personal information may be covered or deleted from the copies submitted)

2. *Attach a Certificate of Insurance* indicating insurance coverages, including Workman's Compensation Insurance.

3. Is a written contingency plan dealing with business interruption issues available? Yes ☐ No ☐

4. Does the company have a written Safety and Health Plan or Program? If yes, please provide the table of contents. Yes ☐ No ☐

5. Is employee training provided for the following topics?

Respiratory Protection	Yes ☐	No ☐	Hazard Communication	Yes ☐	No ☐
40-hr HAZWOPER	Yes ☐	No ☐	Hazard Recognition/Hazard Assessment	Yes ☐	No ☐
Lockout/Tagout	Yes ☐	No ☐	Hearing Conservation	Yes ☐	No ☐
Heat Stress	Yes ☐	No ☐	Personal Protective Equipment	Yes ☐	No ☐
Electrical Safety	Yes ☐	No ☐	Fork Lift/ Powered Industrial Trucks	Yes ☐	No ☐

6. Is the training documented? Yes ☐ No ☐ How would a copy of the training records be obtained?

7. Is an employee "craft" training program in place? If yes, please describe.

Yes ☐ No ☐

8. Does the company have a written Emergency Action Plan? Yes ☐ No ☐

9. Does the company have a written Drug and Alcohol Policy? Yes ☐ No ☐

10. Has your company experienced any OSHA violations in the last three years? If so what were the issues and how were they resolved?

11. How do you assure that any subcontractors you hire have good safety performance and are prepared to work safely on your projects?

a. OSHA Incident Rate as calculated using the formula: # of OSHA recordable multiplied by 200,000 then divided by the total man-hours worked that year.

b. OSHA Lost Workday Incident Rate as calculated using the formula: # of OSHA incident resulting in lost or restricted workdays multiplied by 200,000 then divided by the total man-hours worked that year.

c. Experience Modification Rates are assigned by the company's insurance carrier and is a comparison of the company to other insured companies conducting similar activities.

Appendix B
Key Personnel
Curriculum Vitae

J. Lawrence Hosmer, P.E.

Mr. Hosmer is a Senior Consultant with 35 years experience in waste management, environmental and civil projects, primarily focused on site remediation and solid/hazardous waste management under the CERCLA, RCRA and various state regulatory programs, and geotechnical engineering in support of a vast array of remedial and civil works projects. He has performed over 250 land disposal projects, over 60 CERCLA RI/FS's and RD/RA's, and more than 20 RCRA Part B and RFI/CMS projects throughout the United States and overseas. His technical capabilities include study, design and construction control phase activities for public and private clients, including federal, state and local government, industry, private developers and law firms.

Mr. Hosmer is a recognized expert in the investigation and remediation of past land disposal facilities; the site selection, study, design and implementation of new land disposal and other waste management facilities; and the negotiation of environmental permits at all levels of government. Mr. Hosmer has also conducted waste management planning and economic studies, waste-to-energy and landfill-gas reuse feasibility studies, and the full range of planning and engineering for solid/hazardous/industrial waste and wastewater sludge management. Beneficial re-use of waste materials, and the by-products of municipal waste decomposition, have become a significant component.

Mr. Hosmer has provided expert testimony and litigation support services on approximately 35 cases, primarily related to regulatory issues, engineering design practice, construction techniques, performance prediction and cost estimation for waste management facilities.

Registration

- Professional Engineer in the States of Connecticut, Delaware, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, Washington, Wisconsin, and the District of Columbia

Fields of Competence

- Master Planning/Siting
- Alternatives/Feasibility Studies
- Conceptual and Final Design
  - Land Disposal Facilities
  - Closure and Remediation
  - Containment Systems
  - Geotechnical Engineering
- Construction Management
- Program Management

Credentials

- Masters of Civil/Geotechnical Engineering, University of Illinois, 1972
- Bachelors of Civil/Geotechnical Engineering, Lehigh University, 1970

Professional Affiliations

- American Society of Civil Engineers
- Construction Specifications Institute
- Solid Waste Association of North America
- Water Environment Federation

Publications

- Hosmer, J.L. "Sanitary Landfill Site Selection, Evaluation and Design." A Continuing Education Course offered by the American Public Works Association.
- Hosmer, J.L. "Sanitary Landfill Closure and Re-Design: A Case History," Governmental Refuse Collection and Disposal Association, 1982.
- Hosmer, J.L. "Design Considerations for Solid Waste Disposal Systems," Virginia Department of Health, Division of Solid and Hazardous Waste Management.
- Hosmer, J.L. "Advances in Sanitary Landfill Design and Technologies," Governmental Refuse Collection and Disposal Association, 1983.
- Hosmer, J.L. "Ground-Water Protection at Landfill Sites: Leachate Management System Design Consideration," Governmental Refuse Collection and Disposal Association, 1985.
- Hosmer, J.L. "The Role of the Consulting Engineer in Hazardous and Industrial Management for Municipal Government," Maryland Hazardous Waste Facilities Siting Board, 1985.
- Hosmer, J.L. "Landfill Gas Management: Landfill Gas Control Considerations," Governmental Refuse Collection and Disposal Association, 1986.
- Hosmer, J.L., L.M. Piper. "Minimization of Environmental Problems: Best Management Practices," Long Island Business Forum, 1989.
- Hosmer, J.L., J.D. Mayfield. "Evaluation of Containment Technologies as a Method for Site Remediation," Institute of Gas Technology, 1990.
- Quillen, D.S., J.M. Dant, and J.L Hosmer, P.E. "Performance-Based Landfill Liner System Design," First Annual Landfill Symposium, Solid Waste Association of North America, 1996.

Key Projects

Solid and Hazardous Waste Management

Mr. Hosmer has been involved in the siting, design, permitting, operation, closure and remediation of municipal solid waste, construction and demolition waste, hazardous waste, industrial (mining, processing and residuals) waste facilities throughout his career. These projects include both "greenfields" and "Brownfields" sites.

Mr. Hosmer has experience with multiple sites incorporating ex-situ or in-situ waste and soil stabilization as a remedial technology. Containment technology study, design and implementation has also been significant, including slurry walls, a combination jet-grout/steel sheet-pile wall, shallow and deep soil mixed walls and steel sheet/synthetic membrane panel walls. Another innovative technology applied is phyto-remediation for both the extraction of shallow leachate in the subsurface, and to form a cap over closed landfills.

Several specific solid waste management projects include the following:

- Directed the expansion of an existing municipal ashfill/balefill facility in Portland, Maine that receives the ash from an incinerator serving 31 host communities. The project entailed assistance with permitting an interim vertical expansion over the existing facility located on soft marine soils serving as a foundation, the surrounded by wetland habitat and underlain by a productive aquifer system.
- Directed a unique project assignment in Puerto Rico involving the expansion and upgrading of an open-dump within a 140-meter deep sinkhole in a mountainous terrain to the first permitted Subtitle D landfill on the island.
- Managed the closure design for a CKD landfill in Kansas where an innovative clay/CKD combination barrier layer was incorporated into the cap. This waste beneficial re-use significantly reduced cost without affecting performance, and served as a standard for future closures.
- Directed three municipal landfill closure projects in Kentucky karst terrain. One of these landfills was configured for re-development as an industrial park after closure.
- Directed the closure of a captive, steel-making sludge landfill in Ohio, and the permitting and design of a replacement landfill that meets current residual waste requirements in that state. These projects involved the preparation of closure plans and Permits-to-Install; engineering design and construction documents; and construction management.
- Managed the investigation of landfill gas and the assessment of mitigation alternatives for a closed municipal solid waste landfill in Belair, Maryland. This facility, which received both municipal and industrial, predominately TCE, waste is bounded by residential development toward which the gas migrated.

Site Remediation

Mr. Hosmer has conducted numerous remediation projects, primarily in response to prior land disposal practices, under voluntary clean-up programs or other

non-regulatory initiatives; several of these projects include the following:

- Directed the remediation of a prior municipal landfill within the confines of a National Wildlife Refuge in Rhode Island at which a portion of the waste was removed, mined for recoverables and placed over the remaining waste. The natural setting was enhanced by cover systems that blended with the native environment, and were surrounded by 25 acres of newly-created salt marsh in the prior landfill footprint.
- Directed the remediation of six manufactured gas plant (MGP) sites in New Jersey for two utilities. These remedial actions were conducted under federal and state lead programs, and consisted of site delineation and evaluations, remedy selection and regulatory approval, design and implementation. Because of the proximity of these types of facilities to in-town locations and waterways, both public involvement and environmental issues were paramount in the selection of remedies.

CERCLA Program/State Superfund

Mr. Hosmer has participated in over 60 site remediation projects driven by the CERCLA legislation, including the following examples:

- Managed a PRP-driven CERCLA site project in which a shadow HRS scoring was performed for multiple co-located municipal/industrial landfills in the vicinity of the Chesapeake Bay to address the validity of the potential NPL listing. This project required negotiations with the State of Maryland and the USEPA to assess the potential risk of the site and guide an effective resolution outside of the CERCLA process. "Brownfields" programs were also explored as a mechanism to effectively remediate and re-use the site. Ultimately, performed negotiations for an AOC for the site under the USEPA SAS Program.
- Served as the Engineer-of-Record and Senior Consultant for the performance of an RD at an NPL-listed municipal/commercial waste landfill in Indianapolis, Indiana. The remedy included containment slurry wall, groundwater and leachate collection/treatment systems, and capping at a 60-acre landfill that had received both solid and hazardous wastes.
- Directed the evaluation, design and construction oversight of an NPL-listed industrial landfill in Tennessee that consisted of RCRA and non-RCRA wastes above steep slopes leading to environmentally sensitive surface-waters. Both conventional and phyto cover systems were implementaed.
- Directed the development of remedial strategies and negotiation with the USEPA-Region III and Commonwealth of Virginia for the completion of design and implementation of the remedy at a battery-breaking NPL site in Richmond, Virginia. The assumption of responsibility by the PRP's, the redesign of the USEPA/USACE remedy, which included lead-contaminated soil removal, stabilization and off-site disposal, and remedy privatization, was conducted on a "fast-track" basis.

RCRA Pre-RFA/RFI/CMS/CMI/ Closure/Permitting

Specific projects in this area include the following:

- Assisted in the permitting and design of a captive RCRA-permitted hazardous waste landfill in Pennsylvania to receive stabilized electroplating sludges. The facility met all state requirements, and when permitted, was the first such facility in Pennsylvania. The closure plan for one of the land disposal facilities included consideration of siting a hazardous waste recycling structure over the completed cap system.
- Conducted CMS projects under RCRA at a chemical manufacturing facility in West Virginia, an automobile parts manufacturing facility in Ohio, an automobile parts distribution center in West Virginia, and a chemical solvent reclaiming facility in North Carolina.

Geotechnical Engineering

Beyond environmental project applications, Mr. Hosmer has conducted over 100 geotechnical and foundation investigations for petrochemical, nuclear and fossil-fueled power, mining, manufacturing, municipal and other governmental and commercial facilities. He has addressed bearing capacity, settlement, slope stability, earth pressures, static and dynamic stability and earthwork operations to specify soil/rock parameters and design/construction criteria.

Gary L. Walters, CHMM

Principal-in-Charge

Twenty-three years of experience in environmental engineering, with an emphasis in hazardous waste management and remediation, and water/wastewater treatment. Mr. Walters is a Senior Project Director within ERM's site remediation practice area and a partner of the firm. In addition, he manages the engineering group in ERM's Annapolis, Maryland offices. In these capacities he has managed or provided technical direction for over 100 state or federal (NPL) Superfund sites or RCRA Corrective Action sites, and specializes in strategic planning, investigative scoping, and the remedy selection process prescribed in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as well as the RCRA Corrective Action Process. As manager of ERM's engineering practice in the Annapolis office, he provides technical direction and oversight for a staff of 10 multi-disciplined engineers in the conduct of a wide variety of engineering projects.

Mr. Walters has extensive experience with the DOD and DOE environmental restoration programs and HTRW management and remediation. He was a senior manager within the Army's IRP for over six years, with oversight responsibility for environmental restoration activities at 30 Army installations, many of which were on or proposed for inclusion on the NPL. He has diverse engineering experience related to site remediation feasibility studies, remedial design/remedial action implementation and water supply, and water and wastewater treatment.

Credentials

- M.S., Civil Engineering (Environmental Engineering option), University of Maryland, 1982
- B.A., *Cum Laude* Biology/Chemistry, Western Maryland College, 1977
- Courses in Environmental Laws & Regulations
- (Government Institutes, 1989), and Ground Water
- Pollution & Hydrology (Princeton Associates, 1985)
- OSHA 1910.120 Certified

Fields of Competence

- Hazardous Waste Site Investigation and Remediation
- Environmental Compliance Audits
- Environmental Due Diligence
- Water and Wastewater Treatment
- DOD Superfund (IRP) Programs
- Hazardous Waste Management
- Civil/ Environmental Engineering

Professional Affiliations

- Certified Hazardous Materials Manager (CHMM) (Master Level)
- American Society of Civil Engineering
- Water Environment Federation
- Member of Advisory Board for Johns Hopkins University Graduate School for Environmental Engineering

Key Projects

28 Phase I ESAs Completed in 7 Days ~ Project Manager for project which entailed completing 28 Phase I ESAs at properties in US, South America, and Europe in one week. Coordinated all site visits, preparation of draft final reports, addressed outside council's comments on all draft reports, produced multiple copies of all final reports and delivered to client in seven days to facilitate billion dollar transaction.

Performed numerous environmental due diligence assessments and HS&E compliance audits at a wide array of industrial facilities. Due diligence assessments were performed within the context of ASTM Standard E1527. HS&E audits focus on compliance with all major federal HS&E statutes and regulations, including Clean Water Act (CWA), Clean Air Act, RCRA, TSCA, and OSHA.

Deposed and/ or testified as expert witness on State of Maryland and Federal Superfund projects. Also performed peer reviews of numerous RI/FS projects, including Federal and State of Maryland Superfund Sites.

Managed the U.S. Army's Superfund program (IRP) at numerous Army properties, with studies ranging from preliminary assessments/site inspections (PA/SI), through remedial investigations/feasibility studies (RI/FS) and remedial actions. Prepared technical scopes of work, cost estimates, sampling and analysis plans, and technical reports. Maintained familiarity with environmental regulations and interfaced with all levels of DoD personnel and regulatory agencies.

Managed all on-site support services provided to Westinghouse Materials Company of Ohio (WMCO) and DOE at the Feed Materials Production Center (FMPC) in Fernald, Ohio. Services included: RCRA Parts A and B application support; RCRA training; engineering evaluations of hazardous waste management units (HWMU), and solid waste management units (SWMU); and extensive regulatory analysis.

Managed the environmental review phase (Phase II) of a licensing procedure before the Maryland Public Service Commission for a proposed 230 MW Non-Utility Generator Cogeneration Facility. Also provided lead engineering support to client for two of the more contentious aspects of the case: 1) use of treated wastewater for cooling water; and 2) design and safety issues associated with the facility's natural gas pipeline. Provided expert testimony to support engineering findings.

Managed RI/FS activities at two State of Maryland Superfund sites, both involving VOC contamination in soils and ground water. Also assisted in the design, installation and operation of an interim remedial measure (IRM) consisting of a dual vacuum extraction system designed to treat source area contamination at both sites.

Managed all RD/RA activities at a former wood-preserving facility on the NPL within EPA Region III. Final remedy consisted primarily of capping in place the surface soils which had been contaminated by chromated copper arsenate (CCA). All RD/RA activities were completed in less than 2 years and project is now in longterm monitoring to support EPA's 5-year review and possible delisting.

Project Manager for preliminary assessments (PA) at National Guard Bureau (NCB) facilities in the Mid-Atlantic region under an IDO contract with the U.S. Army Environmental Center (AEC). Projects involved detailed on-site site visits, review of Army, NGB, and state and federal regulatory agency files, and preparation of narrative reports in accordance with EPA guidance for PAs. NGB facilities investigated included those located at Anacostia Naval Air Station in Washington, D.C. and Ft. Belvoir in northern Virginia.

Managed expanded site inspection (ESI) and removal action for PCB-contaminated media at Navy CHESDIV's David Taylor Research Center (DTRC) in Montgomery County, Maryland. Project involved extensive sampling and analysis at 10 waste sites and preparation of an engineering evaluation and cost analysis (EE/ CA) for a PCB removal action. Also assisted in the organization of the facility's Technical Review Committee (TRC) and routinely serve as technical leader for TRC/RAB meetings.

As a result of favorable reviews received for its work during the ESI and PCB removal action, ERM was retained via sole source contract arrangements to provide a variety of services directly to various DTRC facilities. Manager for all environmental support to the DTRC, including the development of a plan for characterizing 33 drums of field generated wastes (i.e., drill cuttings and well development water). ERM used

existing analytical data to determine that none of these wastes could be RCRA characteristic hazardous waste and thereby eliminated the need for any additional sampling and analysis. ERM then coordinated the disposal of the liquid wastes with the local POTW; solid wastes were disposed off-site as non-hazardous waste.

Managed environmental investigations at three Army bases in the Baltimore-Washington Metropolitan area performed in response to the Community Environmental Response Facilitation Act (CERFA). Studies documented environmental conditions at the facilities and identified land parcels which are suitable for immediate transfer under the Army's BRAC program because they have not been adversely impacted. Baltimore City Superfund Site ~ Project Manager for remedial investigation/feasibility study (RI/FS) for former herbicide/pesticide manufacturing plant currently owned by City of Baltimore. Property is a State of Maryland Superfund Site and the project has entailed extensive negotiations with MDE, other potentially responsible parties (PRPs) and community relations activities.

Project Director for highest-ranking State of Pennsylvania Superfund Site, which was a former solvent recycling facility located between York and Harrisburg, PA. Coordinated and oversaw the characterization and disposition of over 6,000 drums and 200 bulk storage tanks of liquid waste. Managed the RI/FS which resulted in a final remedy costing just over $1MM, whereas original projects by State of Pennsylvania estimated cleanup costs to be over $40 MM. Coordinated and interacted with a PRP Steering Committee representing over 1,000 PRPs, as well as PADEP throughout seven-year project.

Darren Quillen, P.E.

Project Manager

As a civil engineer with13 years of experience in the geoenvironmental field, Mr. Quillen has served as a engineering department manager, project manager, design engineer, and construction manager on numerous land disposal projects throughout the country. Mr. Quillen has been involved with various aspects of project work such as scope development, budget and schedule management, quality control and certification. Project work has ranged across the spectrum of project types and sizes including investigation and research, technical design, report and permit preparation, field implementation, and certification. His assignments have involved waste disposal, remediation sites, contingency plans, value engineering, construction management, and litigation support. Mr. Quillen has serviced clientele through the development of innovative design and project approach, and he has experience with the interaction and negotiation at all levels of regulatory authority.

Credentials

- B.S., Civil Engineering (Minor Computer Science), University of Delaware, 1992
- OSHA 40-Hour Hazardous Material Training
- USNRC Radiation Safety Training (Nuclear Moisture/Density Gauge)
- Certified Maryland Erosion and Sediment Control Personnel
- Courses in geotechnical engineering and hydrology

Papers & Publications

- Quillen, D.S., Bedessem J., P.E., "Dual Geotextile Installation for Sediment Filtration", International Geosynthetics Conference '99, Industrial Fabrics Association International, 1999.
- Quillen, D., Johnson, J., Potter, S. PhD., P.E., "Use of Predictive Models to Evaluate Leachate Management Systems", SWANA Tri-State Solid Waste Conference, 1999.
- Bedessem, J., P.E., Quillen D., "Stabilization/Solidification of Coal Tar", Industrial Waste Technical Conference, Water Environment Federation, 1999.
- Johnson, J.G., Quillen, D.S., Potter, S.T. PhD, P.E., Smith, J.O., P.E., "Optimizing Leachate Management Systems Through the Use of Predictive Models", Environment Virginia '99 Conference, 1999.
- Quillen, D.S., Dant, J.M., Hosmer, J.L., P.E., "Performance-Based Landfill Liner System Design", First Annual Landfill Symposium, Solid Waste Association of North America, 1996.

Fields of Competence

- Solid/Hazardous Waste
- Site Remediation
- Geotechnical Engineering
- Construction Management
- Land Development
- General Engineering and Planning

Professional Affiliations

- Professional Engineer: Maryland, Delaware
- Society of American Military Engineers
- Solid Waste Association of North America

Key Projects

68th Street Superfund Site - Project manager for the negotiations of the Administrative Order on Consent and development of the Statement of Work for a nearly 200-acre Superfund Site in located Maryland. Developed a site re-use plan for remediation and redevelopment of the site. Also, prepared an environmental and redevelopment evaluation of specific parcels to facilitate negotiations among PRPs.

Lake Calumet Cluster Superfund Site - Lead senior technical engineer for an 80-acre Superfund site with nearly 120 PRPs. Negotiated with the state and EPA for monitored natural attenuation (MNA) as the final remedy. In the interim, prepared specifications and an EE/CA in an expedited manner to enable the implementation of an interim remedy using "free" soil from nearby construction sites.

Managed the preparation of a permit-to-install application and design for two, 20-plus acre industrial landfills located in Ohio. Design included a vertical expansion of the existing facility and the construction of an additional waste disposal facility. The design for each landfill included leachate management, stormwater management, considerations for steep side slopes and overall grading, and a cover system. Both landfills are situated above a sole source aquifer and required specific design considerations with respect to the numerous siting criteria variance requests.

Managed the Remedial Design (RD) preparation and implementation for the remediation of a former manufactured gas plant (MGP) which is currently listed on the State of Maryland Notice of Potential Hazardous Waste Sites. The RD addressed the remediation of contaminated soil and the implementation of the remedy concurrent with on-going facility operations. The RD included soil and asphalt caps for parking and other continued site uses.

Managed the field investigation and preparation of the Engineering Evaluation/Cost Analysis Work Plan (EE/CA) for high profile dioxin-contaminated sites. The sites were being evaluated by the USEPA for listing on the NPL. Two sites were high profile where the residents, interest groups, media, and the government were involved and met on a frequent basis.

Provided technical support and construction management for the design and closure of a tar contaminated settling basin. Closure implementation for this project included in-situ stabilization of the tar/soil materials with a cement bentonite mix, a RCRA cap, a retaining wall for slope stabilization, and flood protection from nearby waters. The project saved the client more than $30,000,000 compared to the regulatory- and community-preferred remedy.

Provided technical support and construction management for the design and closure of a process waste contaminated pond. Closure implementation for this project included stormwater management, dredging, pond water treatment via an on-site GAC system and discharge to the sewer system, in place pond flocculation, installation of one, 2-acre geotextile panel, and establishment of wetlands. The project required implementation of an innovative alternative to successfully complete the work within the allotted time schedule constraint.

Managed the preparation of a site modifications plan and remedial implementation for a 60-acre landfill located in Kentucky and owned by the same client. Modifications plan was prepared in accordance with a notice of violations issued by the state and incorporated site-wide regrading, a leachate management system, and a cover system. Regrading was designed in accordance with future site development plans. Two asphalt cap sections (approx. 5 acres) were incorporated for parking and a truck training area. Additionally, concrete footings, beams and slabs were designed and constructed as part of the cap to permit future buildings on the landfill.

Managed the closure design, implementation, and certification of a 10-acre industrial landfill located in Cleveland, Ohio. Assisted with the conceptual development, design, and preparation of a cover system alternatives analysis and closure plan. Managed and prepared the construction drawings, technical specifications, and contract documents, assisted client throughout bid procurement process and award, and provided construction management and construction quality assurance services during field implementation. Prepared construction certification report for State approval upon completion of the project.

Managed the permit-to-install application for a municipal ashfill/balefill facility expansion located in Maine. The design included a lateral and vertical expansion over a soft-soil foundation. The project included a leachate collection system, liner and cap systems, storm water management system, wetlands considerations, delicate waste sequencing and cell phasing, slope stability issues, regulatory negotiations, and a gas management system.

Pond B Closure - Project manager for the design and closure of a sludge pond located adjacent to a river at a chemical facility. Performed value engineering/alternatives analysis, coordinated the treatability study, prepared technical specifications and construction drawings, prepared permit documents, and assisted in procurement activities.

Winchester Municipal Utility Landfill - Project manager for the evaluation and remediation of a 20-acre landfill site in Kentucky. Prepared a Work Plan for the overall project including investigation, evaluation, design, and implementation. Evaluated other means for managing leachate/impacted groundwater, including on-site wetlands and land application. Also, evaluated cost-efficient alternatives for decreasing leachate generation while integrating the site into the surrounding wooded and green space use, including "multiple mounds", phytocover, and a RCRA cap.

Federated Metals Corrective Measures Project - Lead senior technical engineer and manager for corrective measures at a land disposal site located at an active facility adjacent to a lake and within wetlands. The design consisted of excavation, dredging, and consolidation of wastes on site to the primary 11-acre disposal area. The cover designs included a phytocover and an asphalt cover.

Managed the design, permitting, and construction to replace deteriorated concrete slabs and sanitary plumbing within bathrooms of a 4-story, 43-room residence hall at The George Washington University. The project required a "fast-track" implementation to complete the project over the 2-month window while students were on break. Specific permitting and procurement strategies were implemented to complete the project in a timely manner. Other tasks included planning and maintenance of budgets, coordination of resources, preparation of design specifications and drawings, solicitation and evaluation of contractor bids, preparation of permit drawings and permit applications, construction management, submittal review, review and execution of change orders, and preparation of post-construction as-builts and report.

Served as a task manager among a nine-consultant team in a consortium legislated for preparing a master plan within the Maryland Port Zone. The project included investigating vacant and underutilized properties surrounding the Port of Baltimore in order to invigorate appropriate economic development within the Zone. Priority sites were identified and an impact analysis performed to qualify and quantify the anticipated impact of each site to the surrounding areas.

Jeff Flanzenbaum, P.G.

Project Manager

Twenty years of experience in environmental consulting, with an emphasis on site remediation and environmental due diligence for commercial and industrial clients. Managed numerous site environmental investigation projects including several RCRA Facility Investigations (RFI), associated Corrective Measures Studies (CMS), and Remedial Investigation/Feasibility Studies (RI/FS) at NPL sites. Experienced in the use of surface geophysical techniques, rotosonic drilling, dye tracing in karst and fractured media, and natural attenuation monitoring for site characterization. Site remediation experience includes the use of *in-situ* chemical oxidation, UVB groundwater treatment systems, hydraulic containment systems, and enhanced bioremediation, for the remediation of chlorinated solvents in ground water. Managed hundreds of environmental site assessments for due diligence associated with corporate mergers, acquisitions, and divestitures.

Publications

Caprioulo, G.M., J. Flanzenbaum, C.F. Wurster, and R.G. Rowland. 1983. Resistance may be an important mechanism by which marine microbes respond to environmental toxicants. Estuarine, Coastal and Shelf Science, v.17, pp. 573-579.

Bradford, W. and J. Flanzenbaum. 1991. Application of Leaching Algorithms and Worst-Case Analysis to Determine Risks to Groundwater from Contaminated Soil. Proceeding of the Eighth International Conference on Chemistry for Protection of the Environment, Lublin, Poland.

DiGuiseppi, W. and J. Flanzenbaum. 1996. Innovative Techniques for Soil and Groundwater Investigation. Field Workshop, Geological Society of America, Annual Meeting, Denver, Colorado.

Flanzenbaum, J., 1998. *In-situ* Chemical Oxidation for Groundwater Remediation, Environmental Claims Journal, v. 10, no. 3, pp 147-154.

Registration

- Professional Geologist Licensure in Delaware, Virginia, Kentucky, Pennsylvania, Tennessee, Wisconsin, and Illinois

Fields of Competence

- RCRA Corrective Action (RFI, CMS, CMI)
- Superfund RI/FS
- Environmental Due Diligence for Mergers, Divestitures and Acquisitions
- Hydrogeological Site Investigations; emphasis on karst and fractured rock environments
- Remediation of Chlorinated Solvents in Ground Water

Credentials

- M.S., Environmental Sciences, University of Virginia, 1986, Concentration in Hydrogeology
- B.S., Earth & Space Sciences, State University of New York at Stony Brook, 1982, Concentration in Geology

Professional Affiliations

- National Ground Water Association

Key Projects

Client Manager for coordinating environmental investigation and remediation activities at 20 operating and former manufacturing facilities for a major automotive parts manufacturer. Responsibilities included QA/QC of all documents, oversight and project coordination with individual site project managers, coordination of legal, regulatory and real estate activities, development of project scope and strategy, budget development and program management, development and implementation of a new program for corporate environmental reserve determination, and client communications.

Key Projects (continued)

Project Director for RCRA Corrective Action at a former chemical distribution facility in Florida. Directed investigations to characterize and remediate groundwater contaminated with chlorinated solvents. Directed remediation that included *in-situ* chemical oxidation, *in-situ* UVB air stripping, HRC™ injection, and monitored natural attenuation. Coordination of site environmental activities with regulatory agencies.

Project Director for RCRA Corrective Action at an industrial chemical distribution facility in Tennessee. Directed investigations to characterize groundwater contaminated with chlorinated solvents in a complex karst hydrogeologic environment. Directed remedial actions for hydraulic containment, source area remediation, and *in-situ* spring discharge treatment. Coordinated site environmental activities with regulatory agencies.

Conducted or managed of Remedial Investigation (RI) activites at several NPL sites, including the Buckeye Reclamation Landfill, Hellertown Manufacturing, Revere Chemical, Dover Gas Light Site.

nd management of environmental due diligence of multiple-facility international industrial companies.

Task manager and senior hydrogeologist for RCRA Corrective Action activities at a former manufacturing/electroplating facility in central Kentucky. Responsible for RCRA permitting, RCRA Closure plan, karst aquifer site characterization, and all communication with State and Federal regulators on behalf of the client. Directed an extensive dye-trace investigation to assess contaminant flow in the karst bedrock aquifer. Assisted in design of Interim Remedial Actions and in the design and implementation of a site-wide groundwater remediation system that is monitored via remote telemetry.

Project Manager for post RI/FS Treatability Study Pilot Testing at an NPL site in eastern PA. Directed investigations to assess groundwater flow in fractured rock to depths in excess of 500 feet. Testing included rock core evaluation, electromagnetic borehole flowmeter (EBF) testing, discreet interval HydraSleeve™ sampling, dye tracing using fluorescent dyes, and *in-situ* chemical oxidation using potassium permanganate.

Supervised the characterization, testing, repacking, overpacking, and labeling of over 800 drums of unknown wastes from McMurdo Station, Antarctica during the 1991-1992 Antarctic season. Directed a crew of six individuals over a 4-month period at McMurdo Station. All wastes, which included toxic, corrosive, reactive, chemical and biological wastes, were safely transported from Antarctica to the continental U.S. for recycling and/or disposal. Also participated in and procured all equipment for, the remediation of the Fortress Rocks landfill at McMurdo Station. The project was performed for the U.S. Antarctic Program administered by the U.S. National Science Foundation.

Designed, performed and directed environmental investigations for site characterization at U.S. Naval Facilities, including the former Bainbridge Naval Training Center, MD, NWS Yorktown, VA (on the NPL) and NSC Craney Island, VA.

Directed the subsurface investigation of a fuel pipeline release at Misawa Air Base, Japan, a US Air Force installation in northern Japan. Performed hydrogeologic investigations to delineate contaminant plumes in groundwater and soil, and provided recommendations for remedial actions. Directed integrity testing of 33 USTs and 4 ASTs (cut and cover tanks) with capacities up to 4.5 million gallons.

Project Manager for a Feasibility Study (FS) at the Maryland Sand Gravel and Stone NPL site in Maryland. In addition to the FS, directed post-Remedial Investigation (RI) Treatability Studies that included a detailed evaluation of natural attenuation of chlorinated solvents in ground water, application of innovative FLUTe™ and MIPS™ technologies for DNAPL site characterization, and laboratory testing of *in-situ* chemical oxidation using potassium permanganate and sodium persulfate.

Project Manager for a Brownfield's cleanup and redevelopment of a former foundry and industrial manufacturing facility in Newport News, VA. The site was impacted with lead, and the selcted remedy was to consolidate the impacted soil into a Remediation Waste Management Unit (RWMU), in accordance with the Virginia Voluntary Cleanup Program (VCP). This resulted in considerable savings to our client and faciltated successful property redevelopment that is pretective of human health and the environment.

CHARLES A. MENZIE, Ph.D.

EDUCATION:

Ph.D.	1978	Biology, City University of New York
M.A.	1974	Biology, City College of New York
B.S.	1971	Biology, Manhattan College

CONTINUING EDUCATION AND CERTIFICATION:

OSHA Certified Eight-Hour HAZWOPER Annual Refresher Training in Hazardous Waste Operations and Emergency Response, updated annually

OSHA Certified 40-Hours of Training in Hazardous Waste Operations and Emergency Response

EXPERTISE:

Dr. Menzie is in charge of the Maryland office of Menzie-Cura & Associates, Inc. Dr. Menzie's primary area of expertise is on environmental fate and effects of physical, biological, and chemical stressors on terrestrial and aquatic systems. Over the past two decades most of this work has been focused on chemicals. Dr. Menzie has worked at over 100 sites and has been involved in approximately a dozen NRDA-related cases. He is recognized as one of the leaders in the field of risk assessment and was awarded the Risk Practitioner Award by the Society of Risk Analysis. He has served on the Council of SRA and the Board of SETAC, the two major professional organizations in this field. Dr. Menzie has led numerous peer reviews for industry and for government. He has taken the lead on the development of guidance documents for industry and government and has focused on methods that are workable and acceptable to a broad range of parties. He was one of the committee members to draft the ASTM Standard for Risk-Based Corrective Action (RBCA) for chemical release sites and extended that standard to ecological considerations. In addition to his work on chemical risk-related matters, Dr. Menzie has developed and applied methods for identifying third parties who have contributed to contamination in aquatic and terrestrial environments. These projects have involved meshing historical information with fate and transport analyses, risk considerations (remediation drivers), and forensic analysis. Most of this work has been carried out for a select group of industrial clients. Dr. Menzie's expertise in chemical fate and transport includes organochlorine compounds (e.g., PCBs, dioxins, many pesticides), polyaromatic hydrocarbons (PAHs), benzene and other light aromatic hydrocarbons, chlorinated volatile compounds (e.g., TCE and PCE), phthalate esters, petroleum and organic compounds, most metals (e.g., arsenic, cadmium, lead, vanadium, nickel, zinc), and cyanide compounds.

Dr. Menzie has conducted several human health and ecological risk assessments for sites in USEPA Region 3, including Cottman Avenue Superfund site in Philadelphia, PA, Eastalco Aluminum Company in Frederick, MD, former coal gas plant in Wilmington, DE, Columbia Gas Plant in PA, former manufactured gas plant in West Chester, PA, Hunterstown Road Superfund site in Gettysburg, PA, the Westinghouse Elevator Plant site in Gettysburg, PA, the Shrivers Corner site in Gettysburg, PA, Teledyne Rodney Metals Facility in Scottdale, PA, Petroleum Trainings Facility in Petersburg, VA, and Amoco Fairfax terminal in Fairfax, VA. He has developed a work plan for a Public Health and Environmental Risk Evaluation, which will be completed as part of a RCRA RFI investigation at the ITT manufacturing and research and development facility in Roanoke, Virginia. Dr. Menzie has also performed peer reviews of ecological risk assessments for Fort Lee in Richmond, VA, Fort Story in Virginia Beach, VA, Fort Eustis in Newport News, VA and a former rail yard in Alexandria and Arlington.

In addition to Dr. Menzie's work on chemical-related matters, he has been involved in evaluating the risks associated with habitat modifications and the introduction of species. Prominent among these efforts was work related to the introduction of shrimp viruses to U.S. coastal systems. Dr. Menzie and staff at Menzie-Cura have been developing a number of software tools to analyze the effects of chemical and other stressors at the level of landscapes. Much of this work is being used to predict future effects and to sort among alternatives.

EMPLOYMENT HISTORY:

1983-Present **Menzie-Cura & Associates, Inc**. Principal. Responsible for providing environmental and risk assessment services related to soil, sediment, surface water and groundwater contamination, industrial and municipal discharges, hazardous waste sites, and RCRA and Right-to-Know Law compliance. Geographic experience includes continental United States, Alaska, Hawaii, Puerto Rico, Bahamas, Australia, Indian Ocean Atolls, Nigeria, and Canada. Voluntarily supports cleanup programs in many states, including Massachusetts, Connecticut, and Rhode Island.

1976-1983 **EG&G Environmental Consultants**. Manager of Environmental Services Department. Responsible for staff of Biologists, Chemists, Hydrogeologists, Environmental Scientists, and Regulatory Analysts. Directly responsible for coordinating business development activities related to waste disposal issues in marine, aquatic, and terrestrial environments.

1978-1993 **Boston University and University of Lowell.** Lecturer. Developed and presented graduate-level courses on Risk Assessment, Marine Pollution, and Environmental Science.

1973-1974 **Research Foundation of City University of New York (CUNY**). Involved in evaluating impacts of sewage sludge disposal.

1971-1976 **Lawler, Matusky and Skelly Engineers.** Environmental Scientist. Responsible for evaluating the impacts of fossil-fuel and nuclear power plants on rivers, estuaries, and the Great Lakes. Involved in developing 208 plans.

PROFESSIONAL AFFILIATIONS:

Water Environment Federation
Society for Risk Analysis, (Past President of New England Chapter)
Society of Exposure Analysis
Society of Environmental Toxicology and Chemistry, (Board Member)
New England Estuarine Research Society
Estuarine Research Federation
Boston Bar Association, (Environmental)
Association for the Environmental Health of Soils
ASTM
Editorial Board for the journal *Human and Ecological Risk Assessment*
Councilor for Society of Risk Analysis

NATIONAL AND INTERNATIONAL COMMITTEES, WORKSHOPS, AND DISTINCTIONS:

Selected as Outstanding Risk Practitioner by the Society of Risk Analysis for 2003
Member National Academy of Science National research Council Committee on Bioavailability of Chemicals in sediments and Soils
SETAC Pellston Conference on Sediment Ecological Risk Assessment
SETAC Pellston Conference on Contaminated Soils
SETAC Pellston Conference on Sediment Quality Guidelines
SETAC Pellston Conference on Population-Level Risk Assessment
EPA Risk Forum: Ecological Case Studies/Dioxin/Monte Carlo Analyses

COMMUNITY SERVICE

Westford Board of Health – Vice Chairman and 9 years of service
Westford Hazardous Material Coordinator

PUBLICATIONS:

Book Chapters

Lanno, R. and **C.A. Menzie**. 2006. Ecological Risk Assessment of Cyanide in Water and Soil. Chapter 17 in: Dzombak, D.A., Ghosh, R.S., and Wong-Chong, G.M., Eds., Cyanide in Water and Soil: Chemistry, Risk, and Management, CRC Press/Taylor & Francis Group, Boca Raton, FL.

Menzie, C.A., Efroymson, R.A., Ells, S.J., Henningsen, G.M., and Hope, B.K. 2003. Risk Assessment and Risk Management, Chapter 2. In: Pellston Workshop on Contaminated Soils: From Soil-Chemical Interactions to Ecosystems Management. Roman P. Lanno (Ed.). SETAC Publications. Pensacola, FL.

Gaudet, C.L., **C.A. Menzie**, and S. Ouellet. 2002. Risk-based assessment of soil contamination: generic versus site-specific approaches. Chapter 12. G.I. Sunahara, A.Y. Renoux, C. Thellen, C.L. Gaudet, and A. Pilon, eds. In: *Environmental Analysis of Contaminated Sites*. John Wiley & Sons Ltd. pp 203-219.

Menzie, C.A. 2002. The evolution of ecological risk assessment during the 1990s: challenges and opportunities. Chapter 16. G.I. Sunahara, A.Y. Renoux, C. Thellen, C.L. Gaudet, and A. Pilon, eds. In: *Environmental Analysis of Contaminated Sites*. John Wiley & Sons Ltd. pp 281-299.

Cura, J.J., S.B. Kane Driscoll, R. Lacey, M. McArdle, **C.A. Menzie**. 2001. Assessing Ecological Risks of PAH-Contaminated Sediments. In: Sediments Guidance Compendium. Electric Power Research Institute (EPRI), Palo Alto, CA. 1005216.

Menzie, C.A., W.J. Heiger-Bernays, C.R. Montgomery, D.G. Linz, and D.V. Nakles. 1996. Development of an ecological risk assessment framework based on contaminant availability. "Ecotox - Environmental Contaminants through the Macroscope." Wuerz Publishing Ltd., Winnipeg, MB, Canada.

Menzie, C.A. 1996. Perspectives on sediment risk analysis for hazardous waste sites. In: Sediment Risk Assessment. Proceedings of the 22nd Pellston Conference Workshop, Pacific Grove, April 23 - 28, 1995. SETAC Special Publication.

Work Group Summary Report for Site Clean-Up Decisions. Chapter 6 In: Sediment Risk Assessment Proceedings of the 22nd Pellston Conference Workshop, Pacific Grove, April 23 - 28, 1995. SETAC Special Publication.

Cura, J.J., G. Mariani, C. Ketchum, R. Gillmor**, C. A. Menzie**, W. Curtis and B. Tuholke. 1989. Site-selection criteria for deep ocean disposal of low-level radioactive wastes. In M. Champ and K. Park, eds., *Oceanic Processes in Marine Pollution*. Volume 3 - Marine Waste Management: Science and Policy. Kreiger Publishing Co., Melbourne, FL, pp. 177-85.

Menzie, C.A., J. Cura, R. Gillmor, B. Magnell, G. Mariani, T. Bartholomew, W. Gardner and W. Smith. 1989. The optimum mix of pollution-monitoring platforms: Deepwater Dumpsite-106 Case Study. In M. Champ and K. Park, eds., *Oceanic Processes in Marine Pollution*. Volume 3 - Marine Waste Management: Science and Policy, eds., Kreiger Publishing Co., Melbourne, FL, pp. 260-76.

Nocito, J.A., H.A. Walker, J.F. Paul, and **C.A. Menzie**. 1986. Application of a risk assessment framework for marine disposal of sewage sludge at mid-shelf and off-shelf sites. In *Proceedings of the 11th ASTM Symposium* by American Society for Testing and Materials. Philadelphia, PA, American Society for Testing and Materials.

Gillmor, R.B., **C.A. Menzie**, G.M. Mariani, D. Levin, R.C. Ayers and T.C. Sauer. 1985. Effects of exploratory drilling discharges on the benthos. In IW. Duedall, D.R. Kester and P.K. Park, eds., *Wastes in the Ocean*. Volume 4 - Energy Wastes in the Ocean, Wiley Interscience Publications, John Wiley & Sons, New York, NY, pp. 244-57.

Robson, D.S., **C.A. Menzie** and H.F. Mulligan. 1980. An environmental monitoring study to assess the impact of drilling discharges in the Mid-Atlantic. II. An experimental design and statistical methods to evaluate impacts on the benthic environment. In Research of Environmental Fate and Effects of Drilling Fluids and Cuttings.

Menzie, C.A., D. Maurer and W. Leathem. 1980. An environmental monitoring study to assess the impact of drilling discharges in the Mid-Atlantic. IV. The effects of drilling discharges on the benthic community. In Research of Environmental Fate and Effects of Drilling Fluids and Cuttings.

Journal Articles

Magar, V.S., R.J. Wenning, **C.A. Menzie,** S.E. Apitz**.** In publication 2006. Parsing Ecological Impacts in Watersheds. Journal of Environmental Engineering ASCE.

Wickwire, W.T., **C.A. Menzie**, D. Burmistrov and B.K. Hope. 2004. Incorporating Spatial Data into Ecological Risk Assessments: The Spatially Explicit Exposure Module (SEEM) for ARAMS. *Landscape Ecology and Wildlife Habitat Evaluation: Critical Information for Ecological Risk Assessment, Land-Use Management Activities, and Biodiversity Enhancement Practices, ASTM STP 1458* , L.A. Kapustka, H. Galbraith, M. Luxon, and G.R. Biddinger, Eds., ASTM International, West Conshohocken, PA.

Shatkin, JA, M. Wagle, S. Kent, **C.A. Menzie**. 2002**.** Development of a Biokinetic Model to Evaluate Dermal Absorption of Polycyclic Aromatic Hydrocarbons from Soil. *Human and Ecological Risk Assessment. (HERA)* 8(4) 713 - 734

Menzie, C.A., S.S. Hoeppner, J.J. Cura, J.S. Freshman, and E.N. LaFrey. 2002. Urban and suburban storm water runoff as a source of polycyclic aromatic hydrocarbons (PAHs) to Massachusetts estuarine and coastal environments. Estuaries. Vol. 25, No. 2, p. 165-176.

Menzie, C.A. and W. T. Wickwire. (2001). Defining populations: a key step in identifying spatial and temporal scales. Toxicology and Industrial Health. 17:223-229.

Menzie, C.A., and R. Lacey. 2002. Ecological risk assessment in a new millennium: where are we going? Risk Policy Report, March 19, 2002. 9(3):36-38.

von Stackelberg, K. and **C. A. Menzie.** 2002. A cautionary note on the use of species presence and absence data in deriving sediment quality criteria. *Environmental Toxicology and Chemistry* 21(2):466-472.

Menzie, C.A. 2001. Hormesis in ecological risk assessment: a useful concept, a confusing term, and/or a distraction? Belle Newsletter. 10(1), 17-20, September 2001.

Menzie, C.A., Burke, A.M., Grasso, D., Harnois, M., Magee, B., McDonald, D., Montgomery, C., Nichols, A., Pignatello, J., Price, B., Price, R., Rose, J., Shatkin, J., Smets, B., Smith, J., Svirsky, S. 2000. An approach for incorporating information on chemical availability in soils into risk assessment and risk-based decision making. *Human and Ecological Risk Assessment. (HERA).* 6(3) 479-510.

Menzie, C.A., 1999. *Applying Risk-Based Solutions - the importance of communication. Environmental Engineer.* 35(4) 20-22.

Charles, J.C. and **Menzie, C.A.** 1998. Identifying Southeast Asian immigrant populations in Massachusetts at risk from eating contaminated shellfish. *Journal of Environmental Management*. 52:161-171.

Menzie, C.A. 1998. Risk communication and careful listening – resolving alternative world views. *Human and Ecological Risk Assessment (HERA).* 4(3):619-622.

Menzie, C.A., and Freshman, J.S. 1997. An assessment of the risk assessment paradigm for ecological risk assessment. *Human and Ecological Risk Assessment (HERA).* 3(5):853-892.

Menzie, C.A. 1997. Implementing risk management at manufactured gas plant sites. *Soil & Groundwater Cleanup*. August/September. pp12-18.

Menzie, C.A., J.J. Cura, J. Freshman, E.N. LaFrey. 1997. Polycyclic aromatic hydrocarbons (PAH) in Massachusetts urban runoff and potential for enrichment of near-shore coastal sediments. (Submitted).

Menzie, C.A., M. Hope Henning, J. Cura, K. Finkelstein, J. Gentile, J. Maughan, D. Mitchell, S. Petron, B. Potocki, S. Svirsky, P. Tyler. 1996. Special report of the Massachusetts weight-of-evidence workgroup: A weight-of-evidence approach for evaluating ecological risks. *Human and Ecological Risk Assessment:* (HERA): 2(2)277-304.

Freshman, J.S., **C.A. Menzie**. 1996. Two wildlife exposure models to assess impacts at the individual and population levels and the efficacy of remedial actions. *Human and Ecological Risk Assessment*. 2(3):481-496.

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Menzie, C.A., B. Potocki and J. Santodonato. 1992. Exposure to carcinogenic PAHs in the environment. *Environ. Sci. Technol.* 26(7)1278-1284.

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Callahan, C.A., **C.A. Menzie**, D.E. Burmaster, D.C. Wilborn and T. Ernst. 1991. On-site methods for assessing chemical impact on the soil environment using earthworms: A case study at the Baird & McGuire Superfund Site, Holbrook, MA. *Environ. Toxicol. Chem.* 10:817-826.

Burmaster, D.E., **C.A. Menzie**, J.S. Freshman, J.A. Burris, N.I. Maxwell and S.R. Drew. 1991. Assessment of methods for estimating aquatic hazards at Superfund-type sites: A cautionary tale. *Environ. Toxicol. Chem.* 10:827-842.

Menzie, C.A. 1984. Diminishment of recruitment: A hypothesis concerning impacts on marine benthic communities. *Marine Pollution Bull*. 15:127-129.

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Menzie, C.A., J.J. Cura and W.F. Skinner. 1982. Thermal impact evaluation for Brunner Island Steam Electric Station: Toward a more realistic assessment. *Environ. Monitoring and Assessment* 2:301-308.

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Maurer, D., W. Leathem and **C.A. Menzie**. 1982. Macrobenthic invertebrates from the Mid-Atlantic continental shelf. *Int. Rev. der Ges. Hydrobiol*. 67(4):491-515.

Menzie, C.A., G. Mariani, and J. Ryther, Jr. 1981. Seafloor mapping system applied to biological, environmental surveys. *Sea Technol*. 22(2):15-16.

Menzie, C.A. 1981. Production ecology of Cricotopus sylvestris Fabricius (Diptera: Chironomidae) in a shallow estuarine area. *Limnol. Oceanog*. 26(3):467-481.

Mauer, D., W. Leathem and **C.A. Menzie**. 1981. The impact of drilling fluids and well cuttings on polychaete feeding guilds from the U.S. northeastern continental shelf. *Marine Pollution Bull.* 12(10):234-347.

Menzie, C.A. 1980. The potential significance of insects in the removal of contaminants from aquatic systems. *Water, Air and Soil Pollution* 13:473-479.

Menzie, C.A. 1980. A note on the Hynes method of estimating secondary production. *Limnol. Oceanog.* 25 (4): 770-773.

Menzie, C.A. 1980. The chironomid (Insecta: Diptera) and other fauna of a Myriophyllum spicatum L. plant bed in the lower Hudson River. *Estuaries* 3(1): pages 38-54.

Menzie, C.A. 1979. An approach to estimating probabilities of transportation related spills of hazardous materials. *Environ. Sci. Technol.* 13(2):224-228.

Menzie, C.A. 1979. Growth of the aquatic plant Myriophyllum spicatum in a littoral area of the Hudson River Estuary. *Aquatic Botany* 6:365-375.

Mulligan, H.F. and **C.A. Menzie**. 1978. How to prepare environmental reports for drilling on the OCS (outer continental shelf). *Oil and Gas J*., pp. 86-87.

Published Proceedings, Conferences and Symposia

Wickwire, W.T., **C.A. Menzie** and D. Burmistrov. 2004. Enhancing the realism of wildlife exposure modeling: An introduction and demonstration of the Spatially Explicit Exposure Model (SEEM), In: Johnson, MJ, Sample, BE, Wickwire, WT and Kapustka, LA, An Introduction to the Terrestrial Wildlife Exposure Model (TWEM) and the Spatially Explicit Exposure Model (SEEM). SETAC 2004 Short Course Instructor. Society of Environmental Toxicology and Chemistry (SETAC) 4th World Congress and 25th Annual Meeting, November 14-18, 2004, Portland, Oregon.

Wickwire, W.T.**, C. A. Menzie**, D. Burmistrov and Mark S. Johnson. 2004. Applying a Spatially Explicit Wildlife Exposure Model to Improve Remedial Efficiency: The SEEM Case Study (Abstract/Poster Presentation). Annual International Conference on Soils, Sediments and Water, University of Massachusetts, Amherst, Massachusetts. October 18-21, 2004.

S.B. Kane Driscoll, M.E. McArdle, **C.A. Menzie**, A. Coleman. 2002. Application of Sediment Quality Guidelines of PAHs to Manufactured Gas Plant Sites. Presented at the 23rd Annual Meeting of SETAC North America, November 16-20, 2002, Salt Lake City, Utah.

Menzie, C.A., J.J. Cura, S. Kane-Driscoll, R. Lacey, and M. McArdle. 2001. Assessing ecological risks of PAH-contaminated sediments. Published in: Proceedings of the International Conference on Remediation of Contaminated Sediments. Venice, Italy, October 10-12, 2001. Battelle Press, Columbus, OH.

Cura, J.J. and **C. A. Menzie.** 1996. Methodologies for Ecological Risk Assessment: The Overall Process and Recent Advances. Presented at the Water Environment Federation 69th Annual Conference & Exposition. Conference Workshop #12 - Ecological Risk Assessment: Why and How - An Important Tool in Environmental Decision Making. October 5-9, Dallas, Texas.

Menzie, C.A. 1995. Problems in Ecological Assessment Related to Contaminated Site Management. In Proceedings of the NRC - CNRC Workshop, Toxicity Testing Applied to Soil Ecotoxicology, 28-29 November, 1995, Montreal, Quebec. NRC's Biotechnology Research Institute in collaboration with Environment Canada and the Quebec Ministry of Environment and Wildlife. pp. 26-27.

von Stackelberg, K., **C.A. Menzie**, and J.J. Cura. 1995. Risk Assessment: Helping to Focus Risk Management Objectives for MGP Sites. *Land Contamination & Reclamation*. (special issue). 3(4):24-29. Presented at the International Symposium and Trade Fair on the Clean-up of Manufactured Gas Plants, September 19-21, Prague, Czech Republic.

Menzie, C.A. and J.J. Cura. 1991. Environmental evaluations at hazardous waste sites. In Proceedings of the HMC-Northeast '91 Conference in Boston, Massachusetts, July 10-12, 1991, by the Hazardous Materials Control Research Institute. Greenbelt, MD, Hazardous Materials Control Research Institute, pp. 77-84.

Menzie, C.A. and J. Cura. 1991. Loadings of pollutants in Massachusetts Bay. Presented at U.S. Environmental Protection Agency Conference on Estuaries, February 24-26, Sarasota, FL.

Burmaster, D.E., K.M. Thompson, **C.A. Menzie**, E. Crouch and T. McKone. 1990. Monte Carlo techniques for quantitative uncertainty analysis in public health risk assessment. In *Proceedings of the 1990 HMCRI Conference*,

New Orleans, LA, by the Hazardous Materials Control Research Institute. Greenbelt, MD, Hazardous Materials Control Research Institute, pp. 215-21.

Menzie, C.A. 1988. Application of Connecticut's Aquatic Toxicity Program. Panel discussion and presentation to the Second Annual Workshop of the Connecticut Forum of Regulated Environmental Professionals, June 2, New Haven, CT.

Menzie, C.A. and D.E. Burmaster. 1988. Overview of soil clean-up levels and risk based decision making. Presented at the HazMat '88 Conference, June 14-16, Atlantic City, NJ.

Menzie, C.A. and D.E. Burmaster. 1988. Evaluation of environmental risk assessment methods. Presented at the Ninth Annual Meeting of the Society of Environmental Toxicology and Chemistry, November 13-17, Arlington, VA.

Menzie, C.A. 1988. The use - and possible misuse - of risk assessment as part of overall site management. Presented at the second Hazardous Waste Superfund Conference in San Francisco and Washington, D.C. 1988. Andrews Associates.

Burmaster, D.E., B. Murphy, J. Gushue and **C.A. Menzie**. 1987. A risk assessment for the Baird & McGuire Superfund Site. Presented at the Hazardous Materials International Conference, Washington, D.C.

Menzie, C.A., J.J. Cura, R. Gillmor, G. Mariani and S. Wilson. 1983. Research needs related to ocean disposal. Presented at the Ocean Waste Management Conference at the University of Rhode Island, May, Kingston, RI .

Menzie, C.A., J. Ryther, Jr., L.F. Boyer, J.D. Germano and D.C. Rhoads. 1982. Remote methods of mapping seafloor topography, sediment type, bedforms, and benthic biology. In Oceans '82 Conference Record. IEEE Publication Number 82CH1827-5. Piscataway, NJ, IEEE Service Center, pp. 1046-1051.

Gillmor, R.B., **C.A. Menzie** and J. Ryther, Jr. 1981. Side-scan sonar and T.V. observations of the benthic environment and megabenthos in the vicinity of an OCS exploratory well in the Middle Atlantic Bight. In Oceans '81 Conference Record. IEEE Publication No. 81CH1685-7. Piscataway, NJ, IEEE Service Center.

Menzie, C.A., D. Frye and R.N. Hazelwood. 1980. OTEC-1 Environmental Monitoring Program. In *Proceedings of the Seventh Ocean Energy Conference*, June 1980, Washington, D.C., by conference sponsor.

Menzie, C.A. and J. Ryther, Jr. 1980. Diego Garcia (Indian Ocean): An Atoll estuary. Presented at the New England Estuarine Research Society at the University of Rhode Island, Spring Session, Kingston, RI.

Mulligan, H.F. and **C.A. Menzie**. 1979. Phytoplankton as tracers of water masses on and around Georges Bank. Presented at the Second Informal Workshop on the Gulf of Maine and Scotian Shelf, May, Dalhousie, Nova Scotia.

Menzie, C.A, *et al* 1976. The environmental impact of the Clean Water Act on the Hudson River Estuary. Presented at the Fourth Hudson River Environmental Symposium.

Menzie, C.A., R. Hyman, and B. Woodward. 1976. Investigations of the chironomid fauna of Haverstraw Bay. Presented at Fourth Hudson River Environmental Symposium.

Menzie, C.A., D. Logan and J. Matousek. 1976. Benthic investigations in the Hudson

River Estuary. 1972-1974. Presented at the 24th Annual Meeting of the North American Benthological Society, Madison, WI.

Technical Reports

Kane Driscoll, S.B., M.E. McArdle, M.S., **C.A. Menzie**, Ph.D., T. Thompson, L. Mortensen, A. Fitzpatrick. 2003. Using Polycyclic Aromatic Hydrocarbons in Sediments for Judging Toxicity to Aquatic Life: Volume I and II, EPRI final Report. Electric Power Research Institute (EPRI), Palo Alto, California. 1005280.

Kane Driscoll, S.B., **C.A. Menzie**, G.A. Burton, J. Williams, A. Coleman. 2001. Review of Toxicology of PAHs in Invertebrate Aquatic Organisms. EPRI Final Report. Electric Power Research Institute (EPRI), Palo Alto, California. 1006594.

Dr. Menzie has written more than 100 technical reports as part of various programs. Information on these reports is available upon request.

David W. Blaha, AICP

Redevelopment Planning Task Leader

Mr. Blaha has 25 years of experience in land planning, engineering and environmental assessment addressing growth management, comprehensive planning, and resource protection. Experienced with master planning for brownfield sites pursuant to USEPA Superfund land use directives. He has designed master plans for over 3,000 acres of industrial/business parks. Clients include Baltimore Development Corporation, CSX, Constellation Properties, Westinghouse, General Motors Pension Fund, and Halle Development Company. Testified as an expert witness for many zoning, special exception, conditional use, and variance cases. Evaluated need for proposed facilities, consistency with Comprehensive Plans, compatibility with the neighborhood, adequacy of facilities, and change/mistake. Qualified as an expert in land planning and environmental assessment for many hearing officers, Board of Appeals, and district courts.

Registration

- American Institute of Certified Planners, 1986

Fields of Competence

- Regional planning, including siting studies for a variety of facilities including industrial plants, residential communities, energy facilities, sanitary landfills, prisons, parks, airports, highways, and dredge material placement sites.
- Master planning for industrial facilities and brownfield redevelopment, including site layout, utilities, grading, stormwater management, local permitting, environmental constraints.
- Environmental impact assessment and permitting experience for a wide variety of construction projects including reservoirs, marinas, power projects, highways, housing, and industrial development.

Credentials

- Master of Environmental Management, Duke University, 1981
- Bachelor of Arts, Biology, Gettysburg College, 1978

Key Projects

68th Street Landfill Preliminary Master Redevelopment Plan, Baltimore, MD. Task Manager for developing a preliminary master redevelopment plan as part of an Interim Data Gap analysis for this Superfund site pursuant to EPA guidance. Preliminary Master Plan served as basis for risk assessment and focused remedial investigation. Considered access, existing infrastructure, zoning, natural resources, real estate market, and site contamination in developing Preliminary Master Plan.

Fairfield Eco-Industrial Park Master Plan, Baltimore MD. Project manager for developing a brownfield redevelopment plan for an old under-utilized 2,200 acre industrial waterfront area in Baltimore City for the Baltimore Development Corporation (BDC) pursuant to EPA guidance. Tasks included land assembly plans, infrastructure assessment, transportation plans, site plans for the reuse of larger tracts for up to 2.5 million square feet, actual design of a regional stormwater management facility, and drafting of an urban renewal ordinance addressing design guidelines and environmental performance convenants.

Curtis Bay Solid Waste Transfer Station, MD. Prepared first detailed siting study conducted per the Chesapeake Bay Critical Area regulations to allow a solid waste management facility within the Critical Area. Close coordination with Chesapeake Bay Critical Area Commission staff.

Curtis Bay Property Redevelopment Plan, MD. Project Manager for redevelopment master planning and environmental assessment of 70-acre brownfield site on Curtis Bay in Baltimore City for a confidential client. Coordination with MDE to obtain Oil Control Program closure and Voluntary Cleanup Program certificates.

Solley Road Landfill Reuse Feasibility Study, MD. Project Manager for a feasibility study evaluating reuse options and regulatory requirements for an approximately 300-acre industrially and residentially zoned former sanitary landfill in Glen Burnie, MD.

Celanese Cellulose Acetate Facility Redevelopment Plan, Alberta, Canada. Senior Planner responsible for evaluating redevelopment options for Celanese's 800 acre campus. Evaluating land use regulations, infrastructure capacity, and highest and best use options for the property.

Dorchester County Economic Development Strategy, Cambridge MD. Task manager for the preparation of an economic development strategy to help Dorchester County adjust to Department of Defense cutbacks. ERM provided infrastructure engineering, master planning, and environmental support, including evaluating building conditions, utility capacity, and expansion potential for over 300 acres of under-utilized brownfield property in older sections of the City of Cambridge.

Regional Landfill Feasibility Study, NC. Coordinated development of a regional sanitary landfill feasibility study for the Research Triangle area of North Carolina (Raleigh, Durham, and Chapel Hill). Study included detailed assessment of need for and location of transfer stations using heuristic routing. Developed detailed economic analysis of transportation, construction, and operating costs. Developed siting criteria and evaluated 10 alternative sites.

International Trade Center, Anne Arundel County, MD. Prepared a master plan, preliminary engineering, and environmental assessment for 100 acre business park near Baltimore-Washington International Airport for McCormick Properties, including determination of consistency with FAA and noise regulations.

The National Business Park, Anne Arundel County, MD. Prepared a master plan, preliminary engineering, environmental assessment, and permitting for 180 acre site adjacent to the National Security Agency.

Westinghouse Oceanic Facility, MD. Prepared a facility master plan for the Westinghouse Oceanic Division property and testified as an expert land planner and environmental scientist at the Chesapeake Bay Critical Area Reclassification hearing before the County hearing officer, Board of Appeals, and Maryland Critical Area Commission for 115 acre site on Chesapeake Bay.

Tanyard Business Park, MD. Prepared a master plan, preliminary engineering, environmental assessment, and permitting for 107 acre site for CSX Realty just south of Baltimore City within the Chesapeake Bay Critical Area.

Arundel Crossing Business Park, MD. Prepared a master plan, preliminary engineering, environmental assessment, and permitting for 200 acre site in Anne Arundel County for Cafritz Company.

Gateway International Office & Hotel Complex, MD. Prepared a master plan, preliminary engineering, and environmental assessment for a 40 acre site for BTR Realty near BWI Airport.

Ridge Business Center, MD. Prepared a master plan, preliminary engineering, and environmental assessment for 35 acre site near BWI Airport for The Svatos Company.

Piney Orchard Planned Unit Development, Odenton, MD. Provided planning support, preliminary engineering, environmental assessment, and permitting for over 2,000 unit planned development on approximately 1,000 acres for Constellation Properties.

Odenton Town Center, Anne Arundel County, MD. Project Manager for NEPA/404 permit process for 11 acres of wetland impacts (including vernal pools) associated with proposed Town Center development. Coordinating with EPA, Corps, FWS, DNR, and MDE. Successfully secured all federal and state permits after 3 prior consultants failed over previous 10 years.

Bethlehem Steel Permitting and Mitigation, MD. Coordinated the delineation of 2.89 acres of wetlands associated with bringing an old sanitary landfill into compliance. Successful in convincing Corps of Engineers that only 0.9 acres of wetlands were jurisdictional. Developed wetland mitigation concept.

Lexington Park Revitalization Plan, St. Mary's County, MD. Project Manager for a master plan for the 2,200 acre Town Center area adjacent to the Patuxent River Naval Air Station, including market analysis, urban design plan, streetscape enhancements, and zoning.

Queensbury (NY) Remediation EA. Project manager for FERC evaluating remediation alternatives for sediments contaminated with PCB's along the Hudson River, just upstream of the Town of Queensbury water supply intake. Key issues was resuspension of contaminated sediments.

Crown Landing LNG Project, N.J.. Project Manager for redevelopment of a 175-acre brownfield site formerly used for the disposal of contaminated sediments for a liquefied natural gas import terminal for BP.