DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON
4551 LLEWELLYN AVENUE
FORT GEORGE G. MEADE, MARYLAND 20755-5000

REPLY TO
ATTENTION OF:

March 27, 2009

Directorate of Public Works

Mr. Robert Stroud
U.S. Environmental Protection Agency, Region III
Environmental Science Center
701 Mapes Road
Fort Meade, Maryland 20755

Re: Resource Conservation and Recovery Act § 7003 Unilateral Administrative Order
EPA Docket No. RCRA-03-2007-0213TH

Dear Mr. Stroud:

In accordance with Section VI (Work to be Performed), Paragraph A (Interim Measures), Subparagraph 4 of the Order, please find enclosed one original and two copies of the March 2009 *Final Interim Measures Workplan for Monitoring Wells 125d and 126d* for Fort George G. Meade for your records.

If you have any questions, please feel free to contact me at (301) 677-9188 or Paul Fluck at (301) 677-9365.

Sincerely,

Michael P. Butler

Michael P. Butler
Chief, Environmental Division
Directorate of Public Works

Enclosure

DISTRIBUTION:

John Buescher (Office of the Deputy Assistant Secretary of the Army) (w/o encl.)
Jeff Dozier (Fort George G. Meade, Office of the Staff Judge Advocate) (w/o encl.)
Paul Fluck (Fort George G. Meade, Restoration Manager)
Laurie Haines (Army Environmental Command)
Susan Ryan (Army Environmental Command) (w/o encl.)
Kurt Scarbro (Maryland Department of Environment)
Roseann Sendek (Army Environmental Law Division) (w/o encl.)
Kerry Topovski (Anne Arundel County Health Department)
Fort George G. Meade Administrative Record

Fort George G. Meade Installation Restoration Program, Information Repository
Fort George G. Meade Restoration Advisory Board (electronic copy only)

Document certification pursuant to Section XIII, Paragraph C (Certification) of the August 2007 § 7003 Resource Conservation and Recovery Act, Unilateral Administrative Order

March 2009 Final Interim Measures Workplan for Monitoring Wells 125d and 126d

I certify that the information contained in or accompanying this report is true, accurate, and complete.

As to those identified portions of this report for which I cannot personally verify their accuracy, I certify under penalty of law that this report and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Active Installation

Signature : Michael P. Butler **Date:** 27 MAR 09

Name : **Michael P. Butler**

Title : **Chief, Environmental Division, Fort George G. Meade**

FINAL

Interim Measures Work Plan for

Monitoring Wells 125d and 126d

Fort George G. Meade

MARCH 2009

Prepared for:

UNITED STATES ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT
10 South Howard Street
Baltimore, Maryland 21201

Prepared by:

MALCOLM PIRNIE, INC.
300 East Lombard Street, Suite 1510
Baltimore, Maryland 21202

This document is provided in accordance with Section VI (Work to be Performed), Paragraph A (Interim Measures), Subparagraph 4 of the August 27, 2007, Unilateral Administrative Order.

FINAL

Interim Measures Work Plan for

Monitoring Wells 125d and 126d

Fort George G. Meade

MARCH 2009

DoD Delivery Order Contract Number: W912DR-09-D-0021-0001

Reviewed and Approved by:

Heather Polinsky, Vice President
Program Officer
Malcolm Pirnie, Inc.

Daniel P.Sheehan, P.E., BCEE
Project Manager
Malcolm Pirnie, Inc.

Malcolm Pirnie, Inc., prepared this Work Plan at the direction of the United States Army Corps of Engineers (USACE). This document should be used only with the approval of the USACE. This Work Plan is based, in part, on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

Table of Contents

Maps

Figures

Tables

Appendices

Acronyms

Acronym	Definition
ALSI	Analytical Laboratory Services, Inc.
CCl_4	Carbon Tetrachloride
DQO	Data Quality Objectives
EM	Engineering Manual
FGGM	Fort George G. Meade
FSP	Field Sampling Plan
H&S	Health and Safety
HASP	Health and Safety Plan
IAW	In Accordance With
IDW	Investigation-Derived Waste
LDC	Laboratory Data Consultants
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
PCE	Tetrachloroethylene
PM	Project Manager
PMI	Project Management Institute
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAB	Restoration Advisory Board
RI	Remedial Investigation
ROE	Right of Entry
TCE	Trichloroethylene
U.S.	United States
USACE	United States Army Corps of Engineers
USACHPPM	United States Army Center for Health Promotion and Preventative Medicine
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1 Introduction

This Interim Measures Work Plan for Monitoring Wells 125d and 126d has been prepared on behalf of the United States (U.S.) Army to further remedial activities at Fort George G. Meade (FGGM), Maryland. This Interim Measures Work Plan has been prepared, and the planned Interim Measure will be performed, under the Unilateral Administrative Order (Order) issued to the U.S. Department of the Army (Army) on 27 August 2007 by the U.S. Environmental Protection Agency (USEPA) Region III. The scope for this project is also based on the Interim Measure Required letter from the USEPA to FGGM dated 29 January 2009 (Appendix A).

This Interim Measures Work Plan presents the U.S. Army's proposed actions to determine if private wells within one mile of monitoring wells 125d and 126d are contaminated by volatile organic compounds (VOCs) that may originate at FGGM, and to investigate subsurface soil and shallow groundwater to determine the risk to human health, if any, presented by VOCs intruding into indoor air. The intent of the Interim Measure is to control the mitigation of contaminated groundwater that may be emanating from FGGM and control current human and ecological exposure to the contaminated media (Order, Appendix D).

The Interim Measures Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP) for the Monitoring Wells 125d and 126d investigation are presented in Appendices B, C, and D, respectively.

This Interim Measures Work Plan has been prepared by Malcolm Pirnie, Inc., under U.S. Army Corps of Engineers (USACE) Baltimore District, Contract Number W912DR-09-D-0021, Delivery Order 0001.

1.1 Background

As part of the Remedial Investigation (RI) of the Closed Sanitary Landfill Installation Restoration Program site at FGGM, four groundwater monitoring wells (identified as 123s, 124s, 125d, and 126d), were installed in 2003 on private property just outside the southeastern border of the installation on the east edge of North Patuxent Road (Map 1-1). These are two groups of deep and shallow well clusters (125d/123s and 126d/124s) which were sampled in June 2004. The deep monitoring wells (125d and 126d) were also sampled in March 2005 as part of the RI. Upon completion of the RI in 2007, tetrachloroethylene (PCE), trichloroethylene (TCE), and carbon tetrachloride (CCl_4) were recognized as contaminants within the Lower Patapsco aquifer. Concentrations of CCl_4 and PCE were detected above their respective federal maximum contaminant levels (MCLs), but TCE was detected below its MCL. Details, including the purpose, dates of investigation, results, and conclusions, are presented in the August 2007 report *Final FGGM Closed Sanitary Landfill Groundwater RI*.

Anne Arundel County has previously identified residential wells proximal to monitoring wells 125d and 126d and began sampling some of these wells in 2005 and annually since. Not all residential wells were sampled, as not all the home owners agreed to have their water sampled. Since 2005, there have been no VOCs detected at concentrations exceeding their Federal MCLs in the residential wells. Copper and lead have been detected above their respective MCL; however, this is believed to be a result of the home's plumbing.

In November 2008, FGGM redeveloped and resampled the two existing monitoring wells, 125d and 126d as part of the Army's continual effort to monitor groundwater associated with the Closed Sanitary Landfill. Monitoring wells 125d and 126d are screened in the Lower Patapsco aquifer. When the validated data was available, the Army conferred with Anne Arundel County, the Maryland Department of Environment (MDE), and USEPA (separate telecoms) on 22 January 2009. The validated data and the Army's general approach to addressing the matter was presented to Restoration Advisory Board (RAB) members and other stakeholders including Anne Arundel County, MDE, and USEPA at the 22 January 2009 RAB meeting. The results of this sampling event showed concentrations of CCl_4 from 125d and CCl_4, TCE, and PCE from 126d all to have increased above their respective MCL. Thus, the USEPA issued the Interim Measure Required letter to FGGM, requiring FGGM to prepare this Interim Measures Work Plan for Monitoring Wells 125d and 126d. The three analytes (CCl_4, TCE, and PCE) were the only VOCs detected above their respective MCL; and therefore, are the contaminants of concern for this Interim Measure.

1.2 Interim Measures Scope

This Work Plan addresses the implementation of the following actions per the Interim Measure Required letter from the USEPA to FGGM:

- Representative sampling of the residential wells located within 1 mile of monitoring wells 125d and 126d and analysis of well water to determine whether any currently used water sources are contaminated and, if so, to provide a basis upon which to decide what immediate action, if any, should be taken.
- Investigation of subsurface soil and shallow groundwater to determine the risk to human health, if any, presented by VOCs intruding into indoor air.

1.3 Interim Measures Objectives

As an Interim Measure, this work is not intended to be a compliance-based final remedy. However, contaminant monitoring analytical data are expected to be useful in that regard for the Corrective Measures Implementation phase of the Order process.

The objectives of this Interim Measure include the following which are based on the Order and the Interim Measure Required letter from the USEPA to the Army:

- As part of the completion of the Interim Measure, gather data to determine if the VOCs CCl_4, TCE, and PCE are present in residential water wells within one mile of MW 125d and MW 126d.

- If the VOCs CCl_4, TCE, and PCE that are found in residential water wells, determine if they present a health the risk to residents.
- Implement one or more interim measures that will provide immediate protection to those residents determined to use groundwater as a potable water supply.
- Investigate if VOCs present in subsurface soil and shallow groundwater present a vapor intrusion risk to human health.

Identifying the residents/property owners with access to groundwater via private wells and providing them with an alternative water supply (e.g., bottled water, filtered water systems) is a conservative preventive measure until such time it can be determined if the contaminants originated from FGGM (CCl_4, TCE, and PCE) present a health risk, and corrective measures can be implemented. After analyzing the private well water to determine whether any currently used water sources contain levels of CCl_4, TCE, and/or PCE above the MCLs, this Interim Measures Study will provide a basis upon which to decide what immediate action, if any, should be taken.

1.4 Work Plan Organization

As outlined in the Order issued to the Army on 27 August 2007 by the USEPA Region III, this Work Plan is organized as follows:

- Section 1 – Introduction
- Section 2 – Management Approach
- Section 3 – Technical Approach
- Section 4 – Schedule
- Section 5 –References

The following appendices are included as part of this Work Plan:

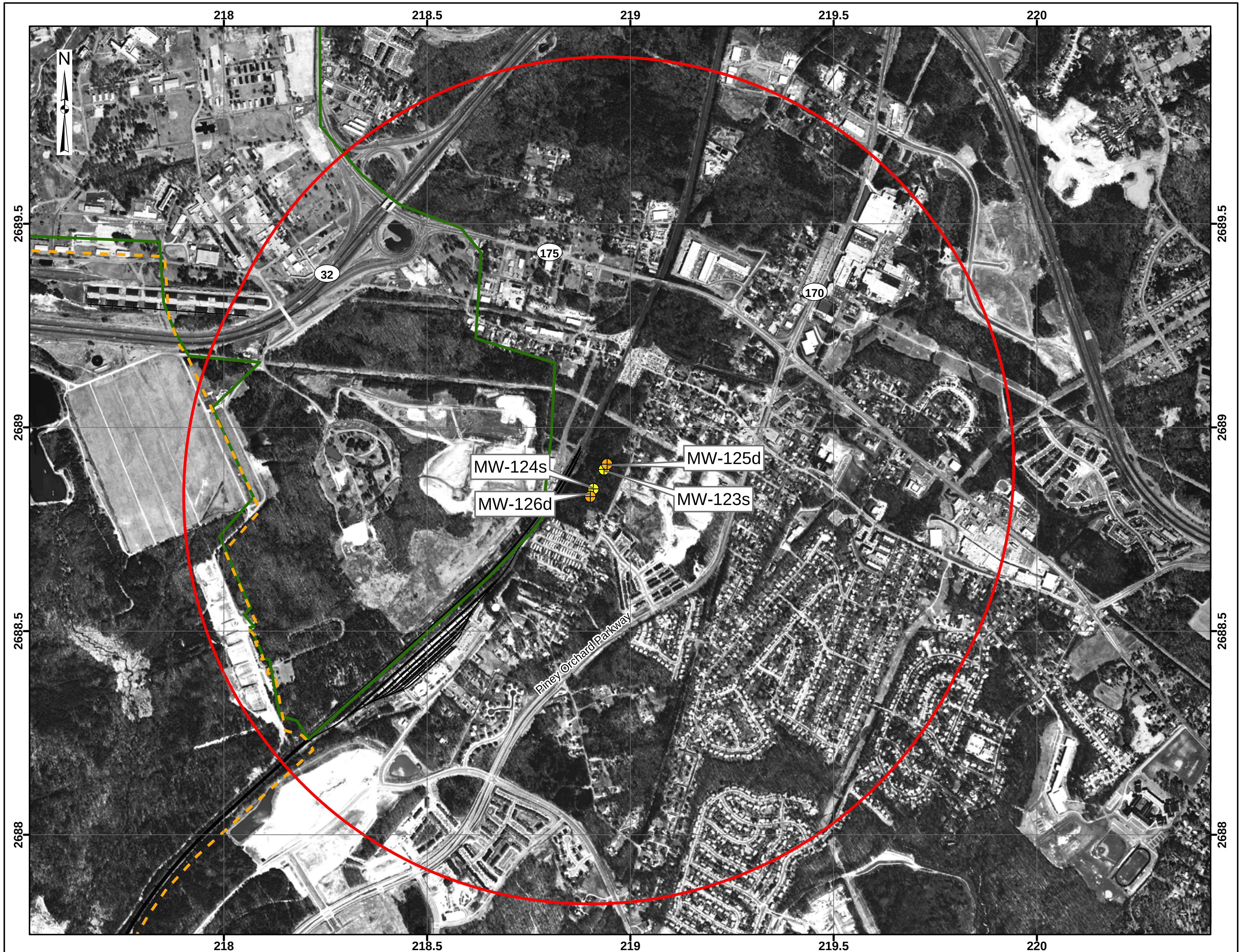
- Appendix A – USEPA Interim Measures Required Letter to FGGM dated 29 January 2009
- Appendix B –FSP
- Appendix C –HASP
- Appendix D –QAPP
- Appendix E –Community Relations Plan
- Appendix F –Project Forms
- Appendix G –Project Team Qualifications and Resumes

  G-1 – Malcolm Pirnie

  G-2 – Analytical Laboratory Services, Inc. (ALSI)

  G-3 – Laboratory Data Consultants (LDC)

  G-4 –Enviroserve
- Appendix H – Vapor Intrusion Technical Memorandum



Interim Measures Work Plan for Monitoring Wells 125d and 126d FGGM

MALCOLM PIRNIE

Map 1
1 Mile Radius of Monitoring Wells

Legend

- Installation Boundary
- BRAC Boundary
- 1 Mile Radius of Monitoring Wells

Monitoring Well

- Deep Monitoring Well
- Shallow Monitoring Well

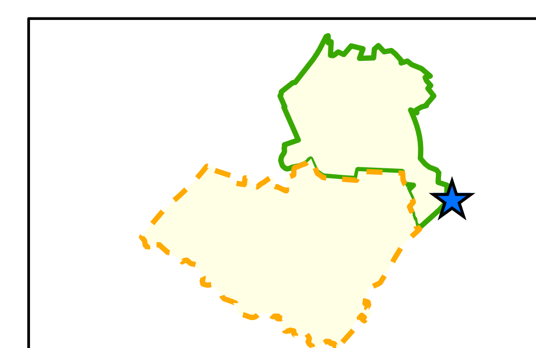
0 0.25 0.5 Miles

1 inch equals 0.25 miles

Data Source: TerraServer DOQ, 2009
FGGM, GIS Data, 2005

Coordinate System: UTM Zone 18
Datum: North American Datum 1983
Units: Meters

Date: March 2009



2 Management Approach

The project management organization consists of the USACE Project Manager (PM) and the Malcolm Pirnie project management team. Figure 2-1 (at the end of this section) depicts the project team. A contact list for key team members is provided in Table 2-1.

Table 2-1: Project Personnel

Name	Title	Work Phone
L. Craig Maurer	USACE Project Manager	(410) 962-3506
Clyde Lichtenwalner	USACE Design Team Lead	(410) 779-0014
Laurie Haines	U.S. Army Environmental Command (USAEC) Restoration Manager	(410) 436-1626
Larry Tannenbaum	U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)	(410) 436-5210
Michael Butler	FGGM Environmental Division Chief	(301) 677-9188
Paul Fluck	FGGM Installation Restoration Manager	(301) 677-9365
Heather Polinsky	Malcolm Pirnie Program Manager	(410) 230-9961
Daniel Sheehan	Malcolm Pirnie PM	(302) 884-6919
Denise Tegtmeyer	Malcolm Pirnie Task Manager	(410) 230-9963
Charles Myers, Certified Industrial Hygienist (CIH)	Malcolm Pirnie Health and Safety (H&S)	(201) 398-4409
Richard Brownell	Malcolm Pirnie Quality Assurance / Quality Control (QA/QC)	(914) 641-2424
Ann Rychlenski	Malcolm Pirnie Public Outreach Task Manager	(718) 397-2372

2.1 Project Management

Malcolm Pirnie embraces a set of proven project management practices that are tailored to meet the Army's needs. Our practices follow Project Management Institute (PMI) standards, including the Project Management Body of Knowledge. The use of PMI's globally accepted standards assures the Army that this project is initiated, planned, executed, monitored, controlled, and closed in accordance with (IAW) world-class principles and procedures.

Effective project management relies on the ability of the PM to manage and unify a team to deliver a project that meets the Army's expectations. Our PM, Dan Sheehan, and Task Manager, Denise Tegtmeyer, have been trained in industry practices and have demonstrated project management excellence on past projects, including the ability to:

- identify and anticipate potential issues before they become critical;

- evaluate competing alternatives and approaches to identify appropriate solutions to solve an issue;
- prioritize activities and resources to maintain project schedule, scope, and budget;
- provide clear leadership to guide the project team through the decision-making process, balancing tradeoffs between competing project goals and objectives as they arise; and,
- communicate frequently with the client along the way.

Malcolm Pirnie’s subconsultants were selected carefully based on unique skill sets, historical insights, and experiences that are critical to project success.

2.1.1 Project Work Plan

This Work Plan includes the elements of a Project Management Plan. The work plan will be maintained and updated as required to reflect any changes to the project identified during Draft review.

2.1.2 Communications

Clear two-way communication is essential to managing a successful project at all levels within the company, between the company and subconsultants, and between the company and the client. The communications plan includes regularly scheduled progress meetings/conference calls between the PM, Task Managers, and project subconsultants during project kickoff and when producing project deliverables. These regularly scheduled progress meetings/conference calls will ensure coordination and common focus on achieving FGGM and USACE goals. In addition to frequent ongoing informal communications, formal monthly progress meetings will also be held between the PM, Task Managers, and FGGM. Meeting schedules will be adjusted, as necessary, to maintain adequate levels of communication as the project ramps up, the team goes to the field, and deliverables are being produced. These meetings, depending on subject matter, will be conducted in person or via conference call.

Meetings with the project stakeholders (USAEC, USACHPPM, USEPA, MDE, FGGM, and Anne Arundel County) will also be conducted periodically throughout the project in order to facilitate the progress of the project. These meetings, depending on subject matter, will be conducted in person or via conference call. It is anticipated either a meeting or conference call will be held after distribution of the draft and draft final versions of reports to facilitate the expedited reviews of the documents.

2.2 Safety Management

Malcolm Pirnie has a responsibility to provide a safe working environment and has empowered its senior management to establish and implement policies and procedures to prevent on-the-job injuries. H&S policies have been developed and incorporated into our HASP. Our policies and procedures are designed for protecting office and field personnel as well as team members and subconsultants working on Malcolm Pirnie projects. By applying these safety policies and procedures, it is our primary goal to reinforce safety procedures through ongoing training so that occupational incidents are minimized. Injuries seriously impact employees both physically and emotionally and can also negatively affect family members and coworkers.

To further deter site injuries, safety orientation training will be provided to all site personnel before any fieldwork begins. All attendees, including subconsultants and visitors, will be required to sign the HASP at the completion of training.

All personnel working on this project are responsible for continuous adherence to the corporate H&S procedures and project-specific safety plan requirements when performing their work. No person may work in a manner that conflicts with the intent of, or the inherent safety and environmental precautions expressed in, these procedures. All on-site personnel have stop-work authority in the event they see an unsafe condition being created. The unsafe condition will be reported to the employee's supervisor and the responsible safety professional for resolution before the affected work activity is resumed.

All site operations will be performed IAW the latest version of the following applicable regulations: federal, state and local regulations and procedures; 29 Code of Federal Regulations 1910.120 *Occupational Safety and Health Standards*; Army Regulation 385-10; Engineer Manual (EM) 385-1-1; and Malcolm Pirnie's corporate safety program as well as the site-specific HASP (Appendix C).

2.3 Project Quality Control

Ensuring QC starts with having tried-and-true QA processes, followed by proper planning and execution. Success is ensured by frequent communication among USACE, FGGM, Malcolm Pirnie, and all team members. The applicable criteria, project goals, and other critical factors, including scheduled reviews, applicable disciplines, project schedule, QC for field activities and office/design activities, and subconsultant management and control procedures have been identified for this project. We have also assigned the right people to the project (including subconsultant support) along with expert independent reviewers to ensure that appropriate experience and expertise are dedicated to the project.

Since execution of QC is critical to the success of this project, quality will be ensured through:

- utilization of quality checklists based on our previous experience;
- weekly reviews to discuss staffing and deliverable schedules to ensure there is adequate time and resources to perform solid QC reviews;
- independent reviews by each discipline engaged in each project;
- periodic meetings with all team members (including subconsultants); and
- frequent meetings with USACE and FGGM to confirm joint goals, discuss project issues, and review lessons learned.

When project assignments are made to team subconsultants, their managers and technical staff will become a part of the integrated project team and are ultimately are accountable to our assigned PM and technical experts. Our goal is to provide a seamless technical team.

The QAPP (Appendix D) consists of policies, procedures, specifications, standards, and documentation sufficient to produce data that meet the quality requirements of the data quality objectives (DQOs) for this project, the USEPA Risk Assessment Guidance, and USACE EM 200-1-4 and that minimizes data loss from out-of-control conditions or malfunctions. The QAPP is prepared using the Uniform Federal Policy for QAPP format and addresses procedures to assure the precision, accuracy, representativeness, completeness, and comparability of field and laboratory data. It also provides a framework for evaluating existing data that may be used in this project. The QAPP identifies the QA procedures to be followed by field sampling teams and the analytical laboratory and specifies the QA parameters that must be met.

2.4 Subconsultant Management

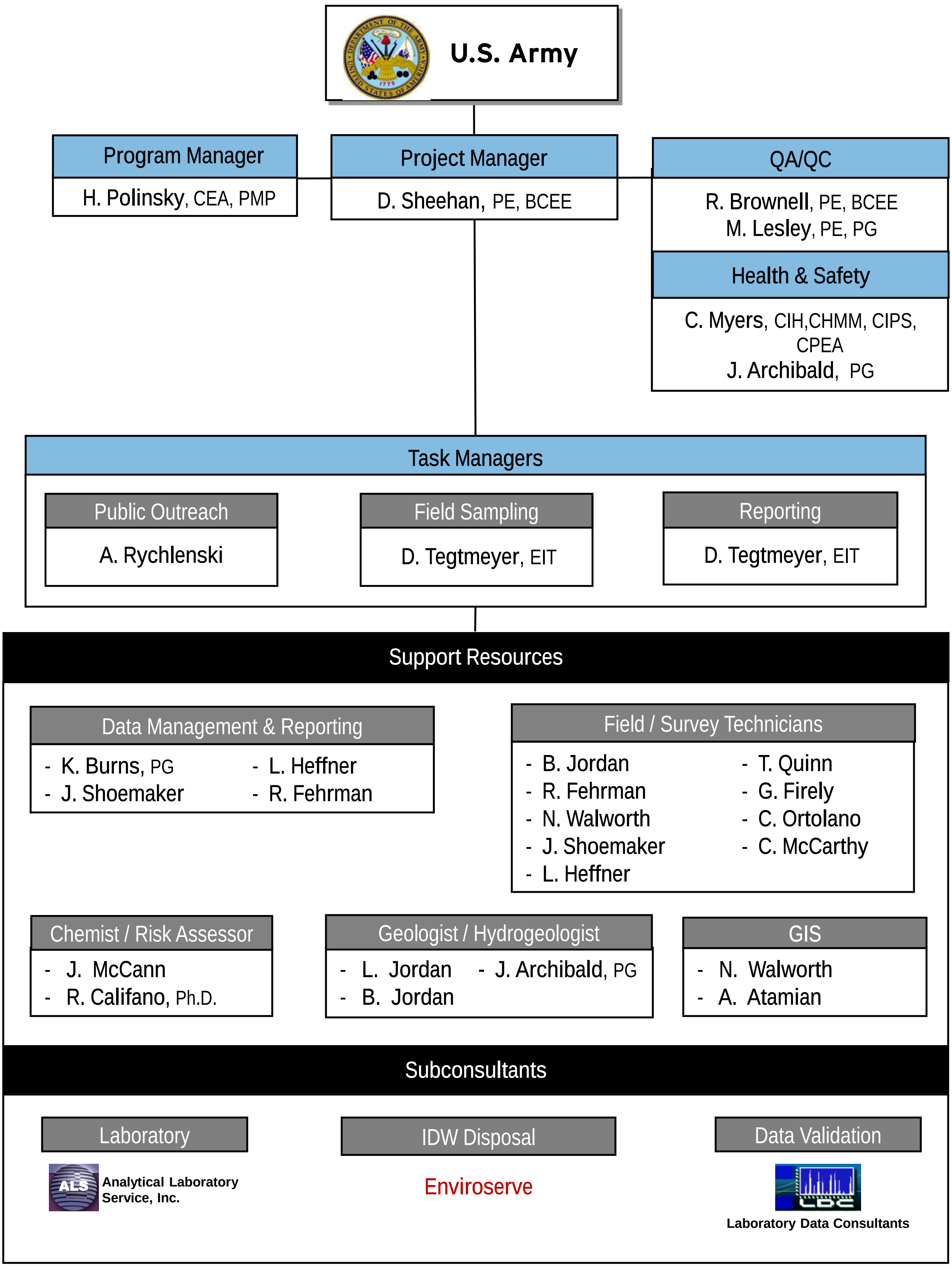
Subconsultants will be managed throughout the project to support fieldwork and document preparation. Subconsultant work will include laboratory services, investigation-derived waste (IDW) disposal, and data validation. Subconsultant performance is the responsibility of Malcolm Pirnie, who will ensure that subconsultants comply with all project requirements. A review process will be implemented to monitor task completion and schedule.

2.5 Qualifications

A description of qualifications of personnel performing or directing the interim measures for this project is provided in Appendix G. A statement of qualification and resumes for key staff from Malcolm Pirnie and the following subconsultants are also provided in Appendix G:

- ALSI
- LDC
- Enviroserve

Figure 2-1: Project Organization Chart



3 Technical Approach

The selected interim measures include conducting a private well survey, conducting outreach and contacting residential property owners or other property owners (e.g., commercial, industrial, federal, etc.), collecting private supply well and monitoring well water samples, performing a vapor intrusion assessment, providing bottled water or filtered water systems, and reporting. These interim measures will serve two purposes: 1) provide data to support a corrective measures evaluation and 2) protect human health and the environment by limiting exposure to contaminated groundwater.

3.1 Private Well Survey

A private well survey will be conducted to identify the presence of private groundwater wells within a 1-mile radius of monitoring wells 125d and 126d, as shown on Map 1-1. A public outreach effort will also be conducted, and residents/property owners will be requested to notify the Army if they have a private well. A flow chart showing the process for the private well sampling is provided in Figure 3-1.

3.1.1 Information Gathering

The first task in identifying private wells that require sampling is to gather information about the presence of wells and the use of those wells within the 1-mile radius. The survey will include researching state and county records for well permits. The Anne Arundel County Health Department and Anne Arundel County Department of Public Works will also be contacted to research and identify residents/property owners within the 1-mile radius that have private wells, as well as to confirm that the remainder of the residents/property owners are on public water supplies. The names and addresses for owners and residents/tenants within the 1-mile radius will also be identified in conjunction with Anne Arundel County (e.g., review of tax parcel maps). The area within the 1-mile radius will also be physically canvassed for visible signs of private wells (well heads in yards, etc.). This survey will be conducted from publically accessible roadways and/or sidewalks, and no private property will be accessed during this initial survey.

3.1.2 Survey Notification Letters

The private well survey effort will include notification via mail of the owners and residents/tenants within the 1-mile radius. The notification letters will be sent at least one week in advance of the door-to-door resident/property owner survey. The notifications will state the purpose of the survey, provide the schedule for performing the door-to-door survey, and provide information about the scheduled public meeting. Contact information for the Army representatives will also be provided in the notification letter in order to answer property owners' potential questions.

3.1.3 Private Well Survey

A door-to-door survey will be conducted for the residents/property owners within the 1-mile radius. During the survey, up to three attempts will be made to interview the residents/property owners in coordination with FGGM, USEPA, MDE, and/or Anne Arundel County. At least two attempts will be made in person, and an additional attempt may be made via telephone. If the residents/property owners are not available during the door-to-door survey, a notice indicating "sorry, we missed you" will be left at the residence/property. This notice will include contact information, as well as when another attempt to contact the residents/property owners will be made.

The private well surveys will be conducted by multiple teams. Each survey team will have a minimum of two personnel. When possible, an Army representative will accompany each interview team. An example of the survey questionnaire is provided in Appendix F. The questionnaire will not only seek to identify which residents have a private well, but also, if it is determined that a well does exist, request details about it (e.g., depth, construction, usage).

At the conclusion of the private well survey, an interim letter report that concludes the results of the private well survey effort (i.e., formalizing activities conducted and where well samples are proposed) will be prepared. A figure identifying the locations of the private wells within the study area will be included in the interim letter report. This letter report will be incorporated into the Interim Measures Report.

3.2 Outreach and Contact with Residents

Any project dealing with public safety and environmental contamination needs to develop a proactive program of public involvement to provide a platform for disseminating information and gathering public input and comment. Any community involvement will be coordinated with USACE, Baltimore District's Public Affairs Office and FGGM. In collaboration with the Army, public outreach activities will be conducted to inform the public of the impacted groundwater and provide information on the potential exposure hazards associated with CCl_4, TCE, and PCE. Community outreach will encompass a letter to residents/property owners, public meetings, RAB meetings, and contact with residents/property owners.

3.2.1 Letters to Residents

A letter will be prepared for residents/property owners of the community describing the project and the current activities that will be performed. The letter will be distributed to all members of the community within a 1-mile radius of Monitoring Wells 125d and 126d. All written correspondence will be on Army letterhead. Refer to Section 3.1.2.

3.2.2 Public Meetings

Two public meetings will be conducted (one at the beginning of the project and one after the fieldwork has been completed) to provide an arena to:

- Share the information known,
- Outline the plan to obtain additional information needed to determine if there is anyone at risk from potential exposure, and
- Answer questions from the public.

The goal of the first meeting is to inform the public of the impacted groundwater and provide information on the potential exposure hazards associated with CCl_4, TCE, and PCE. This meeting will also lay the foundation for future discussions and interactions with the community. The first public meeting will be conducted prior to commencing the external aspects of the private well survey so the residents/property owners are informed prior to receiving the survey notification letters. The existing Community Relations Plan (Appendix E) will be used to help engage stakeholders.

The second public meeting will be held during the public comment period for the Draft Final Interim Measures Report and will provide stakeholders an opportunity to directly express concerns to Army representatives and to ask questions or make comments on the results of the interim measures activities, including results of the groundwater sampling and groundwater use survey. The steps taken to mitigate potential exposure to VOCs in groundwater will also be presented at the public meeting.

For both public meetings, the Army will prepare and assist in presentation of the materials that explain the activities and the process associated with the interim measures. Materials for the meetings may include a PowerPoint presentation and poster-size graphics for a more informal open house meeting format. Tentatively, public meetings to discuss the project will be held at the West County Area Library, 1325 Annapolis Road, Odenton, Maryland, 21113.

A verbatim transcript will be taken of each public meeting. A copy of each public meeting transcript will be maintained in the Administrative Record at FGGM. The Army will also strive to provide the public with an opportunity to speak with representatives of the involved government agencies during the public meetings.

3.2.3 RAB Meetings

Team members will attend and participate in two FGGM RAB meetings. The meetings will be held at FGGM with time and place of these meetings to be determined by the installation. The installation will be responsible for a transcript and meeting minutes for the RAB meetings. The Army will prepare and assist in presentation of the materials that outline/explain the activities and the process associated with project activities at the FGGM off-Post private well investigation. The Army will include an update on the status of the project at the next two RAB meetings (March and May 2009) and future RAB meetings as the situation warrants. Materials for the RAB meetings may include a PowerPoint presentation, poster-size graphics, and/or informational handouts.

3.2.4 Contact Residents

In addition to the initial contacts made during the private well survey (reference Section 3.1.3), Public and private well owners within the investigation area will be contacted by the contractor (in collaboration with the Army and potentially the USEPA, MDE, and/or Anne Arundel County officials) to request permission to sample their wells. The residents/property owners identified to have private wells, as a result of the private well survey, will be contacted and a right of entry

(ROE) will be requested to enter their property to collect the samples. The ROEs will be prepared in coordination with the USACE, Baltimore District Real Estate Office. No properties will be accessed without a signed ROE. Analytical results will be provided to each owner and resident/tenant where samples were collected. These results will be provided via letter and prior to the second public meeting.

When approached by a resident or property owner, USACE, Baltimore District and FGGM will be informed of the request and, as applicable, a response will be made with relevant information that has been authorized by USACE, Baltimore District and FGGM.

3.2.5 Community Relation Plan

The U.S. Army has developed the Final Community Relations Plan for Fort George G. Meade (2005) to facilitate local community involvement with the environmental investigation and cleanup program at FGGM. Updates to the existing Community Relations Plan have been incorporated and are presented in Appendix E.

3.3 Well Sampling

3.3.1 Private and Public Well Sampling

Water samples will be collected from all private and public wells within the study area as identified during the private well survey. An approved (signed) ROE is required prior to entering private property and collecting samples from private wells. Each private water supply well will be sampled two times within a two-month period. Procedures for sampling the private wells are outlined in the FSP (Appendix B), and the schedule is provided in Section 4.

3.3.2 Monitoring Well Sampling

Groundwater samples will be collected from existing monitoring wells 125d, 126d, 123s, and 124s. These are two groups of well clusters (125d/123s and 126d/124s) located in Odenton, Maryland. Each monitoring well will be sampled two times within a two-month period. Procedures for sampling the monitoring wells are outlined in the FSP (Appendix B) and include collecting water level measurements and developing the monitoring wells prior to the first sampling event. The schedule for conducting the monitoring well sampling is provided in Section 4.

3.3.3 Data Analysis

All water samples collected (private wells and monitoring wells) will be analyzed using USEPA method SW846/8260 or other appropriate method. All data analyses will be completed by subconsultant, ALSI, a National Environmental Laboratory Accreditation Conference-validated laboratory, with a turnaround time not to exceed five business days. A third-party data quality review and validation will be conducted for all samples (100%) collected. USEPA level III data validation will be conducted per current guidance. Subconsultant LDC will provide data validation of the samples within five business days of receipt.

The QAPP in Appendix D provides additional details on the data analysis as well as DQOs.

3.3.4 IDW Plan

Well water will be containerized and disposed of at an appropriate facility. Subconsultant Enviroserve is fully qualified to handle disposal activities and will be responsible for disposal of the drums, including providing the appropriate paperwork to confirm proper disposal. The development and sampling water will be stored temporarily at the Fort Meade Recycling Center. All drums will be securely sealed (e.g., capped and banded). No drums will remain overnight at the monitoring well locations. During pickup of the drums, a field team representative and an FGGM representative will be present at the site. Prior to and/or during drum pickup by the Enviroserve, manifest signatures and review of destiny of IDW will be finalized.

3.4 Vapor Intrusion Assessment

Existing groundwater quality data and hydrogeologic data has been evaluated to determine the likelihood of vapor intrusion risk to residences within the investigation area. The boring logs, well construction logs, and field notes from the installation of wells 123s, 124s, 125d, and 126d have been reviewed to determine if there are any potential sources for VOCs. Available sampling data from these wells and other wells in the adjacent area have also been evaluated. A Vapor Intrusion Technical Memorandum has been prepared which summarizes the results of the vapor intrusion assessment and is presented in Appendix H.

3.5 Bottled Water Distribution

The residences requiring bottled or filtered water will be identified based on the results of the private well survey. Refer to Figure 3-1 for the decision process to provide bottled water. Bottled or filtered water will be supplied to the identified residences for drinking water and cooking purposes, and the amount of water supplied will be determined based on the number of residents within each household.

A risk evaluation will be conducted to determine if other exposure routes (i.e., inhalation and direct contact), in addition to consumption, pose a risk to residents using well water. This evaluation will include an evaluation of potential risk from using well water for showering, bathing, agricultural use, car washing, and etc. pursuant to the Interim Measure Required letter from the USEPA to FGGM dated 29 January 2009.

If MCL exceedances are detected in the private wells, additional water supply services may be required. This will be addressed separately and is not addressed in this Work Plan.

3.6 Reporting

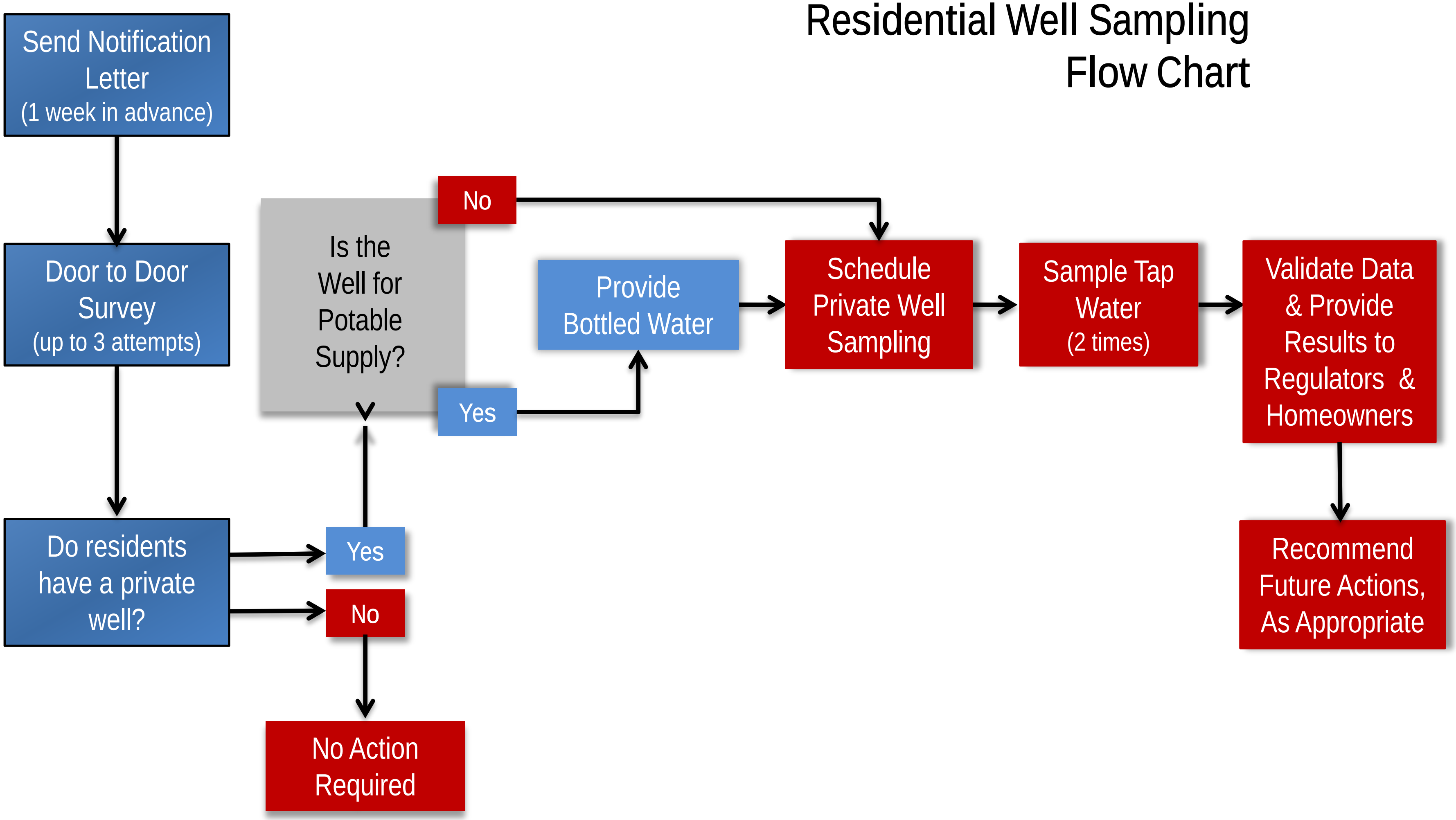
Reporting efforts for this project include, but are not limited to, the following:

- A letter report that concludes the results of the private well survey effort (i.e., formalizing activities conducted and where well samples are proposed). This letter report will be incorporated into the Interim Measures Report.

- A letter report summarizing the results of the initial round of sampling (monitoring wells and private wells). This interim letter will be incorporated into the Interim Measures Report.
- A Vapor Intrusion Technical Memorandum has been prepared to summarize the results of the vapor intrusion assessment. Updates, if required, will be incorporated into the Interim Measures Report.
- An Interim Measures Report will be written to summarize all field activities, interpret and analyze the data, discuss public involvement and well survey results, and make the appropriate recommendations for future activities necessary to protect potential receptors. The Interim Measure Report will also explain any modifications to the plans and why these were necessary for the project.
- A letter summarizing the disposal requirements pertaining to IDW management (containerized drums), if required.

The Interim Measures Report will be produced in draft, draft final, and final versions in both hardcopy and electronic format. The draft and draft final versions will be revised based on comments received from the Army and regulatory stakeholders, respectively. Public comments from residents and RAB members will also be incorporated. Separate Response to Comments documents will be prepared for the draft and draft final versions. It is anticipated that either a meeting or conference call will be held after distribution of the draft and draft final versions to facilitate the expedited reviews of the documents. After the submittal of the Final Reports, the analytical data will be uploaded to the Environmental Restoration Information System.

Figure 3-1:
Residential Well Sampling Flow Chart



4 Schedule

The project schedule (Figure 4-1) has been established according to the performance of the tasks, as delineated by the USACE, Baltimore District project scope of work dated 3 February 2009. The project schedule has been derived through development of the interim measures requirements to identify a logical progression of tasks and activities aimed at achieving the interim measures. The basis for the schedule is development of tasks and activities, which will support the Interim Measures. The project schedule is subject to change due to issues such as availability of residents/property owners, number of properties requiring access, permission to access private property, and adverse weather. The schedule will be included in the project status reports and clearly outlined to the USACE, Baltimore District PM and FGGM. The project schedule will also be provided to all stakeholders during meetings, presentations, and as requested.

Monthly payment and project status reports will be prepared and submitted to the USACE, Baltimore District each month of this project. The reports will contain the status, on a percentage basis, of the total amount of work completed.

The project schedule is provided as Figure 4-1 and is based on numerous assumptions and dependencies as follows (all days are in business days):

General schedule assumptions:

- USEPA and MDE are allotted 23 working days (1 month) for review and comment.
- USEPA is allotted 10 working days for final plan approval.
- The Army is allotted 10 working days to address comments, including submitting response to comments documents.
- The Army will notify the USEPA in writing at least 10 working days in advance of any field activities.

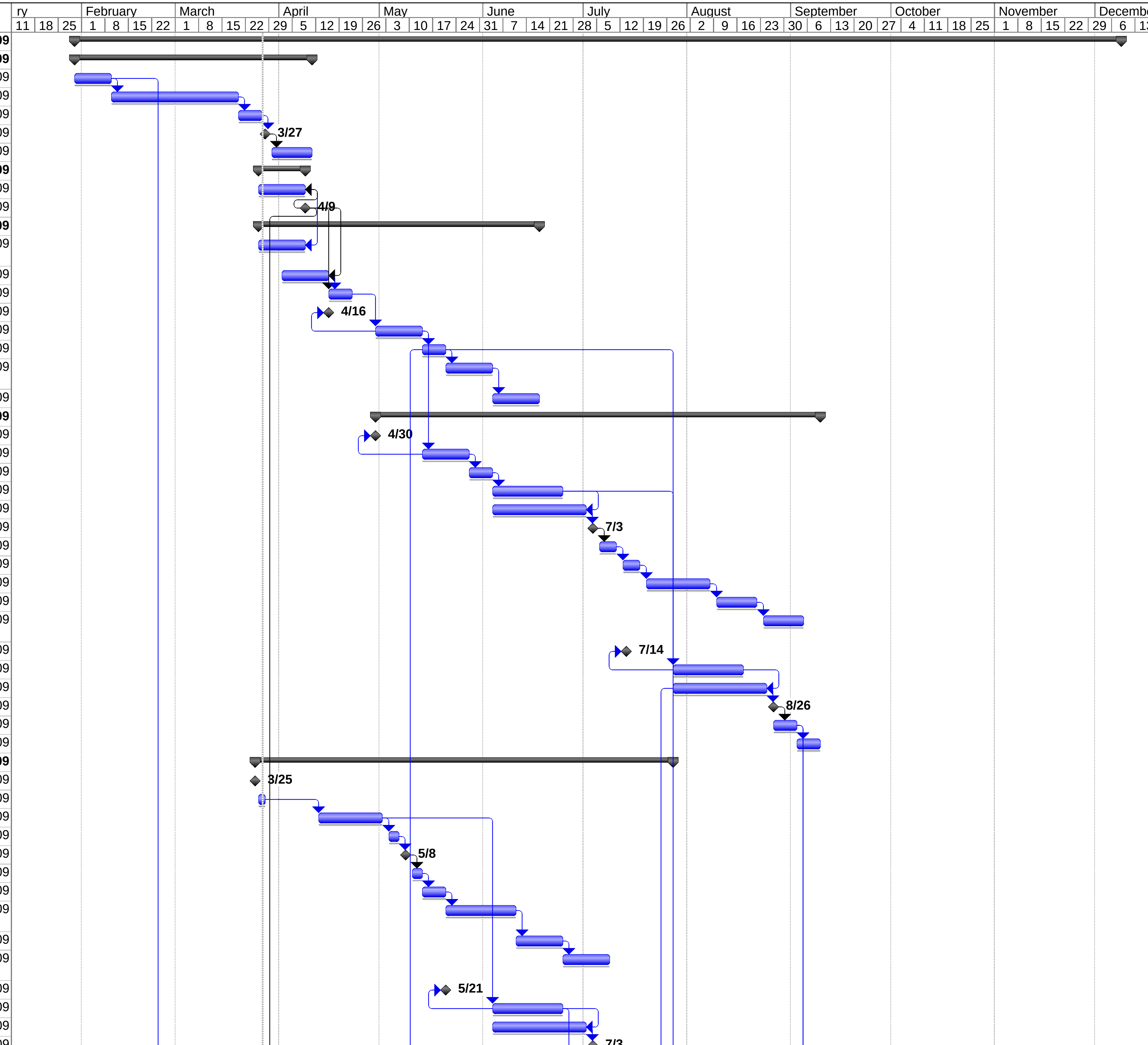
Task-specific assumptions and dependencies:

- An On-Board Review meeting will be held to resolve comments on the draft **Work Plan.** This meeting will be held at the conclusion of draft Work Plan review period.
- The **public meeting** will be the first task and will be held 10 days after submittal of the Final Work Plan.
- The **private well survey** will be initiated after the Final Work Plan is submitted. The private well survey will include the following tasks:
    - Information gathering:
        - identify properties, addresses, and owners in survey area (10 days anticipated) and
        - research well records and water supply (this activity is open until five days after the initial public meeting).

- Survey notification letters: Notification letters will be drafted, made available for review, and mailed prior to the door-to-door well surveys. This task is anticipated to take five days.
- Private Well Survey: The team will conduct the door-to-door surveys within a 10-day period.
- A letter report summarizing the survey results will be generated within 5 days of the completion of the private well surveys. This report will be prepared in draft and final formats.

- The **well sampling** will begin five days after ROEs are obtained. Two rounds of private well sampling and two rounds of monitoring well sampling will be conducted. The sampling of private and monitoring wells will occur in the same field effort. The second round of sampling will occur approximately one month after the first round of sampling. Fifteen days are estimated to conduct each sampling event.
- **Lab and data validation** turnaround times are no more than five working days each. This is a rolling five-day period for the duration of field sampling.
- **IDW** will be tested and properly disposed of within 30 days of the completion of the field sampling event.
- An **Interim Well Report** will be compiled for the first sampling round within 15 days of data evaluation. This report will be prepared in draft and final formats.
- The **Vapor Intrusion Technical Memorandum** is included as Appendix H of this Work Plan. Updates to the Vapor Intrusion Technical Memorandum, if required, will be included in the Interim Measures Report.
- The **Draft Interim Measures Report** will be submitted within 15 days after data evaluation on the second sampling event.
- **Bottled water** will be distributed to or filtration systems will be installed for owners identified during the private well survey to be using private wells for potable water. The current schedule assumes bottled water would be provided for six months.
- **A second public meeting** to discuss results of the sampling will be held five days after Draft Final Interim Measurements Report is submitted.
- **Project management** includes weekly conference calls and monthly reports (Feb through October 2009). The team will attend two **RAB meetings**. Based on the last meeting in January 2009, it is assumed the next meetings to attend would be March 2009 and May 2009.

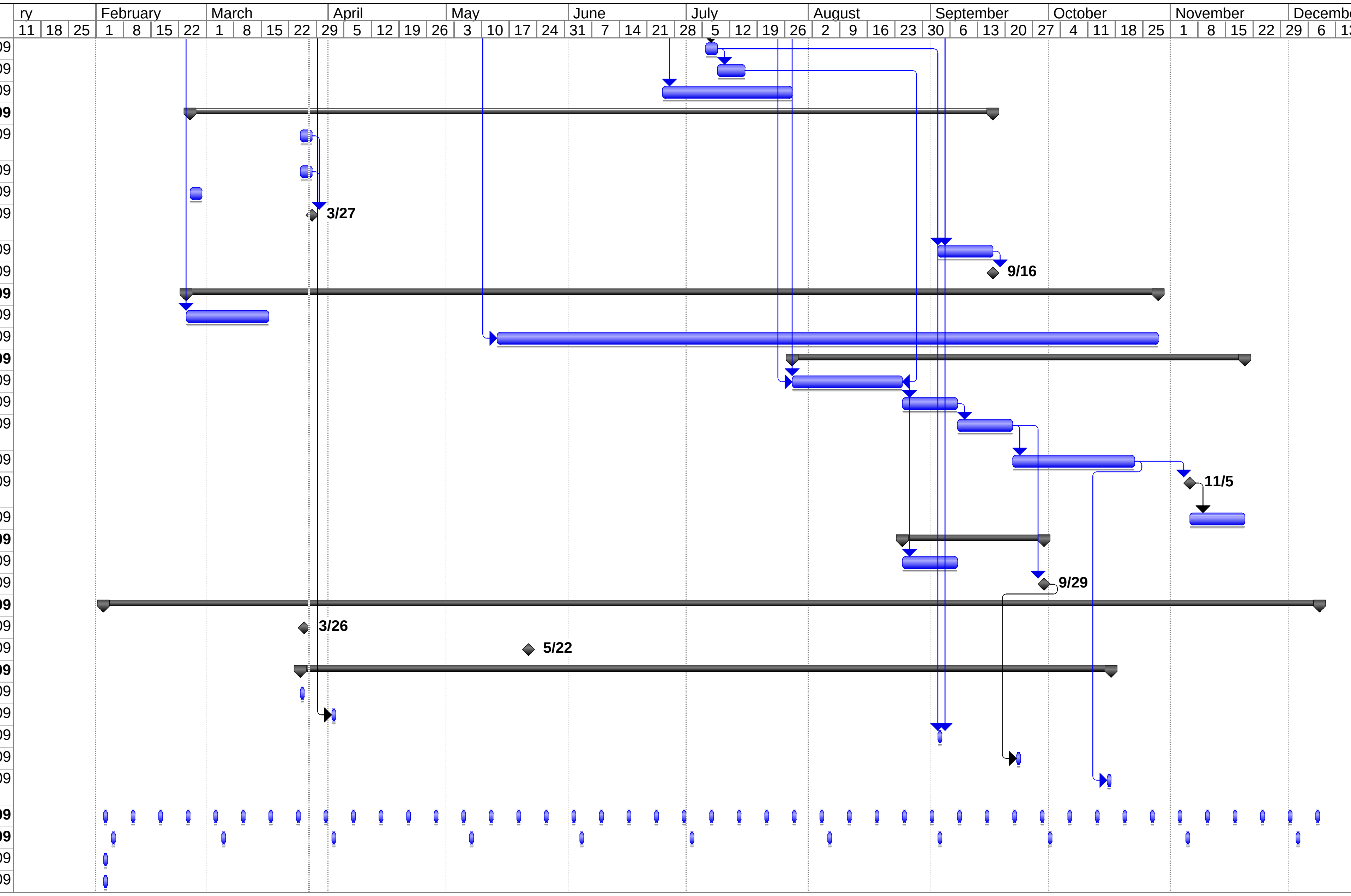
ID	Task Name	Duration	Start	Finish
1	**Fort George G. Meade Private Well Investigation**	**223 days**	**Fri 1/30/09**	**Tue 12/8/09**
2	**Work Plan**	**51 days**	**Fri 1/30/09**	**Fri 4/10/09**
3	Draft Work Plan Submittal to EPA	7 days	Fri 1/30/09	Mon 2/9/09
4	EPA Comment period	28 days	Tue 2/10/09	Thu 3/19/09
5	Final Work Plan Production	5 days	Fri 3/20/09	Thu 3/26/09
6	Final Work Plan Submittal to EPA	0 days	Fri 3/27/09	Fri 3/27/09
7	EPA Approval of Final Work Plan	10 days	Mon 3/30/09	Fri 4/10/09
8	**Initial Public Outreach**	**10 days**	**Thu 3/26/09**	**Thu 4/9/09**
9	Public Meeting 1 Preparation	10 days	Thu 3/26/09	Thu 4/9/09
10	Public Meeting 1 Event	0 days	Thu 4/9/09	Thu 4/9/09
11	**Private Well Survey**	**60 days**	**Thu 3/26/09**	**Wed 6/17/09**
12	Identify properties, addresses, and owners in survey area	10 days	Thu 3/26/09	Thu 4/9/09
13	Research well records & water supply	10 days	Thu 4/2/09	Wed 4/15/09
14	Mail door-to-door survey notifications	5 days	Thu 4/16/09	Wed 4/22/09
15	Army letter to notify EPA of field activities	0 days	Thu 4/16/09	Thu 4/16/09
16	Conduct door-to-door well survey	10 days	Thu 4/30/09	Wed 5/13/09
17	Issue letter report of survey results	5 days	Thu 5/14/09	Wed 5/20/09
18	Army review of draft letter report of survey results	10 days	Thu 5/21/09	Wed 6/3/09
19	Final letter report of survey results	10 days	Thu 6/4/09	Wed 6/17/09
20	**Private Well Sampling**	**95 days**	**Thu 4/30/09**	**Wed 9/9/09**
21	Army letter to notify EPA of field activities.	0 days	Thu 4/30/09	Thu 4/30/09
22	Contact property owners/obtain rights-of-entry	10 days	Thu 5/14/09	Wed 5/27/09
23	Coordinate private well sampling events	5 days	Thu 5/28/09	Wed 6/3/09
24	Conduct private well sampling -event 1	15 days	Thu 6/4/09	Wed 6/24/09
25	Laboratory analysis- event 1	20 days	Thu 6/4/09	Wed 7/1/09
26	Provide Preliminary Data to EPA	0 days	Fri 7/3/09	Fri 7/3/09
27	Data validation - event 1	5 days	Mon 7/6/09	Fri 7/10/09
28	Data evaluation - event 1	5 days	Mon 7/13/09	Fri 7/17/09
29	Prepare and submit interim letter report - event 1	15 days	Mon 7/20/09	Fri 8/7/09
30	Army review of draft interim letter report - event 1	10 days	Mon 8/10/09	Fri 8/21/09
31	Final interim letter report preparation & response to comments	10 days	Mon 8/24/09	Fri 9/4/09
32	Army letter to notify EPA of field activities.	0 days	Tue 7/14/09	Tue 7/14/09
33	Conduct private well sampling -event 2	15 days	Tue 7/28/09	Mon 8/17/09
34	Laboratory analysis- event 2	20 days	Tue 7/28/09	Mon 8/24/09
35	Provide Preliminary Data to EPA	0 days	Wed 8/26/09	Wed 8/26/09
36	Data validation - event 2	5 days	Thu 8/27/09	Wed 9/2/09
37	Data evaluation - event 2	5 days	Thu 9/3/09	Wed 9/9/09
38	**Monitoring Well Sampling**	**89 days**	**Wed 3/25/09**	**Mon 7/27/09**
39	Army letter to notify EPA of field activities.	0 days	Wed 3/25/09	Wed 3/25/09
40	Develop monitoring wells	2 days	Thu 3/26/09	Fri 3/27/09
41	Conduct monitoring well sampling -event 1	15 days	Mon 4/13/09	Fri 5/1/09
42	Laboratory analysis- event 1	3 days	Mon 5/4/09	Wed 5/6/09
43	Provide Preliminary Data to EPA	0 days	Fri 5/8/09	Fri 5/8/09
44	Data validation - event 1	3 days	Mon 5/11/09	Wed 5/13/09
45	Data evaluation - event 1	5 days	Thu 5/14/09	Wed 5/20/09
46	Prepare and submit draft interim letter report - event 1	15 days	Thu 5/21/09	Wed 6/10/09
47	Army review of draft interim letter report - event 1	10 days	Thu 6/11/09	Wed 6/24/09
48	Final interim letter report preparation & response to comments	10 days	Thu 6/25/09	Wed 7/8/09
49	Army letter to notify EPA of field activities.	0 days	Thu 5/21/09	Thu 5/21/09
50	Conduct monitoring well sampling -event 2	15 days	Thu 6/4/09	Wed 6/24/09
51	Laboratory analysis- event 2	20 days	Thu 6/4/09	Wed 7/1/09
52	Provide Preliminary Data to EPA	0 days	Fri 7/3/09	Fri 7/3/09



Project: Interim Measures Schedule_F
Date: Fri 3/27/09

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

ID	Task Name	Duration	Start	Finish
53	Data validation - event 2	3 days	Mon 7/6/09	Wed 7/8/09
54	Data evaluation - event 2	5 days	Thu 7/9/09	Wed 7/15/09
55	Dispose of IDW	23 days	Thu 6/25/09	Mon 7/27/09
56	**Vapor Intrusion Assessment**	**146 days**	**Wed 2/25/09**	**Wed 9/16/09**
57	Evaluation of existing boring logs, well logs, and other soil data	3 days	Wed 3/25/09	Fri 3/27/09
58	Evaluation of well sampling data	3 days	Wed 3/25/09	Fri 3/27/09
59	Evaluation of risk from inhalation and direct contact	3 days	Wed 2/25/09	Fri 2/27/09
60	Vapor Intrusion Tech Memo	0 days	Fri 3/27/09	Fri 3/27/09
61	Revisons to Vapor Intrusion tech Memo, if required	10 days	Thu 9/3/09	Wed 9/16/09
62	Submit Revised Tech Memo	0 days	Wed 9/16/09	Wed 9/16/09
63	**Bottled Water Distribution**	**177 days**	**Tue 2/24/09**	**Wed 10/28/09**
64	Identify and contract bottled water supplier	15 days	Tue 2/24/09	Mon 3/16/09
65	Supply bottled water	6 mons	Thu 5/14/09	Wed 10/28/09
66	**Reporting**	**83 days**	**Tue 7/28/09**	**Thu 11/19/09**
67	Prepare Draft Interim Measures Report	20 days	Tue 7/28/09	Mon 8/24/09
68	Army Comment Period	10 days	Tue 8/25/09	Mon 9/7/09
69	Draft Final Report Preparation & Submittal of Response To Comments	10 days	Tue 9/8/09	Mon 9/21/09
70	Stakeholder review of Draft Final Interim Measures Report	23 days	Tue 9/22/09	Thu 10/22/09
71	Final Report Preparation & Submittal of Response To Comments	10 days	Fri 10/23/09	Thu 11/5/09
72	EPA approval of Final Interim Measurements Report	10 days	Fri 11/6/09	Thu 11/19/09
73	**Public Outreach for Results**	**26 days**	**Tue 8/25/09**	**Tue 9/29/09**
74	Solicit for Public Meeting 2	10 days	Tue 8/25/09	Mon 9/7/09
75	Hold Public Meeting 2	1 day	Tue 9/29/09	Tue 9/29/09
76	**Project Management/ongoing**	**221 days**	**Tue 2/3/09**	**Tue 12/8/09**
77	RAB Meeting 1	0 days	Thu 3/26/09	Thu 3/26/09
78	RAB Meeting 2	0 days	Fri 5/22/09	Fri 5/22/09
79	**Regulator Conference Calls/Meetings**	**148 days**	**Wed 3/25/09**	**Fri 10/16/09**
80	Meeting with AA County	1 day	Wed 3/25/09	Wed 3/25/09
81	Call regarding Public Meeting 1	1 day	Thu 4/2/09	Thu 4/2/09
82	Call regarding results of field work	1 day	Thu 9/3/09	Thu 9/3/09
83	Call regarding Public Meeting 2	1 day	Wed 9/23/09	Wed 9/23/09
84	Call regarding Draft Final Interim Measures Report Response to Comments	1 day	Fri 10/16/09	Fri 10/16/09
85	**Weekly Conference Calls**	**221 days**	**Tue 2/3/09**	**Tue 12/8/09**
131	**Monthly Progress Reports**	**216 days**	**Thu 2/5/09**	**Thu 12/3/09**
143	Contractor Manpower Reporting	1 day	Tue 2/3/09	Tue 2/3/09
144	Closeout	1 day	Tue 2/3/09	Tue 2/3/09



Project: Interim Measures Schedule_F
Date: Fri 3/27/09

Task		Progress		Summary		External Tasks		Deadline	
Split		Milestone		Project Summary		External Milestone			

5 References

29 Code of Federal Regulations 1910.120 *Occupational Safety and Health Standards*

EM Federal Corporation. 2007. *Final Fort George G. Meade Closed Sanitary Landfill, Groundwater Remedial Investigation*.

U.S. Army. 2005. *Final Community Relations Plan for Fort George G. Meade*.

U.S. Army Corps of Engineers. 2008. Engineer Manual 385-1-1; *Safety and Health Requirements*

U.S. Environmental Protection Agency (USEPA) Region III. 2007. Unilateral Administrative Order (Order) issued to the U.S. Department of the Army (Army) on 27 August 2007.

------. 2009. “Interim Measure Required” letter from U.S. Environmental Protection Agency to Fort George G. Meade dated 29 January 2009.

Appendix A - USEPA Interim Measures Required Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

By Overnight Mail (Federal Express) and Electronic Mail

January 29, 2009

Michael P. Butler, Chief
Environmental Division
Directorate of Public Works
U.S. Army Garrison Fort Meade
239 Chisholm Avenue
Fort Meade, Maryland 20755-5115

Re: Interim Measures Required
EPA Docket No. RCRA-03-2007-0213TH

Dear Mr. Butler:

The United States Environmental Protection Agency (EPA) has determined that Interim Measures are necessary under the Unilateral Administrative Order (the Order) issued to the U.S. Department of the Army (the Army) on August 27, 2007, pursuant to Section 7003 of the Resource Conservation and Recovery Act of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984 (collectively referred to hereinafter as "RCRA"), 42 U.S.C. Section 6973, to protect human health and the environment at the Fort George G. Meade National Priorities List site in Fort Meade, Maryland. Pursuant to Section VI.A.4, on page 18 of the Order, EPA is hereby notifying you of its determination and your obligation to proceed in accordance with the Order.

Based on EPA's review of the groundwater sampling results from monitoring wells (MW) 125D and MW126D, EPA has determined that consumption of the water sampled would pose an unacceptable risk to human health based on contaminants present in concentrations significantly exceeding maximum contaminant levels (MCLs), established pursuant to the Safe Drinking Water Act, 42 U.S.C. §300g-1(b)(4), and codified at 40 CFR Section 141.61. Specifically, EPA found that the concentration of carbon tetrachloride in water sampled from MW125D is five times higher and from MW126D is 10 times higher than the MCL of 5 μg/L; the concentration of trichloroethylene in water sampled from MW126D is approximately three times higher than the MCL of 5 ug/L; and the concentration of tetrachloroethylene in water sampled from MW125D equals the MCL of 5 ug/L and from MW126D exceeds the MCL by approximately 10-fold. Based on these concentrations, EPA estimates that the risk presented by the water, if consumed, significantly exceeds a Hazard Index of 1 for carbon tetrachloride and exceeds a cancer risk of 1×10^{-4} due to tetrachloroethylene

REC'D JAN 30 2009

and carbon tetrachloride. In fact, EPA estimates a Hazard Index as high as 6 and a cancer risk as high as 7×10^{-4} based on the concentrations detected in the samples.

Because residential wells are located less than one-half mile from the monitoring wells from which the samples were taken, EPA believes that it is necessary at this time to implement Interim Measures to determine the magnitude of any risk that may be presented by the contaminants in the water to nearby residents from consumption, inhalation, contact with well water and by vapor intrusion. Therefore, pursuant to Section VI of the Order, EPA hereby requires the Army to submit an Interim Measures Workplan **within ten (10) calendar days of your receipt of this letter** to the Maryland Department of the Environment for review and comment and to EPA for review and approval. The Interim Measures Workplan must address implementation of the following actions:

1. Representative sampling of the residential wells located within one mile of MW125D and MW126D and analysis of well water to determine whether any currently-used water sources are contaminated and, if so, to provide a basis upon which to decide what immediate action, if any, should be taken.

2. Investigation of subsurface soil and shallow groundwater to determine the risk to human health, if any, presented by volatile organic carbons intruding into indoor air.

If you have any questions regarding the requirement to submit an Interim Measures Workplan, please contact me at (410) 305-2748. Your assigned attorney may contact Brian Nishitani at (215) 814-2675.

Sincerely yours,

for Robert W. Stroud
Project Coordinator

cc: Kurt Scarbro, MDE, by overnight mail and electronic mail
Harold Dye, MDE, by electronic mail only

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

Appendix B - Field Sampling Plan

2118151 / BAL

MALCOLM PIRNIE

FINAL
Field Sampling Plan for Monitoring Wells 125d and 126d Fort George G. Meade

MARCH 2009

Prepared for:

UNITED STATES ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT
10 South Howard Street
Baltimore, Maryland 21201

Prepared by:

MALCOLM PIRNIE, INC.
300 East Lombard Street, Suite 1510
Baltimore, Maryland 21202

This document is provided in accordance with Section VI (Work to be Performed), Paragraph A (Interim Measures), Subparagraph 4 of the August 27, 2007, Unilateral Administrative Order.

FINAL

Field Sampling Plan for Monitoring Wells 125d and 126d Fort George G. Meade

MARCH 2009

DoD Delivery Order Contract Number: W912DR-09-D-0021-0001

Reviewed and Approved by:

Heather Polinsky, Vice President
Program Officer
Malcolm Pirnie, Inc.

Daniel P. Sheehan, P.E., BCEE
Project Manager
Malcolm Pirnie, Inc.

Malcolm Pirnie, Inc., prepared this Field Sampling Plan (FSP) at the direction of the United States Army Corps of Engineers (USACE). This document should be used only with the approval of the USACE. This FSP is based, in part, on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

ACRONYMS

^{o}C	Degrees Celsius
CCl_4	Carbon Tetrachloride
COC	Chain of Custody
CSL	Closed Sanitary Landfill
DO	Dissolved Oxygen
DQO	Data Quality Objective
FGGM	Fort George G. Meade Site
FSP	Field Sampling Plan
GAP	Generally Accepted Procedure
HASP	Health and Safety Plan
ID	Identification Number
IDW	Investigation-Derived Waste
MCL	Maximum Contaminant Level
ml/min	Milliliters per Minute
MS/MSD	Matrix Spike / Matrix Spike Duplicate
MW	Monitoring Well
ORP	Oxidation/Reduction Potential
PCE	Tetrachloroethylene
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCSR	Quality Control Summary Report
RI	Remedial Investigation
SOP	Standard Operating Procedure
SOW	Scope of Work
TCE	Trichloroethene
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

TABLE OF CONTENTS

APPENDICES
(Appendices are provided electronically on enclosed CD)

1 INTRODUCTION

An Interim Measures Work Plan for Monitoring Wells 125d and 126d has been prepared on behalf of the United States (U.S.) Army to further remedial activities at Fort George G. Meade (FGGM), Maryland. References to the corresponding section(s) of the Final Generic Work Plan are provided within the Interim Measures Work Plan, where appropriate.

The Interim Measures Work Plan includes three additional documents: a Field Sampling Plan (FSP), a Health and Safety Plan (HASP), and a Quality Assurance Project Plan (QAPP). The FSP (this document: Appendix B of the Interim Measures Work Plan) outlines the general methods and activities that will be followed by the field personnel performing the off-Post private well and monitoring well investigation. The HASP (Appendix C of the Interim Measures Work Plan) presents health and safety protocols, referencing Occupational Safety and Health Administration regulations that will be followed by field personnel during performance of the work. The QAPP (Appendix D of the Interim Measures Work Plan) presents the detailed standard operating procedures (SOPs) that will be followed by field personnel, as well as field sampling and analytical laboratory methodologies and procedures.

1.1 Project Description

This FSP is prepared for performance of the Interim Measures Work Plan field activities for the off-Post area adjacent to the southeastern portion of FGGM. FGGM is located in Anne Arundel County, Maryland, midway between Baltimore, Maryland, and Washington, D.C., on the Baltimore Washington Parkway. The FGGM Environmental Division has responsibility for managing the Army's Installation Restoration Program at the installation.

Based on previous groundwater sampling at FGGM monitoring wells (MW)-125d and MW-126d, the U.S. Environmental Protection Agency (USEPA) determined that consumption of the sampled groundwater could pose an unacceptable risk to human health based on contaminants (tetrachloroethylene [PCE], trichloroethylene [TCE], and carbon tetrachloride [CCl_4]) present at concentrations exceeding MCLs (USEPA, 2009). There are a number of residential wells located within one-mile of the location of the sampled monitoring wells. Interim Measures and this proposed investigation were deemed necessary to identify and reduce the magnitude of risk associated with impacted groundwater to the nearby residents with respect to consumption, inhalation, and contact with well water and/or vapor intrusion.

The U.S. Army Corps of Engineers, Baltimore District (USACE) developed a Scope of Work (SOW) for the investigation and risk mitigation activities to be performed. The area within a 1-mile radius of MW-125d and MW-126d will be surveyed for the presence of public and private water supply wells. Owners of public and private wells in the vicinity will be contacted to request permission to sample their wells for the contaminants of concern. . In addition, four existing monitoring wells in the well survey area will be sampled as part of this investigation.

1.2 Report Organization

This FSP is organized into seven sections as follows:

Section 1 – Introduction presents the FSP organization and site background, including a description of historical investigation activities within the off-Post area. It also identifies the 1-mile radius from monitoring wells 125d and 126d, and the rationale for the planned off-Post private well investigation.

Section 2 – Sampling Plan Objectives provides a description of the objectives of the FSP and the general project SOW and schedule for the investigation.

Section 3 – Technical Approach for Sampling Activities identifies potential areas where sampling is to be conducted. The section also describes the private well survey and private well and monitoring well sampling.

Section 4 – Sample Collection Procedures discusses groundwater and tap water sampling procedures, field analyses, decontamination procedures, field quality control (QC) sample procedures, and the general plan for management of investigation-derived waste (IDW).

Section 5 – Sample Management and Analysis summarizes the procedures for sample management activities (e.g., documentation, packaging and shipping, offsite analytical methods). In addition, the site-specific data quality objectives (DQOs) are discussed.

Section 6 – Reporting describes the reporting effort associated with the investigation.

Section 7 – References lists references used in the preparation of this document.

1.3 Site Description

The off-Post area is defined as the area southeast of FFGM within a 1-mile radius of MW-125d and MW-126d, which will be surveyed for private and public wells.

The topography of the off-Post area is generally flat, and the elevation of the eastern boundary of FGGM is approximately 140 above feet mean sea level. This area is considered to be light commercial and rural residential.

1.4 Previous Investigations

Two monitoring wells, MW-125d and MW-126d, were installed in December 2003 in the off-Post area as part of a remedial investigation (RI) for the Closed Sanitary Landfill (CSL). MW-125d was installed with a 20-foot screen to a total depth of 224.5 feet below grade, and MW-126d was installed with a 20-foot screen to a total depth of 240 feet below grade. The wells were first sampled in 2004 and were redeveloped and resampled in 2008. The analytical results indicated that PCE, TCE, and CCl_4 were present at concentrations exceeding USEPA maximum contaminant levels (MCLs), with increases in concentrations observed between the two sampling events. The analytical results were validated and released to the public on January 22, 2009.

The Anne Arundel County Health Department sampled private wells in a portion of the off-Post area during the period of 2005 through 2008. The results of the private well sampling conducted by the county will be reviewed as part of this investigation. It is reported that no volatile organic compound (VOC) concentrations above MCLs were detected in the 2005 to 2008 sampling events from the residential wells.

2 SAMPLING PLAN OBJECTIVES

2.1 Project Objective

The objective of the FSP is to provide the methods and procedures for the collection and analysis of groundwater samples that will yield data of acceptable quality to assess the potential exposure of groundwater users to the contaminants identified in the area groundwater. In areas where the presence of contamination is identified, the data will be used to assess potential exposure risks and provide the information needed to conduct a Corrective Measure Study should it be required. Bottled water will be provided to all private well owners in the survey area until the sampling results, associated risks and the source of the contaminants can be evaluated. The data obtained in this phase of the investigation will be evaluated and provided in the Draft Investigation Report.

2.2 Project Scope

The 1-mile radius off-Post area will be surveyed for the identification of private and public wells. Following the survey, groundwater samples will be collected from the identified public and private wells, as well as from the four existing monitoring wells in the survey area (MW-125d, MW-126d, MW-123s, and MW-124s). Each of the wells will be sampled two times over a two-month period.

All the groundwater samples will be analyzed for VOCs using USEPA Method SW 846/8260B.

The Investigation SOW includes the following activities to obtain additional information on this off-Post area:

- Interview representatives from the Anne Arundel County environmental and health departments to gather information concerning past environmental and operational systems and practices in the off-Post area.
- Review files and records at the Anne Arundel County and at the other relevant agencies to identify the locations and nature of past environmental impacts and locations of potential wells to be sampled.
- Conduct public outreach activities to inform the public of the investigation plans and results.
- Complete a door-to-door survey of residents and other property owners to identify the existence and uses (e.g., potable supply, agricultural, industrial) of any private or public supply wells.
- Collect groundwater samples (two rounds) from identified private or public supply wells for analysis of VOCs. Collect groundwater samples (two rounds) from existing off-Post monitoring wells MW-125d, MW-126d, MW-123s, and MW-124s for analysis of VOCs. Characterize and dispose of IDW generated during field activities.
- Report the groundwater use survey and groundwater investigation results.

The Interim Measures Work Plan provides a complete description of the activities outlined above. The site layout and existing monitoring wells that will be sampled are shown in Work Plan Map 1-1.

2.3 Project Schedule

A project schedule for the field investigation activities has been developed in conjunction with USACE and FGGM. The project schedule for completion of the SOW is provided in Section 4 of the Interim Measures Work Plan.

3 TECHNICAL APPROACH FOR SAMPLING ACTIVITIES

The field activities associated with the investigation will be focused on the off-Post area. The sample locations are provided in Work Plan Map 1-1 and represent the sample numbers to be used in the sample identification numbers (IDs) (refer to Section 5.1 for details). It should be noted that since the exact locations of the residential wells are unknown, sampling locations are approximated in the figure and the actual sampling locations will be determined in the field.

The Interim Measures Work Plan provides a brief review of the previous sampling results for the off-Post area and rationale for this proposed sampling and investigation. The proposed sampling locations, sampling media, and sample analyses are described below for each off-Post area.

All planned well purging, field screening, and groundwater sampling from the monitoring and private wells will be performed in accordance with USEPA low-flow purging and sampling protocols. Details on low-flow groundwater monitoring and sampling are provided in Section 4.1.1 of this FSP, and the generally accepted procedure (GAP) for the low-flow groundwater sampling is provided as Appendix A, Attachment A. Field measurements for turbidity, temperature, pH, dissolved oxygen (DO), oxidation/reduction potential (ORP), and specific conductance will be collected during the groundwater sampling activities.

At a minimum, two rounds of synoptic groundwater level measurements from the four existing monitoring wells will be collected to assess current groundwater heads. The GAP for the groundwater level measurements is provided as Appendix A, Attachment B. Two rounds of groundwater samples from all four existing monitoring wells (MW-125d, MW-126d, MW-123s, and MW-124s) and all private and public supply wells identified in the groundwater use survey will be collected in accordance with the procedures described in Section 4. The groundwater samples, including the applicable quality assurance (QA) / QC samples, will be analyzed for VOCs via USEPA Method SW 846/8260B by Analytical Laboratory Services, Inc., the subcontracted laboratory.

4 SAMPLE COLLECTION PROCEDURES

4.1 Monitoring Well Sampling Procedures

4.1.1 Purging Procedures

Groundwater sampling procedures will include water level measurements, calculation of well volumes, purging, and sampling activities. The following step-by-step procedures are in adherence with USEPA Region III groundwater sampling protocols for low-flow pump purging and sampling and are based upon the method of Puls and Barcelona (USEPA, 1997).

Step 1: Measure depth to water and depth to bottom of every well in the off-Post area, if accessible.

Step 2: Calculate one well volume of the screened or open interval.

Step 3: Lower the low-flow pump to the midpoint of the screened interval.

Step 4: Calibrate water quality meter (Horiba U-22 or equivalent).

Step 5: Begin to purge well. USEPA recommends a purge rate of less than 500 milliliters/minute (ml/min). The purge rate should not exceed the recharge rate (i.e., less than 0.3 feet of drawdown from static water level).

Step 6: Measure purging parameters at a minimum of one per well volume or every 3 to 5 minutes. Measurements will be collected via flow-through cell for pH, temperature, specific conductivity, ORP, and DO as described in Section 4.1.2. Turbidity will also be measured at the outflow of the flow-through cell every 3 to 5 minutes. All measurements will be recorded in the field logbook and individual purge and sampling log sheets (see Appendix B, Attachment A).

Step 7: After conductivity and temperature have stabilized to within 10% over three readings, pH readings differ less than 0.1 standard pH unit, ORP readings differ within 10 millivolts, and turbidity measurements differ within 10%, sampling can begin.

Step 8: Maintain the well purging at a steady flow rate of approximately 100 ml/min, and the sample will be collected out of the discharge line as described in Section 4.1.3. The date and time of the sample collection will be recorded in the field log notebook. See Appendix A, Attachment C for additional details concerning field documentation.

Modifications to these general procedures may be made in the field based on the specific conditions observed and documented in the Quality Control Summary Reports (QCSRs); see Section 6.

4.1.2 Field Analyses

Field measurements will be performed during the well purging and will include pH, specific conductivity, temperature, ORP, DO, and turbidity measurements. Measurements will be collected by inserting the appropriate probes in a closed nondedicated container (flow-through cell) that is rinsed with deionized water prior to purging the well.

Calibration of the instruments (Horiba U-22 or equivalent) will be completed at the beginning of each sampling day, checked in the middle of the day, and completed as otherwise necessary based on the functioning of the meters and equipment. Each meter will be field calibrated in accordance with the manufacturers' specifications and appropriate calibration solutions. All calibrations will be recorded in the field log. Field calibration procedures at a minimum will include the following:

- The pH meters will be calibrated according to manufacturers' instructions prior to each day and will, at a minimum, consist of two standard buffer solutions (pH 4, 7, or 10) obtained from chemical supply houses. The pH values of the buffers will be compensated for the temperature at which the pH sample is measured. Verification checks will be completed at least once per day using a standard solution. The verification check results must agree within $\pm$0.05 pH standard units or recalibration will be performed.
- All temperature measurements will be collected using a field thermometer, recorded to $\pm$0.2 degrees Celsius (°C).
- DO meters will be calibrated to ambient air conditions.
- Specific conductance meters will be calibrated prior to each use with a potassium chloride solution (1000 micromhos) prepared by a qualified laboratory or chemical supplier.
- Turbidity meters will be calibrated daily prior to use with a minimum of two standards of known turbidity as prepared by the manufacturer of the instrument. These solutions should bracket the levels found in the groundwater.
- ORP probes will be checked daily against at least one standard solution prepared by a qualified laboratory or chemical supplier.

All calibration procedures performed will be documented in the field logbook and will include the date and time of calibration, name of the person performing the calibration, reference standards used, and instrument readings.

If equipment fails calibration or equipment malfunction is noted during calibration or use, the equipment will be tagged and removed from service.

4.1.3 Sample Collection

Groundwater samples will be collected using the low-flow pump or peristaltic pump and tubing at a rate of about 100 ml/min as groundwater can be diverted away from the flow-through cell. Groundwater will be collected directly into laboratory prepared bottles. Any intermediate containers, pump tubing, and filters will be disposed of appropriately after each use. A new pair of disposable nitrile gloves will be used for each well sample. VOC sample vials (which have been preserved with hydrochloric acid from the qualified laboratory) will be filled completely so the groundwater forms a convex meniscus at the top and then capped so that no air space exists in the vial. The sample bottle will not touch the sample tubing; the vial will be checked for bubbles, indicating airspace. If air bubbles are observed in the sample vial, the sample vial will be discarded and the procedure repeated. When filling the VOC sample vial from the monitoring wells, stable flow conditions will be ensured (i.e., low flow from a completely filled sample tube and a smooth water surface as the vial is being filled).

All sample bottles will be identified by the use of sample tags/labels with the sample identification. Each sample label will be filled out by the sampler to avoid any possibility of sample misidentification and attached to the sample container. Indelible ink shall be used to complete the sample labels.

All samples will be labeled, preserved, handled, and have a full chain of custody (COC) in accordance with Sections 4.4 and 4.5.

Any water generated in the purging or sampling of the wells will be run through portable carbon filters and collected in drums or other suitable containers. The samplers should also be prepared to containerize the groundwater fluids and transport the water back to FGGM for waste characterization. Reusable equipment (i.e., the electronic water level indicator probe and field parameter meters) will be decontaminated between uses at each well location and will be conducted in accordance with the decontamination procedures outlined in Section 4.6. Prior to the commencement of all sampling activities, the wells will be prioritized so that contaminant-free wells will be sampled before any wells with potential groundwater impacts.

4.2 Private and Public Well Sampling Procedures

Residential and other privately or publicly owned wells will be sampled as outlined below.

Observations made during sample collection will be recorded in the field notebook and field data sheet. Special logistical concerns must be worked out on a case-by-case basis prior to the start of the residential well sampling program. These logistical concerns may include, but are not limited to:

- providing a public relations program to explain the purpose of the sampling;
- preparing of community relations documents, including letters to residents, background or information sheets, and a well survey form;
- obtaining written permission from well owner to enter the home to sample the well, inspect the water system, and note logistical items, such as tap location, securing any pets or other individual concerns;
- arranging appointments to sample the supply well;
- providing two-person sampling teams (with personal identification badges) for the safety of the public and the sampling crew;
- sketching the water treatment system, if any, and document where the sample is collected in relation to the well pump and treatment system; and
- providing the well owner with the analytical results for their well upon completion of data validation.

Prior to sampling a supply well, an initial survey will be conducted to obtain an overview of the well construction and the water system, its operation, and treatment configuration, if any. The typical Homeowner Potable Well Survey form is included in Appendix B, Attachment B and will be completed prior to sampling a residential well. This form will also be used for commercial, industrial or public supply wells.

The supply wells will be sampled at the identified and approved locations. The wells may have the potential to contain trace levels of VOC. These contaminants will be targeted in the groundwater sampled from supply wells in accordance with the following procedure:

- Locate a sampling point nearest to the point of entry of the water line into the dwelling, preferably before any water treatment or storage system. If a water treatment system (e.g., carbon filtration) exists, then attempt to bypass the filter (or remove filter, if possible) prior to sampling. If the sample is to be collected from a tap (or faucet), disconnect any filter or aeration device in the faucet before purging the well.
- Following the sample point identification, open the cold-water faucet and let a slow and steady stream of water flow for approximately 15 minutes prior to sampling. The homeowner should be encouraged to run the water to help shorten the purging process. Opening additional faucets can also shorten the purging time. This process allows for purging of water supply system (including storage tanks) and allows for sampling of fresh groundwater directly from the aquifer.
- Collect field measurements for DO, pH, temperature, specific conductance, turbidity, and ORP at least every 5 minutes. Once each of the field parameters has stabilized within 10% of the previous three readings, the groundwater entering the system is considered to be representative of the local conditions and ready to sample.
- Complete identification labels for sample containers for each well as described in Section 4.5.
- Use a new pair of disposable nitrile gloves for each well sample.
- Fill VOC sample vials (which have been preserved with hydrochloric acid from the qualified laboratory) completely so the groundwater forms a convex meniscus at the top. Cap the vial so that no air space exists in the vial. Do not allow the sample bottle to touch the sampling port or faucet. Turn the vial over and tap it to check for bubbles, indicating airspace. If air bubbles are observed in the sample vial, discard the sample vial and repeat the procedure. When filling the VOC sample vial from the residential tap, ensure stable flow conditions (i.e., low flow from the tap and a smooth water surface as the vial is being filled).
- Record time of sampling.
- Document field activities, including the COC, in accordance with Section 4.5.
- Conduct sample management, packaging, and shipping of samples to laboratory in accordance with Section 5.
- Complete the Groundwater Monitoring Well Sample Collection Log provided in Appendix B, Attachment A.

4.3 Health and Safety Procedures

The health and safety procedures for investigation activities are provided in Appendix C of the Interim Measures Work Plan.

4.4 Sample Containers, Preservation, and Handling

Sample containers, preservation, and holding times will follow USEPA Region III and USACE guidance. Sample containers for all samples will be certified clean and supplied by a qualified laboratory and will be pre-preserved with hydrochloric acid. Once the samples have been placed in the appropriate containers, all samples will be placed immediately into coolers and packed with ice or ice packs to maintain a temperature of approximately 4^{o}C. Samples that require VOC analysis are required to be kept cold and analyzed as soon as practicable. The sample reporting period time requirement should not be longer than five days for VOC analysis. See Worksheet #26 in the QAPP for the sample handling requirements. See Worksheet #28 in the QAPP for the QC sample tables for a summary of analytical method requirements.

4.5 Sample Custody

COC formats and procedures will follow guidance as described in Section 4.3 and SOP A.2 in Appendix A of the FGGM Generic FSP (EM Federal, 2003a). Custody for samples collected during this program will be maintained by the field personnel collecting the samples. The field personnel will be responsible for documenting each sample transfer and maintaining custody of all samples until the samples are shipped to the laboratory.

A self-adhesive label will be affixed to each sample container before sample collection. A COC record will be filled out by the field personnel during sampling. The COC record will be placed in a ziplock plastic bag and will accompany the samples inside the cooler for shipment to the laboratory. The field personnel will be properly relinquished samples on the COC record.

Each sample cooler containing samples will contain sufficient ice and/or ice packs to maintain the proper temperature (approximately 4^{o}C). All sample coolers will be packed in a manner to prevent damage to the sample containers. The field personnel will place signed custody seals on each sample cooler. All coolers will be handled by designated couriers or will be shipped directly to the qualified laboratory. All coolers will be shipped in accordance with current U.S. Department of Transportation and International Air Transport Association regulations. See Appendix A, Attachment D for the GAP for sample custody and tracking methods. The purpose of this GAP is to delineate sample custody procedures and responsibilities related to field operations. This GAP also defines the procedures, organizational responsibilities, and documentation requirements associated with the field and laboratory sample control system.

4.6 Decontamination and Post-Sampling Procedures

Decontamination of sampling equipment will follow Maryland Department of the Environment, USEPA Region III, and USACE guidance. SOP H.1 for conducting decontamination operations is provided in Appendix A of the FGGM Generic FSP (EM Federal, 2003a). All nondisposable sampling tools will be decontaminated in the field prior to sampling and prior to leaving the site in the following manner:

1. Wash equipment thoroughly with a low phosphate detergent and water using a brush to remove any particulate matter or surface film.
2. Rinse equipment with distilled water.
3. Pump approximately 5 gallons of low phosphate detergent and water through the sampling pump.
4. Pump approximately 5 gallons of potable water through the sampling pump.
5. Pump approximately 5 gallons of deionized or distilled water through the sampling pump.
6. Air dry equipment.
7. Wrap equipment in clean plastic sleeve or wrap in aluminum foil if not used immediately.

4.7 Quality Assurance / Quality Control Samples

Field duplicates will be collected at a frequency of one duplicate per 10 residential wells samples. Matrix spike / matrix spike duplicates (MS/MSD) samples will be collected at a frequency of one MS/MSD per 20 samples and will include one of the existing monitoring wells. Rinsate blanks will be collected at a rate of one per type of sampling equipment per decontamination event. This rate should not exceed one rinse blank per day. Field QC samples will be collected to determine if contamination of samples has occurred in the field and, if possible, to quantify the extent of contamination so that data are not lost. Field duplicate samples, trip blanks, equipment blanks, and MS/MSD samples will also be collected. The duplicate QC samples will be labeled with fictitious identification locations and times and submitted to the laboratory as regular samples. The actual identification of the duplicate QC samples will be recorded in the field logbook. The samples will be identified as duplicate, trip blank, equipment blank, and MS/MSD samples in the final report. QA/QC samples will be collected as part of the groundwater monitoring sampling.

A summary of the field QA/QC samples to be collected during the sampling program is presented as follows:

- Trip blanks for volatile samples consist of laboratory-supplied deionized water in preserved VOC vials that are prepared in the laboratory and are shipped in the coolers.
- Rinsate blanks will consist of pouring laboratory-supplied deionized water over the dedicated sampling pumps.
- Duplicate samples for groundwater samples from the residential wells
- MS/MSD for groundwater from a monitoring well

4.7.1 Field Duplicate Samples

Field duplicate samples are independent samples collected in such a manner that they are equally representative of the sampling point and parameters of interest at a given point in space and time. Field duplicate samples provide precision information of homogeneity, handling, shipping, storage, preparation, and analysis.

A field duplicate sample will be collected immediately after the original sample is collected and will be analyzed with the original field sample for the same parameters. One of every 20 investigative samples collected per matrix will be duplicated.

4.7.2 Trip Blanks

The trip blank is designed to address possible sample contamination from transportation between the site and the laboratory. A trip blank will be prepared by the laboratory and sent to the site in the cooler with the other sample containers. One trip blank will be sent to the laboratory for analysis for each day that samples have been collected for VOCs.

4.7.3 Equipment Rinsate Blanks

The equipment (rinsate) blank is designed to address cross-contamination between sample sources in the field due to deficient field equipment decontamination procedures. This blank also addresses field preservation procedures, environmental site interference, and the integrity of the source water for field cleaning.

An equipment blank will be prepared during sediment, surface water, and groundwater sampling when a particular piece of nondedicated sampling equipment was employed for sample collection and subsequently decontaminated in the field for use in additional sampling. The equipment blank will be composed in the field by collecting, in the appropriate container for the water, a blank water rinse from the equipment (sampling pump) after execution of the last step of the proper field decontamination protocol. Preservatives will be added to the equipment blank where appropriate for the sampling parameters. At least one equipment rinsate blank will be collected and sent to the off-site lab for analysis.

4.7.4 Matrix Spike / Matrix Spike Duplicate Samples

MS/MSD samples will be collected from the same location as the parent sample and will be analyzed for the same parameters as the parent sample. Each sample will be labeled with the same sample number as the original sample, designated as MS or MSD samples, and submitted to the laboratory for the appropriate analyses. MS/MSD samples determine accuracy by the recovery rates of the compounds added by the laboratory (the MS compounds are defined in the analytical methods). The MS/MSD samples also monitor any possible matrix effects specific to samples collected from the site and the extraction/digestion efficiency. In addition, the analyses of MS and MSD samples check precision by comparison of the two spike recoveries. One MS and MSD sample will be collected for every 20 samples collected per matrix and sent to the off-site lab for analysis.

4.8 Documentation

Field documentation generated during sample collection, such as field measurements, observations, and field instrument calibrations, will be entered in indelible ink directly into a bound field logbook or on a field boring log. Appropriate information will be entered into the logbook to reconstruct the sampling event, including the site name and location, sample identification, sample description, date and time of sample collection, methodology, field measurements and observations, and the sampler’s initials. See Appendix A, Attachment C for the GAP on Field Documentation.

4.9 Management of Investigation-Derived Wastes

Management of IDW will be in accordance with Section 3.3.4 of the Work Plan. Drummed materials will be staged within the FGGM Recycling Center (Building 2250). All drums will be securely sealed (e.g., capped and banded). A Malcolm Pirnie subcontractor fully qualified to handle disposal activities will conduct the characterization and disposal of the drums. During pickup of the drums, a Malcolm Pirnie representative and an FGGM representative will be present at the site. Prior to and/or during drum pickup by the Malcolm Pirnie subcontractor, manifest signatures and review of destiny of IDW will be finalized. See Appendix A, Attachment E for additional details concerning the procedure for the management of IDW.

5 SAMPLE MANAGEMENT AND ANALYSIS

The procedures described in this section ensure that once representative environmental samples are obtained, they are properly containerized, preserved, shipped, and otherwise handled in a manner that will maintain their chemical integrity. The use of these techniques will ensure the representativeness of a sample and significantly reduce the possibility of sample contamination from external sources.

The Sample Management and Analysis procedures for the investigation are those provided in Appendix A, Attachment F. Exceptions and/or additions to the Sample Management and Analysis discussed in the FGGM Generic Work Plan are provided below.

5.1 Sample Documentation

Sample IDs will consist of the well ID, the media type (GW for groundwater), and a sequential sample number. The newly defined sample IDs differentiate between residential well (RW) and monitoring well (MW) groundwater samples. For example, the first sample collected from MW-125d would have the following sample ID: MW-125d-GW-01.

5.2 Sample Packaging and Shipment

Sample packaging and shipment procedures will follow guidance as described in the FGGM Generic FSP (EM Federal, 2003a).

5.3 Sample Receipt

The procedure for sample receipts will follow guidance as described in the FGGM Generic FSP (EM Federal, 2003a).

5.4 Analytical Program

The analytical program for the off-Post area was developed based on the results of previous USACE investigations, including the previous phase of the investigation conducted by the county. Comments received from USACE and regulatory agencies were also used to identify the analytical program for the off-Post area.

In accordance with the FGGM Generic FSP, samples collected from the site will be analyzed for VOCs using SW-846 USEPA Method 8260B (EM Federal, 2003a). The analyses for each sample are provided in the QAPP.

5.5 Off-site Analytical Methods

USEPA SW-846 Method 8260B will be used for the chemical analysis of samples collected at the off-Post area. Analytical methods for each parameter are provided in Table 4-3 of the FGGM Generic FSP (EM Federal, 2003a). Methods, specific analytes, and respective quantitation limits are provided in the QAPP (Work Plan, Appendix D).

The analytical data packages will contain sufficient information for data validation in accordance with *EPA Region III Modifications to the National Functional Guidelines for Organic Data Review*. In accordance with the SOW, the analytical data will be 100% validated.

5.6 Site-Specific Data Quality Objectives

Site-specific DQOs are developed to achieve the level of data quality required for the anticipated data use and are implemented so that, for each task, the data are legally and scientifically defensible. The development of DQOs for a specific site and measurement takes into account project needs, data uses and needs, and data collection. These factors determine whether the quality and quantity of data are adequate for their end use. Sampling protocols have been developed and sample documentation and handling procedures have been identified to yield the required data quality.

The DQO process used to develop the site-specific DQOs is consistent with the *Guidance For the Data Quality Objectives Process* (USEPA, 2000).

5.6.1 Field Data Quality Objectives

The project field DQOs are quantitative and qualitative statements used to assess the quality of the data required. Field DQOs will be used to measure the performance of the field investigation program and their impact on the final results. The sampling activities may introduce potential sources of uncertainty or bias that may affect the overall confidence in the final measurements.

The evaluation of field DQOs with respect to precision, accuracy, representativeness, completeness, and comparability criteria is presented as follows:

- **Precision.** In terms of the precision DQO, the consistent use of sample collection, documentation, handling and transportation procedures during all sampling activities, as described in the FGGM Generic FSP (EM Federal, 2003a), should provide data of acceptable quality. Field measurements will be made to the required levels of precision as described in Section 3.3.2 of the FGGM Generic QAPP (EM Federal, 2003c). Field measurement equipment will be calibrated properly, and the field investigation program will be documented properly. In addition, sufficient MS/MSDs (one per 20 samples per matrix type) and duplicate samples (one per 20 samples per sampling technique collected for each medium) will be collected from the groundwater to evaluate precision after the analytical program is completed.
- **Accuracy.** In terms of the accuracy DQO, a sufficient number of field blank samples (collected as described in Section 3.11 of the FGGM Generic FSP; EM Federal, 2003a), equipment rinse blanks (one per type of sampling equipment per decontamination event), and trip blank samples (one trip blank for each cooler containing aqueous volatile organic samples) will be collected to determine whether contamination was introduced from outside the sample matrix. In addition, the field logbooks and sampling forms will be completed accurately. Field monitoring equipment will be calibrated properly pursuant to the requirements of the SOPs in Appendix A of the FGGM Generic FSP to ensure accurate measurements are taken (EM Federal, 2003a).
- **Representativeness.** The representative DQO will be met by collecting data that are representative of site conditions. This field DQO will be achieved by using procedures that maintain the sample, as close as possible, in its original condition when contained. Careful preservation and handling of field samples will contribute to acceptable field representativeness.

- **Completeness.** The completeness of all analytical data will be evaluated by comparing the number of samples collected to the number of samples required. A completeness goal of 98% has been established. All field documentation, such as sampling forms and the field logbooks, will be completed properly.
- **Comparability.** The comparability DQO will be achieved by using sampling techniques and equipment that are based on USEPA-accepted methods, follow SOPs as stated in the FGGM Generic FSP and FGGM Generic QAPP (EM Federal, 2003a and 2003c), and produce consistent data and measurement.

5.6.2 Analytical Data Quality Objectives

The level of analytical DQOs for the investigation sampling program is Level III. To achieve these objectives, the field sampling program incorporates procedures defined in the USEPA's *Data Quality Objectives Process for Superfund, Interim Final Guidance*, (USEPA, 1993). To assist in the interpretation of data, the Superfund program has developed the following two descriptive data categories:

- **Screening Data with Definitive Confirmation.** Screening data are generated by rapid, less precise methods of analysis with less rigorous sample preparation. At least 10% of the screening data are confirmed using analytical methods and QA/QC procedures and criteria associated with definitive data. Screening data QA/QC elements include the following:
  - Sample documentation
  - COC
  - Sampling design approach
  - Initial and continuing calibration
  - Determination and documentation of detection limits
  - Analyte identification and quantification
  - Analytical error determination
  - Definitive confirmation
- **Definitive Data.** Definitive data are generated using rigorous analytical methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce tangible raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files. For the data to be definitive, either analytical or total measurement error must be determined. Definitive data QA/QC elements include the following:
  - Sample documentation
  - COC
  - Sampling design approach
  - Initial and continuing calibration
  - Determination and documentation of detection limits

- Analyte identification and quantification
- QC blanks (trip, method, rinse)
- MS recoveries
- Performance evaluation samples (when specified)
- Analytical error determination
- Total measurement error determination

6 REPORTING

6.1 Investigation Report

An Interim Measures Report (in draft, draft final, and final versions) will be submitted upon the conclusion of field investigations. The report will summarize the findings of all field investigations conducted and include site activity logs, diagrams showing sampling locations, and laboratory results. Analysis and a discussion of the data generated during the investigation along with conclusions and recommendations for further action or no further action in the off-Post area will be included. The residents will receive their individual sample results following completion of the data validation.

6.2 Investigation-Derived Waste Letter Summary

Malcolm Pirnie will provide a letter summarizing the analytical results and disposal requirements pertaining to IDW waste management.

6.3 Quality Control Summary Reports

A draft and final investigation QCSR will be submitted as part of the Investigation Report at the conclusion of the investigation site investigations. These reports will include a summary of quality issues related to the investigation activities. The QCSR will outline QC practices employed by Malcolm Pirnie, including any problems and corrective actions taken and contain consolidation and summary of the laboratory data. Laboratory data and data validation reports will be provided in electronic format as part of the QCSR, if requested. A QCSR will be submitted to USACE for review and comment prior to finalizing the report.

7 REFERENCES

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GENERALLY ACCEPTABLE PROCEDURE

FOR

LOW STRESS (LOW FLOW) GROUNDWATER SAMPLING

PURPOSE/APPLICATION

This low flow groundwater purging and sampling procedure presents a standard method for collecting groundwater samples that are representative of the formation from which they are being withdrawn. By using low flow rates for purging and sampling to minimize drawdown within the well, three primary benefits gained. First, using a low flow rate during sampling promotes laminar flow, which minimizes the disturbance of sediment at the bottom of a well or fine particles in the well's filter pack. Groundwater samples are therefore less turbid, which reduces sampling time and generally eliminates the need to filter. Second, the amount of groundwater purged from the sampling well is significantly reduced, minimizing investigation derived waste. Third, low flow purging and sampling reduces aeration and therefore helps to preserves the natural chemical characteristics of the groundwater sample. Low flow sampling may be used to collect groundwater samples for analysis of contaminants of concern, as well as geo-chemical and biological parameters.

This guideline is for information purposes and should not take precedence over the requirements of project specific plans. This is especially true for federal project sites, which are governed by regionally directed United States Environmental Protection Agency (USEPA) low flow groundwater sampling protocols.

EQUIPMENT

Low flow groundwater sampling requires traditional groundwater sampling equipment with the addition of the following:

- Multi-parameter water quality monitoring system (e.g. Horiba U-22 or equivalent) equipped with a flow through cell.
- An adjustable rate, positive displacement, groundwater pump (e.g., centrifugal, submersible, or bladder pumps) constructed of stainless steel or Teflon capable of achieving low flow pumping rates (i.e., 100 to 500 ml/min).
- Polyethylene tubing or equivalent.
- Flow measurement device (e.g., a graduated container and stop watch).
- A water level probe or oil/water interface probe.

PRE-SAMPLING PROCEDURES

The pre-sampling procedures for low flow groundwater sampling and purging are as follows:

1. To minimize the risk of cross-contamination, if possible, begin with the monitoring well that is known or believed to have the lowest contaminant concentrations.

2. Position a sheet of polyethylene over the monitoring well for placement of all sampling equipment.

3. Where applicable, measure the concentration of volatile organic compounds (VOCs) in the well's headspace with a photoionization detector (PID) and record the concentration in the field log book.

4. Measure and record the depth to water and if applicable, the depth to light non-aqueous phase liquid (LNAPL).

SAMPLING PROCEDURES

The procedures for collecting groundwater samples using low flow are as follows:

1. **Pump Installation:** Install the pump by slowly lowering the pump assembly and tubing into the well. The pump should be set to the appropriate depth with the intake being a minimum of two-feet above the bottom of the well to prevent disturbing and re-suspending any sediment at the bottom of the well.

2. **Water Level Measurement:** Measure the depth to groundwater from the top of the well casing using a water level probe. Leave the probe in the well for subsequent water level measurements.

3. **Purging:** Begin purging the well at a rate of 200 to 500 milliliters per minute (ml/min) and measure the water level. If excessive drawdown is observed in the well (i.e. greater that 0.3 feet), reduce the flow rate until the water level stabilizes. When the water level has stabilized, subsequent measurements should be made on five minute intervals. The flow rate, as well as flow rate adjustments should be recorded on a field purge log.

4. **Field Parameter Monitoring:** Field parameters (pH, conductivity, reduction/oxidation potential, DO, and turbidity) should be recorded every five minutes with water level measurements. The well is considered stable and ready to be sampled once the field parameters are stable over three consecutive readings (USEPA Region 2, 1998). The following criteria identify stabilized field parameters:
   - ± 0.1 for pH
   - ± 3.0 percent for conductivity
   - ± 10.0 mv for redox potential
   - ± 10.0 percent for DO and turbidity

   The pump should **not** be removed or shut off between purging and sampling.

5. **Sample Collection:** If necessary, reduce the flow rate to 100 to 250 ml/min to reduce turbulence while filling sample containers during sample collection. Where wells are purged at a flow rate less than 100 ml/min, maintain the same flow rate during sample collection. Disconnect the inflow line from the flow through cell and collect the groundwater sample. All sample containers should be filled directly from the tubing. Allow water to flow from the tubing gently down the inside of the containers to minimize turbulence during sample collection. Groundwater samples should be collected in order of importance, according to the project requirements.

6. **Pump Removal:** Once sampling is complete, slowly remove the pump assembly and tubing from the well. If the tubing is dedicated to the well, disconnect the tubing from the pump, re-insert the tubing into the well, and secure the tubing so it is easily accessible.

7. **Secure Well:** Secure the top of the well casing with a locking cap or expansion plug and close the well. In the case of a stick-up protective well cover, , lock the outer casing.

DECOMTAMINATION

All dedicated or "single use" groundwater sampling equipment should be disposed in accordance with all applicable local and federal regulations. The decontamination procedures for non-dedicated low flow groundwater sampling equipment are as follows:

1. **Pre-rinse:** Operate the pump and flush equipment thoroughly with deionized or distilled water for approximately five minutes.

2. **Wash:** Operate the pump and flush equipment thoroughly with Alconox or other non-phosphate detergent solution for approximately five minutes.

3. **Rinse:** Operate the pump and flush equipment thoroughly with deionized or distilled water for approximately five minutes or until all of the detergent has been removed from the equipment.

FIELD SAMPLING FORM

See attached.

REFERENCES

United States Environmental Protection Agency (USEPA) Region II, 1998, Ground Water Sampling Procedure, Low Stress (low flow) Purging and Sampling, GW Sampling SOP, March 16th.

POTENTIAL PROBLEMS/TROUBLESHOOTING

Insufficient yield, cascading, field parameters failing to stabilize, and aerating the groundwater sample are potential problems when trying to use low flow protocols to collect representative groundwater samples.

Insufficient Yield/Cascading

A low yielding well that cannot sustain a low flow purge rate may eventually go dry. The sampler should take care not to dewater the well below the top of the well screen to prevent cascading of the sand pack. Therefore, pumping a well dry should be avoided in all situations. If a well should go dry, the groundwater sample should be collected as soon as there is sufficient recharge to collect the sample. If the well has not recharged sufficiently within 48 hours, the well should not be sampled.

A low yielding well that consistently demonstrates that it cannot sustain a low flow purge rate of 250 ml/min or less should not be sampled using low flow protocols. Groundwater samples collected from low yielding wells are often representative of the stagnant groundwater within the well and the surrounding sand pack, and not representative of the geologic formation. In addition, these samples are typically very turbid, which can skew the analytical results of groundwater samples being analyzed for organic compounds and metals.

Key Field Parameters Fail to Stabilize

If any key parameters fail to stabilize within four hours of purging, then the following alternatives should be considered:

1. Continue purging until stabilization.

2. Stop purging, do not collect a sample, and document the activity.

3. Stop purging, collect a sample, and document the activity.

4. Stop purging, secure the well, and resume purging the following day.

The key parameter for samples being analyzed for VOCs is dissolved oxygen (DO). The key parameter for all other analytical samples is turbidity. Typically DO and turbidity take the longest to stabilize.

Non-stabilizing turbidity measurements may be avoided by periodically removing sediments that may be trapped in the flow through cell during purging. Trapped sediments may cause artificial fluctuations in turbidity measurements. Additionally, the sampler should visually compare the turbidity of the groundwater in the Cell with the groundwater entering the Cell. If the groundwater entering the Cell is clearer, disconnect the inflow line, drain the turbid groundwater from the Cell, and reconnect the inflow line. Turbidity readings should more accurately reflect true groundwater conditions.

Fluctuations in DO measurements may be caused by air bubbles that form in the flow through cell or sample tubing. Ensure that the inflow tubing is sealed tightly to the flow through cell to prevent the intrusion of air. It may be necessary to drain the flow through cell to remove all air bubbles that may interfere with accurate DO readings.

Aerating the Sample

To prevent inadvertently aerating the groundwater sample, the flow rate should be set so that pump suction and positive groundwater flow through the sample tubing is maintained. The sampler should minimize the length and diameter of the sample tubing. It is recommended that either one-quarter or three-eights-inch inner diameter tubing are used.

Where centrifugal pumps are being used to collect a groundwater sample from a deep well, preventing aeration and sustaining a low flow rate becomes problematic. These issues can be minimized if an impeller is removed from the pump. This allows the pump to run at a lower flow rate and reduces the potential for aerating the groundwater sample. There is also concern that the centrifugal pump will heat the groundwater sample, however, the increases in temperature rarely increases more than two degrees Celsius during sampling.

GENERALLY ACCEPTABLE PROCEDURE

FOR

GROUNDWATER LEVEL MEASUREMENT

PURPOSE/APPLICATION

The objective of these guidelines is to provide general reference information and technical guidance on the measurement of the depth to groundwater in an open borehole, cased borehole, monitoring well, or piezometer.

METHOD SUMMARY

When measuring groundwater levels, there should be a clearly established reference point of known elevation, which is normally the top of the well casing. The reference point should be scored or permanently marked on the rim of the casing if the casing rim is not even and level. To be useful, the reference point should be tied to a USGS benchmark or a local datum. The field notes recorded should clearly describe the reference used. An arbitrary datum could be used for an isolated group of wells if necessary.

Before measurements are made, water levels should be allowed to stabilize for a minimum of 24 hours after well construction and development. In low-yield conditions, recovery of water levels to equilibrium may take longer. Groundwater levels should be measured and recorded to the nearest 0.01 foot. Water level measuring equipment must be decontaminated and, in general, measurements should proceed from the least to the most contaminated boreholes or wells, when possible.

Condition of the wells, piezometers, or boreholes should be recorded along with the name of the individual who has measured the groundwater levels. Groundwater levels that are subject to tidal influence should be measured in conjunction with a tidal chart. The frequency of such measurements should be pre-established.

LIMITATIONS

These guidelines give overall technical guidance only and could be modified as necessary based upon specified requirements of project-specific plans, site conditions, or equipment limitations.

DEFINITIONS

Water table. The surface in an unconfined aquifer where groundwater pressure is equal to atmospheric pressure.

Potentiometric (or piezometric) surface. An imaginary surface representing the total head of groundwater in an aquifer that is defined as the level to which water would rise in a well screened at and/or beneath the water bearing zone. The water table is a particular potentiometric surface.

EQUIPMENT

- Electronic Water Level Indicator with an accuracy of 0.01 foot.
- Field book or field form and pen.
- Decontamination materials.

An electronic water level indicator consists of a spool of graduated, small-diameter cable and a probe attached to the end. When the probe comes into contact with water, the circuit is closed and a meter, light, and/or buzzer attached to the spool will signal the contact. Nine-volt batteries are typically used for a power source.

PROCEDURES

The procedures for measuring groundwater levels are as follows:

1. Clean all the equipment entering the well by the following decontamination procedure:
   - Wash equipment with an Alconox solution followed by a deionized water rinse.
   - If organic contamination is present, and per the project-specific requirements, rinse with an approved solvent (e.g., methanol, isopropyl alcohol, acetone).

2. Check operations of equipment above ground.

3. Remove well cap, note well ID, time of day and date in site logbook or an appropriate groundwater level data form.

4. If required by site-specific conditions and/or work plans, monitor headspace of well with a photoionization detector (PID) or flame ionization detector (FID) to assess the presence of volatile organic compounds (VOCs), and record results in logbook.

5. Ensure well is at equilibrium with atmospheric pressure. In wells with air tight plugs, or without vents, the hydraulic head may not be the same as in an open or vented well. Allow sufficient time for the well to equilibrate to atmospheric pressure. Several measurements may be needed to verify if equilibrium has been reached. This is especially important for wells screened in confined aquifers.

6. Lower water level probe into well and record water level to the nearest 0.01 foot. If a separate phase is present, an oil/water interface probe is needed for measurement of Light Non-Aqueous Phase Liquid (LNAPL) thickness and water level.

POTENTIAL PROBLEMS/TROUBLESHOOTING

When there is LNAPL on the water table, high or low specific conductance, groundwater cascading in the well, or a turbulent water surface in the well, measuring groundwater levels with an electronic sounder may be difficult. Before lowering the probe into the well, the circuitry can be checked by dipping the probe in water and observing the indicator. The probe should be lowered slowly into the well and once the buzzer sounds, slowly raised and lowered until it just ceases sounding. At this point the depth to water is read directly from the graduated cable at the reference point and recorded to the nearest 0.01 feet.

REFERENCES

Fetter, C.W., 1994, Applied Hydrogeology, Third Edition, Prentice Hall Inc., pp. 691.

United States Environmental Protection Agency (USEPA) 2000, USEPA Environmental Response Team Standard Operating Procedures, Manual Water Level Measurements.

TITLE: FIELD DOCUMENTATION

1.0 INTRODUCTION

Records of field activities generated during the course of projects must be capable of withstanding challenges to validity, accuracy, and legibility. Thus field data is required to be legible, identifiable, retrievable, and protected against damage, deterioration, and loss. Data must be recorded in standardized formats and in accordance with prescribed procedures. This standard operating procedure (SOP) describes the procedures and personnel responsibilities associated with recording field data at the [Site].

2.0 DEFINITIONS

Raw data are defined as any worksheets, records, memoranda, or notes that result from original observations and activities of a project and that are necessary for the reconstruction and evaluation of the project. Raw data may include, but are not limited to, information recorded in:

- Field survey logs
- Laboratory Record Books (LRB)
- Instrument maintenance logs and calibration records
- Sample chain-of-custody forms
- Standard or stock solution preparation records
- Laboratory data sheets (e.g., sample preparation or miscellaneous documentation forms)
- Project-specific data form
- Taxonomic Species ID forms

Raw data may also include photographs, maps, microfilm or microfiche copies, computer printouts, magnetic media such as dictated observations, recorded data from automated instruments, and correspondence related to planning, conduct, and interpretation of a project.

3.0 PROCEDURES

3.1 General

A separate logbook should be dedicated for each sampling project and contain the name of the project leader, team members, and project name written inside the front cover. All aspects of sample collection and handling should be documented in the logbook. Data should be entered directly onto the appropriate form; entries should not be recorded on intermediate materials (e.g., scrap paper) and then transcribed to the logbook. If data must be collected and cannot be entered directly onto the appropriate form, the data should be recorded in a coherent and organized manner and attached permanently in the project logbook. Entries should be legible, accurate, and complete. The language should be factual and objective.

If standard forms are used to record data, the forms must contain enough information to ensure traceability. The minimum information required on each form is the project number, project phase or task, descriptive title identifying the type of data to be recorded (e.g., sample weights), date the work was performed, and the name or initials of the person(s) performing the work and recording the data. For field-collected data, information regarding the sample collection equipment should also be included, such as use and decontamination, field equipment and measurements, calculations and calibration data, sample location, sample number, time of collection, and any observations or unusual events. If the recorded data includes measurements, units must be included. Unused or non-applicable areas of the forms should be deleted or marked "NA". Collection of QC samples should also be documented, as well as any deviations from procedural documents, such as the QAPP and SOPs.

All entries must be made in waterproof, non-erasable ink, preferably black. Felt-tipped pens should be avoided because many of the inks are soluble in water or organic solvents. The use of pencil to record data is not acceptable, except in rare circumstances (e.g., inclement weather conditions in the field). If pencil must be used, the data must be photocopied, stamped or marked as a verified copy, and signed and dated. The photocopies should be maintained with the original data in the project files.

All data must be recorded promptly and legibly. Entries must be signed or initialed by the person performing the work. If another individual recorded the data, that person must also sign or initial. Entries must be dated on the day of entry; times should be recorded for activities for which time intervals are critical.

Any videos, slides, or photographs taken in the field should be numbered to correspond to logbook entries. The name of the photographer, date, time, site location, and site description should be entered sequentially into the logbook as photos are taken. Special lenses, films, filters, or other image enhancement techniques must be noted in the logbook.

3.2 Data Corrections

Corrections to data should be made by drawing a single line through the original entry and replacing it with the correct value. Original data should not be obliterated or written over. All corrections and changes must be initialed, dated, and justified. Write-overs are considered data changes and must be treated in the same manner as other changes, i.e., the written-over value must be deleted with a single line and replaced with the correct value, and the correction initialed, dated, and justified. Justifications for changes should be clear and concise; vague explanations such as “Wrong number" should be avoided.

Suggested error codes for the more common changes are provided in Attachment 1. If a code other than the ones listed in Attachment 1 is used, an explanation of the code must be included in the project files.

3.3 Data Transcriptions

Data that are transcribed from other sources must be traceable to their original source (*i.e.*, either the specific location of the original data must be identified or the data transfer process must be described in an SOP or the project plan). Data entered in spreadsheets are assumed to be transcribed unless clearly marked as direct-entry data. If data are transcribed by hand, vs. instrument transfer, the name of the person transcribing the data and the date of transcription must be recorded. If the transcription was verified, the name of the verifier and the date of verification should be documented.

3.4 Calculations

Calculations should be thoroughly documented so that the calculation can be duplicated by a person other than the originator. If the formula applied to data is not documented in an SOP then it must be documented with the data (as miscellaneous documentation, a footnote, etc.). All data sources, methods of calculation, and assumptions should be documented or identified. If data relevant to the calculation have been recorded elsewhere, the location of that data should be specified.

3.5 Computer-driven Data Collection and Analysis

In computer-driven data systems, the individual responsible for entering the data and the date of entry must be identified. All printouts must be initialed and dated by the person responsible. Changes in computer entries must be traceable to the original entry, and the reason for the change, the date of the change, and the name of the individual responsible for the change must be documented.

4.0 PERSONNEL RESPONSIBILITIES AND TRAINING

It is the responsibility of the technical managers to ensure that all staff performing the procedures described in this SOP are properly trained and that documentation of training exists prior to the performance of those procedures. Individuals whose responsibilities include data recording are responsible for reading and understanding this SOP and for performing the procedures in accordance with the stated requirements.

Individuals are considered trained once they have read this SOP and signed the associated training certificate (Attachment 2). The original certificate is filed in the Quality Assurance Unit office.

5.0 REFERENCES

EPA. 2002. *RCRA Waste Sampling Draft Technical Guidance: Planning, Implementation, and Assessment.* U.S. Environmental Protection Agency, Office of Solid Waste. EPA 530-D-02-002. August 2002.

6.0 ATTACHMENTS

1. Error Code List

Attachment 1

ERROR CODE LIST

Error codes should be written near the correction and must be accompanied by the initials of the person making the change and the date of the change.

WL	Inadvertently recorded in the wrong location (e.g., row, column, page)
CC	Changed for greater clarity
WO	Write over
SE	Spelling error
IR	Inadvertently not recorded at the time of initial observation
CE	Calculation error
TE	Transcription error
RE	Rounding error
EI	Entry not initialed, dated, and/or justified at the time of entry
TI	Incorrect time
DA	Incorrect date
UN	Incorrect units
ID	Incorrect sample ID
MD	See miscellaneous documentation form (refer to page or Misc Doc #)
WP	Peak misidentification (gas chromatography only; analyst judged peak to be incorrectly identified by instrument software)
S/B	Should be; clarifies correct data

Title: Sample Custody and Tracking

I. Introduction

Sample control is a vital aspect of any environmental monitoring program that generates data that may be used for regulatory purposes or as evidence in a court of law. Additionally, the complexity of many environmental sampling programs, which may involve the collection and analysis of samples of various media from different sites to be analyzed for several parameters, makes a sample control system essential. The purpose of this standard operating procedure (SOP) is to delineate sample custody procedures and responsibilities related to field operations. This SOP defines the procedures, organizational responsibilities, and documentation requirements associated with the field and laboratory sample control system.

II. Definitions

Chain-of-Custody Records — The administrative records associated with the physical possession and/or storage history of each individual sample from the purchase and preparation of each sample container and sampling apparatus to the final analytical result and sample disposal.

Sample control — The formal system designed to provide sufficient information to reconstruct the history of each sample, including collection, shipment, receipt and distribution within the laboratory, analysis, storage or disposal, and data reporting.

Sample custody — Samples are considered to be in a person's custody if

- The samples are in a person's actual possession;
- The samples are in a person's view after being in that person's possession;
- The samples were in a person's possession and then were locked or sealed up to prevent tampering; or,
- The samples are in a secure area

III. Responsibilities

The Sample Management Officer (SMO) receives samples that are collected by the Field team. The responsibilities of the SMO include:

1. Receiving samples, verifying that each sample listed on the custody form has been received. (Attachment 1)
2. Completing and signing the custody records accurately and legibly;

3. Completing a sample receipt form (Attachment 2);
4. Maintaining records of sample receipt, release, and shipment (including a copy of the bill of lading) in the Custodian Logbook;
5. Packaging samples for shipment to off-site analytical laboratories in a manner that minimizes the risk of breaks and leaks and ensures that the samples are maintained at the appropriate temperature; see appropriate SOP for details.
6. Notifying each receiving laboratory that samples have been shipped and ensuring that each laboratory returns a faxed copy of the completed custody forms within 24 hours after receipt;
7. Distributing completed custody forms;
8. Arranging for the return of shipping coolers to the client or shipper, if appropriate; and,
9. Communicating sample custody problems to the appropriate project or task manager and implementing corrective action as directed.

IV. Procedures

1. **Sample Receipt:** Once samples are received by the laboratory they should be stored in the lab refrigerator as soon as possible. The original sample custody forms should be transmitted with the samples.

The lab sample receiving officer must review and document the receipt of the samples by completing a project-specific Sample Receipt Form for samples received each day. As part of sample receipt,

- The sample receiving officer should record the temperature of each cooler to document whether or not the samples were maintained at the appropriate temperature (frozen, cool, or room temperature) during shipment. The temperature of a cooler blank (if available), melt water, or the external temperature of the sample containers should be measured and documented. (Thermometers or probes are never inserted into a sample container);
- In general, shipping containers should only be opened under a vented hood unless the character of the samples is known to be innocuous;
- The sample receiving officer formally receives the samples after inventorying the samples vs. the custody forms, by signing and dating the Received By portion of the custody form. This signature documents that the sample custodian has custody of each sample listed on the form;
- The sample receiving officer must determine whether the sample condition upon receipt is acceptable. That is, that the sample temperatures are appropriate for the intended analysis; and that sample integrity is acceptable (no broken or cracked jars or lids). The QAPP or field sampling plan will define acceptable sample handling and holding times. If sample containers, preservation, or

delivery do not meet the QAPP/SAP criteria then the sample custodian must notify the project manager who in turn must notify the client; and they must complete a Corrective Action Form (Attachment 3).

- Samples should be stored in the appropriate storage location until samples are released to the appropriate analytical laboratory.

2. **Sample Acceptance/Rejection Criteria:** It is the responsibility of the project manager to specify in the QAPP that project samples are being analyzed for compliance monitoring. In these cases samples could be rejected if:

- The integrity of the samples is compromised (leaks, cracks, grossly contaminated container exteriors or shipping cooler interiors, obvious odors, etc.);
- The identity of the container cannot be verified;
- The proper preservation of the container cannot be established;
- VOC vials contain bubbles of sizes greater than 1% of the vial volume;
- Sample custody forms are incomplete (the sample collector is not documented or the custody forms are not signed and dated by the person who relinquished the samples);
- The sample collector did not relinquish the samples; and,
- Samples are designated for VOA analysis but no VOA trip blank is provided.

If the SMO or laboratory sample receiving officer identifies any of the above conditions the project manager must be notified.

It is the responsibility of the sample receiving officer to ensure that any conditions that compromise sample integrity are recorded on the Sample Receipt Form. The sample receiving officer will notify the Project Manager in writing (Attachment 3) of sample receipt, condition, and problems (e.g., breakage, leakage, missing samples, excessive temperatures). Upon completion of sample inspection, the sample receiving officer formally acknowledges receipt of the samples by signing, dating, and noting the current time on the sample transmittal form(s).

3. **Documentation:** Documentation of sample custody includes the sample custody forms, any additional records of transmittal (e.g., letter), a copy of the air bill (if applicable), and the Sample Receipt form. There records are maintained by the sample receiving officer in the Custody Logbook.

   Sample custody forms are initiated in the field and are shipped with the samples to the analytical laboratories. Each laboratory should send a faxed copy of the custody forms back to the SMO within 24 hours to document the receipt of samples and for early identification of sample loss or breakage. The original custody forms are returned to the project manager/task leader as part of the final data report. The originals are maintained in the project files have been logged in. A copy of the completed custody forms will be maintained in the Custody Logbook. Sample receipt and condition will also be tracked over the internet via the field application software.

4. **Sample Storage:** Upon completion of sample log-in procedures, samples are transferred to a secure location for storage until transfer to the analytical laboratory. This location may be a room, refrigerator, or freezer, depending on the storage requirements of the samples, but must be an area that can be locked from the outside. This storage location is documented on the Sample Receipt form. Only the lab sample receiving officer will have keys to these controlled-access areas.

5. **Initial Sample Processing and Sample IDs:** The compositing or aliquoting of samples prior to shipment to analytical laboratories is documented on the appropriate processing forms. Split samples retain their original Field Sample identification number. Composited samples will be assigned a new, unique identification field number using the same format. If samples are aliquotted for several analyses, a suffix is added to the Field Sample IDs to distinguish the analysis type. The project QAPP should define the protocol codes.

6. **Sample Packaging and Shipping**
   - Preparation
     - Coolers should be washed inside and outside with soap and warm water to avoid any possible contamination of the samples. The coolers should have two sturdy handles, a working top, and be in good shape. Do not use any coolers that are damaged or are contaminated.
   - Cooler Labeling
     - It is critical that cooler labels are secured to the cooler to ensure that samples are not lost.
     - The shipping label should be permanently attached to the cooler. In order to ensure that the label doesn't fall off, scrub the cooler lid and rinse with a solvent (e.g., methanol). Stick the label on the lid and tape over it with packing tape.
     - In addition to the shipping label, a full label with the recipient's name and address as well as the sender's name and address should be attached to the outside of the cooler.

- The sample custody form should include the full addresses of the recipient and the shipping organizations, as well as a contact name at each organization.
- Print “Environmental Samples” and “This End Up” clearly on top of the shipping container. Put upward pointing arrows on all four sides of the container.

7. **Sample Shipping:** The SMO or designee packs the samples securely in a cooler with bubble wrap and adds blue ice or crushed ice to achieve the proper temperature and to ensure that the samples stay at a constant temperature for their entire trip. The cooler should have at least one inch of bubble wrap placed on the bottom of the cooler and the samples should be wrapped in bubble wrap if breakable or crushable containers are used. Placing the majority of the ice packs on the bottom of the cooler prevents the ice packs from crushing the sample containers. Additionally, the samples must be packed tightly and not be able to move freely in the cooler; they must be secure. An upper weight limit of 70 pounds per cooler is suggested. All paper work is signed, the original custody form is placed in a zip lock bag with a cover letter, and taped to the top of the cooler to avoid moisture damage. The coolers should be sealed shut with tape or strapping material. Finally, custody seals should be placed on the outside of the coolers to assure samples are not tampered with during shipment.

   When one sample shipment is contained in multiple coolers, the custody forms should be copied, placed in Zip-lock bags, and attached to the inside top of each cooler. Copies should be clearly labeled as such and they should indicate which samples are contained in each cooler. The individual coolers should be numbered 1 of 3, 2 of 3, etc. In addition, the commercial carrier label should be completed to indicate the cooler number and total number of coolers in the shipment (1 of 3, 2 of 3, etc.). It is recommended that copies of all custodies and tracking information be saved by the shipper.

   Shipping over national holidays should be avoided whenever possible.

8. **Sample Archival and Disposal:** Unused portions of field samples remain in the custody of the sample custodian. The decision to archive “extra” sample should be made by the client and the Project Manager when the project is initiated. Sample disposition and the length of storage should be defined in the project plan. In the absence of other directives, unexpended samples that are maintained under proper storage conditions archived for six months after the delivery of the final data. Unless otherwise specified by the client, the samples will be discarded in the proper waste stream after this period. Samples not maintained at appropriate temperatures are likely unsuitable for analysis and are held only until chemical analysis is complete so that the samples may be discarded in the appropriate waste stream. The project manager will be notified prior to the disposal of samples.

9. **Safety:** Sample handling must always assume that samples are potentially "contaminated." Therefore, sample shipping containers are always opened in a vented fume hood, and personnel protective equipment is worn when unpacking samples (safety glasses, lab coat, and gloves).

   Occasionally, samples are received broken. Because the potential hazard may be unknown all spills must be treated as if the material is hazardous. Clean-up materials should be maintained in the sample custody room. These consist of

   - absorbent (e.g., speedi-dry)
   - dust pan and brush
   - glass disposal container
   - heavy-duty gloves
   - paper towels
   - plastic bags
   - solid waste stream container

   The hazardous waste coordinator should be contacted to determine the proper disposal procedures for spilled sample. In general, water samples are absorbed into chemical absorbent; sediment, soil, or tissues are placed in heavy-duty plastic bags. These are both disposed of in the laboratory's solid waste stream. Broken glass containers are placed in the glass disposal container.

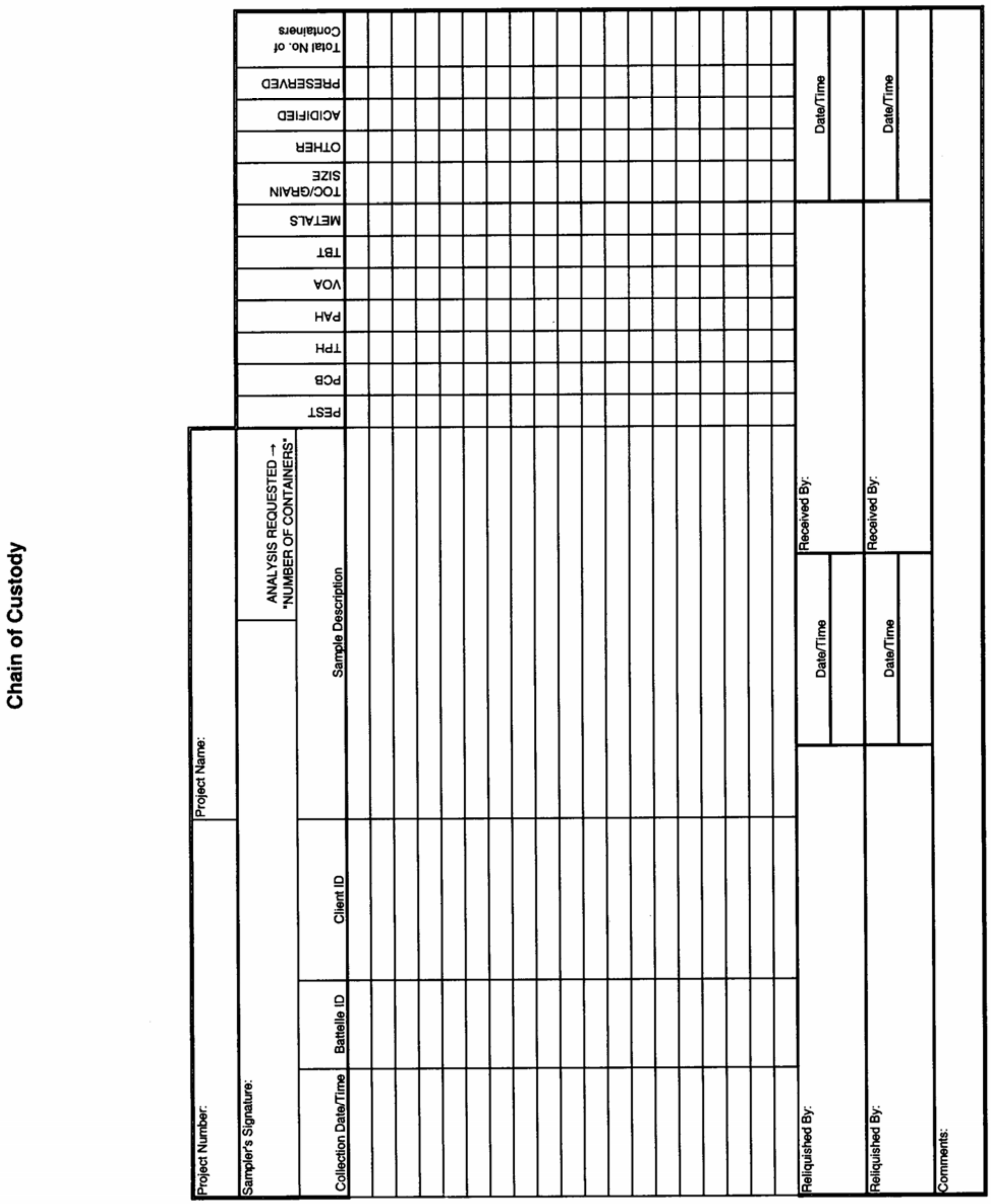
10. **Training:** A person who is being trained as a SMO must first read this SOP. The person may then perform specific tasks under the supervision of a qualified instructor (SMO). Tasks performed by the trainee are reviewed and co-signed by the SMO until it has been established that the trainee is able to perform these tasks without supervision. A certificate of training (Attachment 4) is issued upon completion of training and provided to the Quality Assurance Unit.

ATTACHMENTS

1. Battelle Standard Chain-of-Custody form
2. Sample Receipt Form
3. Sample Custody Corrective Action Form

Malcolm Pirnie, Inc. SOP#
Site Name: Date:

Attachment 1
Chain-of-Custody Form



Chain of Custody

Project Number:
Project Name:
Sampler's Signature:
ANALYSIS REQUESTED →
"NUMBER OF CONTAINERS"

Collection Date/Time	Battelle ID	Client ID	Sample Description	PEST	PCB	TPH	PAH	VOA	TBT	METALS	TOC/GRAIN SIZE	OTHER	ACIDIFIED	PRESERVED	Total No. of Containers

Reliquished By: Date/Time Received By: Date/Time
Reliquished By: Date/Time Received By: Date/Time
Comments:

Attachment 2
Sample Receipt Form

Project Number: ______________________ Client: ______________________________________
Received by: ______________________ Date/Time Received: __________________________
No. of Shipping Containers ______________ __

SHIPMENT
Method of Delivery: _________ Commercial Carrier (Air bill No. ________________)
_________ Hand Delivered

COC Forms: ________ Shipped with samples _______No forms
Cooler(s)\Box(es) were sealed with: ______ Tape _____ Custody Seals______(Other specify)
Were the seals intact for each shipping container?_____Yes______No______NA
If NO, see Sample Custody Corrective Action Form

SAMPLES

Sample Labels: ______ Sample labels agree with COC forms
______ Discrepancies (see Sample Custody Corrective Action Form)*

Container Seals: ______ Tape _____ Custody Seals__________(Other specify)
______ Seals intact for each shipping container
______ Seal broken (list impacted samples):

Condition of Samples: ______ Sample containers intact
______ Sample containers broken/leaking (see Sample Custody Corrective Action Form)*

Temperature upon receipt (°C): ___________Temperature blank used _______Yes_____No
(Note: If temperature upon receipt differs from required conditions, list impacted samples):

Samples Preserved? ____Yes ___No ____Describe:

Storage Location: ____________________

Additional Comments:

Samples logged in by: ______________________ Date/Time: ______________________________
* Must also be noted on the C-O-C.

Attachment 3
Sample Custody Corrective Action Form

Project Number ____________________ Client ____

Description of Problem (continue on back, if needed):

The sample custodian must contact the project manager on the day that problems are identified. If the project manager is not in the office the laboratory manager must be notified.

Documentation of project manager notification:

Sample Custodian: ________________________________ ___________________
Signature Date

Project Manager ________________________________ ___________________
Signature Date

Documentation of client notification (to be completed by project manager):

On __________ I contacted ______________________ at ______________________________
Date Name of client contact Name of client organization

Results of communication with client (Describe any corrective action directed by the client):

RETURN THIS ORIGINAL TO THE SAMPLE CUSTODIAN. THE SAMPLE CUSTODIAN WILL PROVIDE COPIES TO THOSE ON THE ORIGINAL SAMPLE CUSTODY DISTRIBUTION LIST.

Date that this form was received by the custodian:__________

Title: Sample Custody and Tracking

I. Introduction

Sample control is a vital aspect of any environmental monitoring program that generates data that may be used for regulatory purposes or as evidence in a court of law. Additionally, the complexity of many environmental sampling programs, which may involve the collection and analysis of samples of various media from different sites to be analyzed for several parameters, makes a sample control system essential. The purpose of this standard operating procedure (SOP) is to delineate sample custody procedures and responsibilities related to field operations. This SOP defines the procedures, organizational responsibilities, and documentation requirements associated with the field and laboratory sample control system.

II. Definitions

Chain-of-Custody Records — The administrative records associated with the physical possession and/or storage history of each individual sample from the purchase and preparation of each sample container and sampling apparatus to the final analytical result and sample disposal.

Sample control — The formal system designed to provide sufficient information to reconstruct the history of each sample, including collection, shipment, receipt and distribution within the laboratory, analysis, storage or disposal, and data reporting.

Sample custody — Samples are considered to be in a person's custody if

- The samples are in a person's actual possession;
- The samples are in a person's view after being in that person's possession;
- The samples were in a person's possession and then were locked or sealed up to prevent tampering; or,
- The samples are in a secure area

III. Responsibilities

The Sample Management Officer (SMO) receives samples that are collected by the Field team. The responsibilities of the SMO include:

1. Receiving samples, verifying that each sample listed on the custody form has been received. (Attachment 1)
2. Completing and signing the custody records accurately and legibly;
3. Completing a sample receipt form (Attachment 2);
4. Maintaining records of sample receipt, release, and shipment (including a copy of the

bill of lading) in the Custodian Logbook;

5. Packaging samples for shipment to off-site analytical laboratories in a manner that minimizes the risk of breaks and leaks and ensures that the samples are maintained at the appropriate temperature; see appropriate SOP for details.
6. Notifying each receiving laboratory that samples have been shipped and ensuring that each laboratory returns a faxed copy of the completed custody forms within 24 hours after receipt;
7. Distributing completed custody forms;
8. Arranging for the return of shipping coolers to the client or shipper, if appropriate; and,
9. Communicating sample custody problems to the appropriate project or task manager and implementing corrective action as directed.

IV. Procedures

1. **Sample Receipt:** Once samples are received by the laboratory they should be stored in the lab refrigerator as soon as possible. The original sample custody forms should be transmitted with the samples.

The lab sample receiving officer must review and document the receipt of the samples by completing a project-specific Sample Receipt Form for samples received each day. As part of sample receipt,

- The sample receiving officer should record the temperature of each cooler to document whether or not the samples were maintained at the appropriate temperature (frozen, cool, or room temperature) during shipment. The temperature of a cooler blank (if available), melt water, or the external temperature of the sample containers should be measured and documented. (Thermometers or probes are never inserted into a sample container);
- In general, shipping containers should only be opened under a vented hood unless the character of the samples is known to be innocuous;
- The sample receiving officer formally receives the samples after inventorying the samples vs. the custody forms, by signing and dating the Received By portion of the custody form. This signature documents that the sample custodian has custody of each sample listed on the form;
- The sample receiving officer must determine whether the sample condition upon receipt is acceptable. That is, that the sample temperatures are appropriate for the intended analysis; and that sample integrity is acceptable (no broken or cracked jars or lids). The QAPP or field sampling plan will define acceptable sample handling and holding times. If sample containers, preservation, or delivery do not meet the QAPP/SAP criteria then the sample custodian must notify the project manager who in turn must notify the client; and they must complete a Corrective Action Form (Attachment 3).

- Samples should be stored in the appropriate storage location until samples are released to the appropriate analytical laboratory.

2. **Sample Acceptance/Rejection Criteria:** It is the responsibility of the project manager to specify in the QAPP that project samples are being analyzed for compliance monitoring. In these cases samples could be rejected if:

   - The integrity of the samples is compromised (leaks, cracks, grossly contaminated container exteriors or shipping cooler interiors, obvious odors, etc.);
   - The identity of the container cannot be verified;
   - The proper preservation of the container cannot be established;
   - VOC vials contain bubbles of sizes greater than 1% of the vial volume;
   - Sample custody forms are incomplete (the sample collector is not documented or the custody forms are not signed and dated by the person who relinquished the samples);
   - The sample collector did not relinquish the samples; and,
   - Samples are designated for VOA analysis but no VOA trip blank is provided.

If the SMO or laboratory sample receiving officer identifies any of the above conditions the project manager must be notified.

It is the responsibility of the sample receiving officer to ensure that any conditions that compromise sample integrity are recorded on the Sample Receipt Form. The sample receiving officer will notify the Project Manager in writing (Attachment 3) of sample receipt, condition, and problems (e.g., breakage, leakage, missing samples, excessive temperatures). Upon completion of sample inspection, the sample receiving officer formally acknowledges receipt of the samples by signing, dating, and noting the current time on the sample transmittal form(s).

3. **Documentation:** Documentation of sample custody includes the sample custody forms, any additional records of transmittal (e.g., letter), a copy of the air bill (if applicable), and the Sample Receipt form. There records are maintained by the sample receiving officer in the Custody Logbook.

   Sample custody forms are initiated in the field and are shipped with the samples to the analytical laboratories. Each laboratory should send a faxed copy of the custody forms back to the SMO within 24 hours to document the receipt of samples and for early identification of sample loss or breakage. The original custody forms are returned to the project manager/task leader as part of the final data report. The originals are maintained in the project files have been logged in. A copy of the completed custody forms will be maintained in the Custody

Logbook. Sample receipt and condition will also be tracked over the internet via the field application software.

4. **Sample Storage:** Upon completion of sample log-in procedures, samples are transferred to a secure location for storage until transfer to the analytical laboratory. This location may be a room, refrigerator, or freezer, depending on the storage requirements of the samples, but must be an area that can be locked from the outside. This storage location is documented on the Sample Receipt form. Only the lab sample receiving officer will have keys to these controlled-access areas.

5. **Initial Sample Processing and Sample IDs:** The compositing or aliquoting of samples prior to shipment to analytical laboratories is documented on the appropriate processing forms. Split samples retain their original Field Sample identification number. Composited samples will be assigned a new, unique identification field number using the same format. If samples are aliquotted for several analyses, a suffix is added to the Field Sample IDs to distinguish the analysis type. The project QAPP should define the protocol codes.

6. **Sample Packaging and Shipping**
    - Preparation
        - Coolers should be washed inside and outside with soap and warm water to avoid any possible contamination of the samples. The coolers should have two sturdy handles, a working top, and be in good shape. Do not use any coolers that are damaged or are contaminated.
    - Cooler Labeling
        - It is critical that cooler labels are secured to the cooler to ensure that samples are not lost.
        - The shipping label should be permanently attached to the cooler. In order to ensure that the label doesn't fall off, scrub the cooler lid and rinse with a solvent (e.g., methanol). Stick the label on the lid and tape over it with packing tape.
        - In addition to the shipping label, a full label with the recipient's name and address as well as the sender's name and address should be attached to the outside of the cooler.
        - The sample custody form should include the full addresses of the recipient and the shipping organizations, as well as a contact name at each organization.
        - Print "Environmental Samples" and "This End Up" clearly on top of the shipping container. Put upward pointing arrows on all four sides of the container.

7. **Sample Shipping:** The SMO or designee packs the samples securely in a cooler with bubble wrap and adds blue ice or crushed ice to achieve the proper temperature and to ensure that the samples stay at a constant temperature for their entire trip. The cooler should have at least one inch of bubble wrap placed on the bottom of the cooler and the samples should be wrapped in bubble wrap if breakable or crushable containers are used. Placing the majority of the ice packs on the bottom of the cooler prevents the ice packs from crushing the sample containers. Additionally, the samples must be packed tightly and not be able to move freely in the cooler; they must be secure. An upper weight limit of 70 pounds per cooler is suggested. All paper work is signed, the original custody form is placed in a zip lock bag with a cover letter, and taped to the top of the cooler to avoid moisture damage. The coolers should be sealed shut with tape or strapping material. Finally, custody seals should be placed on the outside of the coolers to assure samples are not tampered with during shipment.

   When one sample shipment is contained in multiple coolers, the custody forms should be copied, placed in Zip-lock bags, and attached to the inside top of each cooler. Copies should be clearly labeled as such and they should indicate which samples are contained in each cooler. The individual coolers should be numbered 1 of 3, 2 of 3, etc. In addition, the commercial carrier label should be completed to indicate the cooler number and total number of coolers in the shipment (1 of 3, 2 of 3, etc.). It is recommended that copies of all custodies and tracking information be saved by the shipper.

   Shipping over national holidays should be avoided whenever possible.

8. **Sample Archival and Disposal:** Unused portions of field samples remain in the custody of the sample custodian. The decision to archive "extra" sample should be made by the client and the Project Manager when the project is initiated. Sample disposition and the length of storage should be defined in the project plan. In the absence of other directives, unexpended samples that are maintained under proper storage conditions archived for six months after the delivery of the final data. Unless otherwise specified by the client, the samples will be discarded in the proper waste stream after this period. Samples not maintained at appropriate temperatures are likely unsuitable for analysis and are held only until chemical analysis is complete so that the samples may be discarded in the appropriate waste stream. The project manager will be notified prior to the disposal of samples.

9. **Safety:** Sample handling must always assume that samples are potentially "contaminated." Therefore, sample shipping containers are always opened in a vented fume hood, and personnel protective equipment is worn when unpacking samples (safety glasses, lab coat, and gloves).

Occasionally, samples are received broken. Because the potential hazard may be unknown all spills must be treated as if the material is hazardous. Clean-up materials should be maintained in the sample custody room. These consist of

- absorbent (e.g., speedi-dry)
- dust pan and brush
- glass disposal container
- heavy-duty gloves
- paper towels
- plastic bags
- solid waste stream container

The hazardous waste coordinator should be contacted to determine the proper disposal procedures for spilled sample. In general, water samples are absorbed into chemical absorbent; sediment, soil, or tissues are placed in heavy-duty plastic bags. These are both disposed of in the laboratory's solid waste stream. Broken glass containers are placed in the glass disposal container.

10. **Training:** A person who is being trained as a SMO must first read this SOP. The person may then perform specific tasks under the supervision of a qualified instructor (SMO). Tasks performed by the trainee are reviewed and co-signed by the SMO until it has been established that the trainee is able to perform these tasks without supervision. A certificate of training (Attachment 4) is issued upon completion of training and provided to the Quality Assurance Unit.

ATTACHMENTS

1. Battelle Standard Chain-of-Custody form
2. Sample Receipt Form
3. Sample Custody Corrective Action Form

Attachment 1
Chain-of-Custody Form

Chain of Custody

Project Number:		Project Name:													
Sampler's Signature:			ANALYSIS REQUESTED → "NUMBER OF CONTAINERS"												
Collection Date/Time	Battelle ID	Client ID	Sample Description	PEST	PCB	TPH	PAH	VOA	TBT	METALS	TOC/GRAIN SIZE	OTHER	ACIDIFIED	PRESERVED	Total No. of Containers

Reliquished By:	Date/Time	Received By:	Date/Time
Reliquished By:	Date/Time	Received By:	Date/Time

Comments:

Attachment 2
Sample Receipt Form

Project Number: ______________________ Client: ______________________________________
Received by: ______________________ Date/Time Received: _________________________
No. of Shipping Containers ______________ __

SHIPMENT
Method of Delivery: _________ Commercial Carrier (Air bill No. ________________)
_________ Hand Delivered

COC Forms: ________ Shipped with samples _______No forms
Cooler(s)\Box(es) were sealed with: ______ Tape _____ Custody Seals______(Other specify)
Were the seals intact for each shipping container?_____Yes______No______NA
If NO, see Sample Custody Corrective Action Form

SAMPLES

Sample Labels: ______ Sample labels agree with COC forms
______ Discrepancies (see Sample Custody Corrective Action Form)*

Container Seals: ______ Tape _____ Custody Seals__________(Other specify)
______ Seals intact for each shipping container
______ Seal broken (list impacted samples):

Condition of Samples: ______ Sample containers intact
______ Sample containers broken/leaking (see Sample Custody Corrective Action Form)*

Temperature upon receipt (°C): ___________Temperature blank used _______Yes_____No
(Note: If temperature upon receipt differs from required conditions, list impacted samples):

Samples Preserved? ____Yes ___No ____Describe:

Storage Location: _____________________

Additional Comments:

Samples logged in by: ______________________ Date/Time: _______________________________
* Must also be noted on the C-O-C.

Attachment 3
Sample Custody Corrective Action Form

Project Number ____________________ Client ____

Description of Problem (continue on back, if needed):

The sample custodian must contact the project manager on the day that problems are identified. If the project manager is not in the office the laboratory manager must be notified.

Documentation of project manager notification:

Sample Custodian: ________________________________ ____________________
Signature Date

Project Manager ________________________________ ____________________
Signature Date

Documentation of client notification (to be completed by project manager):

On __________ I contacted ______________________ at ______________________________
Date Name of client contact Name of client organization

Results of communication with client (Describe any corrective action directed by the client):

RETURN THIS ORIGINAL TO THE SAMPLE CUSTODIAN. THE SAMPLE CUSTODIAN WILL PROVIDE COPIES TO THOSE ON THE ORIGINAL SAMPLE CUSTODY DISTRIBUTION LIST.

Date that this form was received by the custodian:_________

Malcolm Pirnie, Inc. SOP#
Site Name: Date:

Title: Procedure for Management and Disposal of Investigation Derived Waste

I. Introduction

This procedure describes the methods used to manage, store, and dispose of investigation derived waste produced during environmental sampling at the [Site]. The procedures specifically address sediments, soils, water, solvents, and PPE waste generated from collection of sediment, soil and water samples.

This SOP does not address radioactive decontamination, PPE for radioactive waste, or disposal of radioactive contaminated waste material.

II. Definitions

DCM	Dichloromethane, organic solvent
HSC	Heath and Safety Coordinator
IDW	Investigation derived waste
PPE	Personal Protective Equipment

III. Equipment and Supplies

The purchase, maintenance, and use of the supplies and equipment listed below are the responsibility of the designated site Health and Safety Coordinator (HSC).

The following equipment and supplies will be used to collect and dispose of investigation derived waste:

1. **Waste Storage and Disposal Containers**
   a. 30- or 55-gallon drums for solid and liquid wastes, including 30 gallon plastic drums for solids, and sealed top drums with screw-plug openings for liquids. As for liquid storage, steel (6D) drums will be used in the storage of solvent waste. For aqueous organic and acid waste, polylined (17E) drums will be used for storage.

2. **Transferring Equipment**
   a. Plastic safety funnels with brass or plastic screens and vents
   b. Hand pump/siphon with Teflon or tygon tubing
   c. Tools: screwdriver, drum plug wrench, and brass pliers
   d. Drum dolly

3. **Personal Protective Equipment**
   a. Disposable Tyvex coveralls and/or lab coats

b. Disposable plastic gloves (nitrile, butyl rubber, or Viton)
c. Respirator and cartridges [consult Environment, Safety, and Health (ES&H) Officer to ascertain necessity]
d. Shoe covers (Rubber or Tyvek)

4. **Spill Cleanup Equipment and Supplies**
    a. Spill absorbent (Vermiculite or Speedidry™)
    b. Broom, foxtail and dustpan
    c. Shovel
    d. Paper towels
    e. 85-gallon overpack drum
    f. Manual drum pump (same as pump in '2. Transferring Equipment')
5. **Labels and Logs** A supply of labels and log sheets that are referred to in this SOP are to be kept on site in an easily accessible location, described in the workplan. Additional logs are obtained from the HSC.
6. **Digital camera** to document IDW management.

IV. Guidelines

The following procedures will be used to store, manage, and transport IDW:

Waste Disposal

IDW is held in the appropriate designated storage area until approval for disposal is granted. After the HSC receives documentation on the level of contamination in the waste, the HWC assists the Project Manager in deciding whether the waste is suitable for disposal in a landfill, or must be discarded in a hazardous waste stream.

Solid Waste

1. Solid waste is to be transferred into an air-tight, 30 gallon open top drum.
2. The lid is to be removed from the collection container and the contents placed into the storage drum.
3. Once the transfer has been completed, the lid and sealing ring are to be replaced on the storage drum.
4. The transfer will be recorded on the waste transfer log, and this log will be placed in a location described in the WP for reference.

Liquid Waste

1. All solvents used for decontamination must be captured and disposed of in appropriate, labeled, aqueous waste containers. Liquids collected into the chemical waste container must be discarded in an appropriate waste stream. Care must be taken not to mix substances that will react with each other. If there is any question concerning compatibility, the HSC or Project Manager should be contacted prior to taking action. A record of the type, relative amount, and hazard associated with each substance added must be kept on the hazardous waste log. This log must be attached to the satellite container. Waste may be temporarily stored, if properly labeled, prior to satellite container introduction. The waste contents in these temporary storage containers must be introduced into an approved satellite container by the end of every working day.
2. Staff performing decontamination procedures need to wear appropriate PPE, gloves (e.g. nitrile) and eye protection. Care must be taken in cleaning not to allow contact of cleaning solutions with clothing as much as possible. If circumstances dictate contact will occur (e.g. high pressure washing, splashing, high wind), waterproof outer clothing must be worn (e.g. foul weather gear or rain gear).
3. Decontamination procedures may vary depending on specific workplan specifications, and unique contaminants of concern at specific locations. The project workplan may designate collection of equipment rinse samples to document effectiveness of cleaning.
4. Liquid waste is to be transferred into an air-tight, 55-gallon, screw-cap drum. When a new drum is started, the larger cap is unscrewed with the drum plug wrench. The safety vent is screwed in and the cap tightened by hand.

PPE

1. PPE are to be transferred into air-tight, 30 gallon open top drums.
2. The lid is to be removed from the collection container and the contents placed into the storage drum.
3. Once the transfer has been completed, the lid and sealing ring will be replaced on the storage drum.
4. A general description of the PPE, and locations it was worn, will be recorded on the waste transfer log. This log will be maintained in a location described in the WP for reference.

Transportation of IDW to the Disposal Area

Transportation of hazardous waste is carried out by assigned Hazardous Waste Handlers only. Personal Protective Equipment is worn during transport and disposal. Satellite containers are transported from to the truck using either dollies or carts.

Health and Safety Coordinator

The HSC is responsible for overseeing IDW and arranging for IDW to be disposed of off site in accordance with local, state, and federal Regulations. The responsibilities of the HSC include:

1. Packaging and labeling of containers
2. Arranging for waste removal
3. Maintaining manifest records and tracking the manifest until its signed and returned
4. Conducting weekly inspections of the waste area
5. Ensuring that the proper waste-handling materials and personal protective equipment are available and adequate (e.g., gloves, coveralls, goggles, respirators and cartridges, boots, funnels, pumps, etc.)
6. Maintaining emergency spill response equipment

IV. References

Title: Procedure for Management and Disposal of Investigation Derived Waste

I. Introduction

This procedure describes the methods used to manage, store, and dispose of investigation derived waste produced during environmental sampling at the Fort George G. Meade (FGGM). The procedures specifically address sediments, soils, water, solvents, and PPE waste generated from collection of sediment, soil and water samples.

This SOP does not address radioactive decontamination, PPE for radioactive waste, or disposal of radioactive contaminated waste material.

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2. **Transferring Equipment**
   a. Plastic safety funnels with brass or plastic screens and vents
   b. Hand pump/siphon with Teflon or tygon tubing
   c. Tools: screwdriver, drum plug wrench, and brass pliers
   d. Drum dolly
3. **Personal Protective Equipment**

a. Disposable Tyvex coveralls and/or lab coats
b. Disposable plastic gloves (nitrile, butyl rubber, or Viton)
c. Respirator and cartridges [consult Environment, Safety, and Health (ES&H) Officer to ascertain necessity]
d. Shoe covers (Rubber or Tyvek)

4. **Spill Cleanup Equipment and Supplies**
   a. Spill absorbent (Vermiculite or Speedidry™)
   b. Broom, foxtail and dustpan
   c. Shovel
   d. Paper towels
   e. 85-gallon overpack drum
   f. Manual drum pump (same as pump in '2. Transferring Equipment')
5. **Labels and Logs** A supply of labels and log sheets that are referred to in this SOP are to be kept on site in an easily accessible location, described in the workplan. Additional logs are obtained from the HSC.
6. **Digital camera** to document IDW management.

IV. Guidelines

The following procedures will be used to store, manage, and transport IDW:

Waste Disposal

IDW is held in the appropriate designated storage area until approval for disposal is granted. After the HSC receives documentation on the level of contamination in the waste, the HWC assists the Project Manager in deciding whether the waste is suitable for disposal in a landfill, or must be discarded in a hazardous waste stream.

Solid Waste

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2. The lid is to be removed from the collection container and the contents placed into the storage drum.
3. Once the transfer has been completed, the lid and sealing ring are to be replaced on the storage drum.

4. The transfer will be recorded on the waste transfer log, and this log will be placed in a location described in the WP for reference.

Liquid Waste

1. All solvents used for decontamination must be captured and disposed of in appropriate, labeled, aqueous waste containers. Liquids collected into the chemical waste container must be discarded in an appropriate waste stream. Care must be taken not to mix substances that will react with each other. If there is any question concerning compatibility, the HSC or Project Manager should be contacted prior to taking action. A record of the type, relative amount, and hazard associated with each substance added must be kept on the hazardous waste log. This log must be attached to the satellite container. Waste may be temporarily stored, if properly labeled, prior to satellite container introduction. The waste contents in these temporary storage containers must be introduced into an approved satellite container by the end of every working day.
2. Staff performing decontamination procedures need to wear appropriate PPE, gloves (e.g. nitrile) and eye protection. Care must be taken in cleaning not to allow contact of cleaning solutions with clothing as much as possible. If circumstances dictate contact will occur (e.g. high pressure washing, splashing, high wind), waterproof outer clothing must be worn (e.g. foul weather gear or rain gear).
3. Decontamination procedures may vary depending on specific workplan specifications, and unique contaminants of concern at specific locations. The project workplan may designate collection of equipment rinse samples to document effectiveness of cleaning.
4. Liquid waste is to be transferred into an air-tight, 55-gallon, screw-cap drum. When a new drum is started, the larger cap is unscrewed with the drum plug wrench. The safety vent is screwed in and the cap tightened by hand.

PPE

1. PPE are to be transferred into air-tight, 30 gallon open top drums.
2. The lid is to be removed from the collection container and the contents placed into the storage drum.
3. Once the transfer has been completed, the lid and sealing ring will be replaced on the storage drum.
4. A general description of the PPE, and locations it was worn, will be recorded on the waste transfer log. This log will be maintained in a location described in the WP for reference.

Transportation of IDW to the Disposal Area

Transportation of hazardous waste is carried out by assigned Hazardous Waste Handlers only. Personal Protective Equipment is worn during transport and disposal. Satellite containers are transported from to the truck using either dollies or carts.

Health and Safety Coordinator

The HSC is responsible for overseeing IDW and arranging for IDW to be disposed of off site in accordance with local, state, and federal Regulations. The responsibilities of the HSC include:

1. Packaging and labeling of containers
2. Arranging for waste removal
3. Maintaining manifest records and tracking the manifest until its signed and returned
4. Conducting weekly inspections of the waste area
5. Ensuring that the proper waste-handling materials and personal protective equipment are available and adequate (e.g., gloves, coveralls, goggles, respirators and cartridges, boots, funnels, pumps, etc.)
6. Maintaining emergency spill response equipment

Malcolm Pirnie, Inc. SOP#
Site Name: Date:

Title: Procedure to Conduct Sample Management

I. Introduction

This guideline is to provide reference information on sample management procedures to be employed at the [Site].

II. Definitions

Target Compound List (TCL). A list of chemical substances consisting of 141 organic compounds. The list is broken into three subdivisions: volatiles, semi-volatiles and pesticide/PCBs.

Target Analyte List (TAL). A list of chemical substances consisting of 23 inorganic contaminants and cyanide.

Rinsate Blanks. Rinsate blanks are used to check sampling equipment decontamination. Rinsates are collected for each type of sampling equipment used on site. Demonstrated analyte-free water is poured over the equipment, collected into bottles, and analyzed for the analytes of concern.

Environmental Duplicate. These are two separate samples collected at the same sampling point. Environmental duplicates are used to determine field sampling precision and are collected at a frequency of at least 5 percent per matrix.

Matrix Spike/Matrix Spike Duplicates (MS/MSD). The process by which standard mixes of various organic TCL compounds are added to environmental samples prior to extraction. The sample is split into duplicates and analyzed. The analysis is used to evaluate the matrix effect of the sample upon the analytical methodology.

Matrix Spike/Matrix Duplicates (MS/MD). The spike analysis is the process by which standard mixes of various inorganic TAL parameters or radionuclide parameters are added to environmental samples prior to digestion. The analysis is used to evaluate the matrix effect of the sample upon the analytical methodology. The duplicate analysis is the process where the assigned sample is split in two and analyzed at the laboratory. The analysis is an indicator of a laboratory's analytical precision.

III. Guidelines

The purpose of sample management is to assure that all samples collected during this hazardous waste site investigation are accounted for when the project is completed. The sample management officer is also responsible for assuring that the proper quality assurance/quality control (QA/QC) samples are collected. These purposes are achieved by adhering to the following procedures:

SAMPLE MANAGEMENT

1) Prepare the Sample Bottles

A) All sample bottles must be cleaned and prepared in accordance with OSWER Directive #9240.05A, December 1992, "Specifications and Guidance for obtaining Contaminant Free Sample Containers."

- Malcolm Pirnie will purchase certified clean sample bottles from an approved supplier. Copies of these certifications will be kept in the site file for future reference.

- Each bottle used to collect a sample will be identified by a supplier and lot number to ensure that it is permanently associated with the sample collected in that particular bottle. A record of which sample is associated with each bottle lot will be kept in the site file. This is to ensure that for all samples collected, the specific sample bottles used can be traced to the sample bottle contractor, QC certification paperwork and custody records applicable to their identifying lot numbers.

B) To the extent possible, sample bottles will be prepared prior to the sampling event. In general, preparing the bottles beforehand helps eliminate error. A sample label will be affixed to each sample bottle. Information provided on the sample label will include the following:

1. Project name and/or number
2. Field ID or sample station number
3. Designation of sample as grab or composite
4. Sample matrix
5. Sample preservation notes
6. Analytical parameters

Clear, acetate tape will be applied over all labeling to maintain label integrity during decontamination procedures.

2) Sample Documentation, Packaging, and Shipping Procedures

One of the field personnel will be designated as the sample management officer. The sample management officer will bear the ultimate responsibility for the documentation, packaging, and shipping of the samples. These procedures are outlined below:

A) Documentation/Chain of Custody

Field Laptop

For documentation purposes, the sample management officer will fill record information in the field laptop and will also fill out the chain-of-custody forms. The following information will be recorded in the laptop:

- Sample date and time of collection
- Associated QC samples
- Any special designation (i.e., split, duplicate, MS/MSD, MS/MD, and rinsate samples)
- Analyses required
- Any problems (e.g., insufficient sample volume)

Chain of Custody

The chain-of-custody form serves as an official communication to the laboratory detailing the particular analyses required for each sample. An example of a Malcolm Pirnie chain-of-custody form is attached. Since all of the samples will be analyzed by a contractor laboratory, either the Malcolm Pirnie chain-of-custody form, or a chain-of-custody form supplied by the analytical laboratory, will be utilized. If a laboratory specific chain-of-custody form is used, it will contain the same information as the Malcolm Pirnie chain-of-custody form.

At the time of sampling, a chain of custody form will be filled out for each sample or group of samples. The sampler (under the sample management officer's direction) or sample management officer will complete a chain-of-custody record to accompany each shipment from the field to the laboratory. The chain of custody form will accompany the samples from the time of sampling through all transfers of custody. It will be kept on file at the laboratory where samples are analyzed and archived. The form will be filled out in triplicate; one copy will be retained by the Site Field Manager and two will be sent to the laboratory. A separate chain-of-custody record will be filled out for split samples.

Errors will be crossed through with a single line, initialed and dated. All entries will be legible. The following information will be recorded on the chain of custody form:

1. Project name and/or project number
2. Signature of sampler(s)
3. Sampling station number
4. Date and time of collection
5. Grab or composite sample designation
6. Sample matrix
7. Sampling location description
8. Field identification number
9. Analyses required
10. Preservation technique
11. Signatures and dates for transfers of custody
12. Air express/shipper's bill of lading identification numbers
13. Tracking (Laboratory Information Management System (LIMS)) number; this is only required for split samples

After all shipping and documentation is completed, the documentation will be maintained as follows:

<u>Laboratory</u>

- 1 original copy of all the chain-of-custody forms

<u>Site Manager for Project File</u>

- 2 original copies of all the chain-of-custody forms (one original will be sent back by the laboratory after sample analysis is complete)
- All original airbill receipts
- All Bottle Lot Certifications
- One copy of the Sample Trip Report

B) <u>Packaging and Shipping Samples</u>

1. Make sure the caps on the sample bottles are tightly sealed. Wipe down the outside of all of the sample bottles.

2. Preserve the samples according to the SOP for Sample Preservation #_____.

3. Apply one custody seal around the circumference of the bottle or over the cap and onto the sides of the bottle. The custody seal will be applied to the sample bottles in such a manner as to reveal if the bottle was opened during transit.

Note: Septum vials should not be covered over the top.

4. Place each bottle in its own ziplock bag. Note: the two aqueous 40-ml VOA vials may be placed in one bag. Eliminate extra air space from the bag before resealing. The EnCore® device comes in its own ziplock bag, and this ziplock bag will be used.

5. Prepare the shipping container (i.e., cooler). The cooler will be prepared so that no leakage can occur during shipping. All valves on the cooler will be securely duct taped, both inside and outside the cooler, and the cooler will be lined with either plastic or a large garbage bag. Only coolers that conform to the general design requirements in 49 CFR § 173.410 will be used for shipment.

6. Pack the coolers. Make sure the bottles do not touch. Packing material will be placed below the samples

7. Surround the samples being shipped for chemical analysis (e.g., TAL/TCL) with bags of ice. The ice will not be kept in its original bag, but will be repacked into ziplock bags. Place a temperature blank (40-ml vial filled with DI water) into the cooler. Use enough ice to ensure that the proper temperature (4-6^{o}C) is achieved and maintained during transport. The radiological samples do not have to be cooled.

8. Place packing material over and around the sample bottles. Sufficient packing material will be used so the bottles will not move or break during transport.

9. The chain of custody form will be placed in a ziplock bag and taped to the inside of one of the coolers. Prior to shipment, the "relinquished by" and "received by" sections of the chain of custody form will be filled in. Generally, the shipper will not sign the chain of custody form. Therefore, the carrier's name is filled in by the sample management officer.

10. Close the cooler and seal with strapping tape.

11. Apply signed and dated custody seals to the cooler. Place two custody seals diagonally across from each other where the cooler lid meets the cooler. The custody seal will be applied in such a manner as to reveal if the cooler was opened during transit.

12. An address label will be placed on the outside of each cooler. The label will be covered with clear tape.

13. If more than one cooler is being sent to one destination, each cooler will be appropriately labeled as 1 of X, 2 of X, etc.

14. The Airbill will be attached to one of the coolers.

15. The laboratory will be notified of the shipment before 10 a.m. on the day after shipping.

QA/QC SAMPLES

The sample management officer is responsible for ensuring that the appropriate types and numbers of QA/QC samples are collected. These samples include rinsate blanks, duplicates, splits, and MS/MSD/MS/MD samples.

Rinsate Blanks

Rinsate blanks are collected for each type of equipment used each day a decontamination event is carried out, with a maximum of one rinsate blank per equipment type per day. Composite rinsates will be collected from all equipment associated to a particular matrix for analysis of semi-volatile organics, pesticides, PCBs, inorganics, and radionuclides. The rinsate must be performed sequentially on all sampling equipment. However, a separate rinsate blank will be collected for each type of equipment associated to a particular sample matrix which will be analyzed for volatile organics. Rinsate blanks are collected by pouring demonstrated analyte-free water over clean equipment and collecting the water into the proper sample bottles. Rinsate blanks are noted as such on the chain of custody.

Environmental Duplicates

Samples for duplicate analysis are collected in the field, for each analytical parameter for each matrix sampled at a minimum frequency of 1 duplicate for every 20 samples. For soil samples, the volatile organic fraction is collected as a collocated grab sample while the non-volatile fraction is homogenized. The laboratory is not informed about which samples are duplicate samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) & Matrix Spike/Matrix Duplicate (MS/MD)

The designation of a sample for MS/MSD analysis for organics and MS/MD analysis for inorganics is required for 1 in 20 environmental samples per analytical parameter for each matrix sampled. No extra sample volume is usually required for the soil samples. MS/MSD and MS/MD samples are noted as such on the chain of custody.

Split Samples

Split samples are collected in the field for each analytical parameter for each matrix sampled at a minimum frequency of 1 duplicate for every 20 samples. For soil samples, the volatile organic fraction is collected as a collocated grab sample while the non-volatile fraction is homogenized. The split samples are sent to the government QA laboratory for analysis.

IV. References

U.S. Environmental Protection Agency. Region 2, Environmental Services Division, Monitoring Management Branch, CERCLA Quality Assurance Manual, October 1989, Revision 1.

Sampler's Guide to the Contract Laboratory Program (CLP), U.S. EPA, EPA-540/R-96/032.

Code of Federal Regulations, Title 49, Transportation Revised, October 1, 1986.

USEPA CLP SOW for Organic Analysis Multi-Media, Multi-Concentration, Doc. No. OLM04.2, 1999.

USEPA CLP SOW for Inorganic Analysis, Multi-Media, Multi-Concentration, Doc. No. ILM04.0, 1996.

USACE Requirements for the Preparation of Sampling and Analysis Plans, September 1, 1994.

POTABLE WELL INFORMATION FORM

DIRECTIONS:

Please complete this form by writing the answer in the space provided next to the question or by circling the most appropriate response. After you complete this questionnaire, please mail it back within 10 days of receipt.

1. Date: ____________________

2. What is the address and tax block/lot number of the property to be sampled?

   ADDRESS: ____

   ____

   BLOCK #: ____________________ LOT #: ____________________

3. What is your name, mailing address and telephone number(s)?

   NAME: ____

   ADDRESS: ____

   ____

   PHONE #: ____________________ (home) ____________________ (work)

4. Are you the owner of the property? **YES/NO**

   If NO, what is your relationship (explain) ____________________ and what is the name, address and telephone number(s) of the owner of the property?

   NAME: ____

   ADDRESS: ____

   PHONE #: ____________________ (home) ____________________ (work)

5. Is any of the water used at the residence supplied by a private well? **YES/NO**
   What is the source of water on your property?____________________

(If you answered NO to question 5 then stop here)

...OVER

6. Do you use the well water for drinking? **YES/NO**
   If NO, what is the source of your drinking water? ____________________

7. Do you use the well water for:
   - bathing? **YES/NO**
   - washing clothes? **YES/NO**
   - lawn/garden? **YES/NO**

8. Has this well been tested recently? **YES/NO**
   (If you answered NO please skip to question 9)

   a. What date was it most recently tested? ____________________

   b. Who tested the well water? ____________________

   c. What was the test for?
      - Bacteria
      - Volatile Organics
      - Metals
      - Others (please describe) ____________________

   d. Did the sampling detect any contaminants? **YES/NO**
      (Please enclose a copy of the results if possible.)

9. Does the well supply water for any other residences? **YES/NO**
   If YES, how many? ____________

10. What is the approximate depth of the well? ________feet

    Approximately what year was it installed? ________ Do you have a Well Installation Record? If yes, can you provide us with a copy? YES/NO

11. Since we want to sample untreated water from the well, we need to know whether you have any treatment system on the well. **YES/NO**

    If **NO**,
    Is there an outside spigot from which we can take a sample? **YES/NO**
    Where is it located?____________________

    If **YES**,
    a. What type of water treatment system(s) do you have?
       (circle those which apply)
       1. Softener
       2. Iron Removal
       3. Turbidity Removal
       4. pH Adjustment
       5. Disinfection
       6. Chlorinators
       7. Acid Neutralizer
       8. Other (please specify)

    b. Can the treatment system be bypassed? **YES/NO/DON'T KNOW**
       (circle those which apply)

       1. Outside spigot bypasses treatment
       2. Faucet in basement?
       3. Faucet on holding tank?
       4. Treatment system can be shut off.

12. If we cannot take an untreated sample from the outside spigot, would it be possible to schedule to meet someone at this location between 8 AM and 4 PM on a weekday to collect a water sample? **YES/NO**

13. Is there any other information that you feel would be helpful for us to know about your well?

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

Appendix C - Health and Safety Plan

2118151 / BAL

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FINAL
HEALTH AND SAFETY PLAN

INTERIM MEASURES WORK PLAN FOR
MONITORING WELLS 125D and 126D
FORT GEORGE G. MEADE, MARYLAND

MARCH 2009

Prepared for:

UNITED STATES ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT
P.O. Box 1715
Baltimore, Maryland 21203

Prepared by:

MALCOLM PIRNIE, INC.
300 East Lombard Street, Suite 610
Baltimore, Maryland 21202

FINAL
HEALTH AND SAFETY PLAN

INTERIM MEASURES WORK PLAN FOR
MONITORING WELLS 125D and 126D
FORT GEORGE G. MEADE, MARYLAND

DoD Delivery Order Contract Number: W912DQ-08-R-0012

Reviewed and Approved by:

Heather Polinsky
Heather Polinsky, Vice President
Program Officer
Malcolm Pirnie, Inc.

Dan Sheehan
Project Manager
Malcolm Pirnie, Inc.

Malcolm Pirnie, Inc., prepared this Uniform Federal Policy Quality Assurance Project Plan (QAPP) at the direction of the United States Army Corps of Engineers (USACE). This document should be used only with the approval of the USACE. This QAPP is based, in part, on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

MARCH 2009

Table of Contents

List of Appendices

All requirements of the Pirnie Health and Safety Program
Are Incorporated into this Document by Reference

HEALTH AND SAFETY PLAN

PROJECT NAME:	Fort George G. Meade Interim Measures Work Plan for Monitoring Wells 125d and 126d
SITE ADDRESS:	Fort George G. Meade, MD
PIRNIE PROJECT & TASK NUMBER:	2118151-001
CLIENT ORGANIZATION:	U.S. Army Corps of Engineers, Baltimore District
CLIENT ON-SITE CONTACT NAME:	Paul Fluck, Fort George G. Meade Public Works - Environmental Division
CLIENT SITE CONTACT PHONE No.:	301-677-9365
CLIENT OFF-SITE CONTACT NAME:	L. Craig Maurer, U.S. Army Corps of Engineers Baltimore District
CLIENT OFF-SITE CONTACT PHONE No.:	410-962-3506

AMENDMENT TO EXISTING APPROVED HASP _____ **EXISTING AMENDMENT NUMBER** _____

SITE TYPE: *Check as many as applicable. Add more if needed.*

☐ Active ☐ Secure ☐ Enclosed Space ☐ Uncontrolled ☐ Recovery ☐ Unknown ☒ Other (Specify) Residential
☐ Inactive ☐ Unsecured ☐ Landfill ☐ Industrial ☐ Well Field ☐ Military ☐ Other (Specify) _____

EMERGENCY CONTACTS	PHONE	EMERGENCY CONTACTS	NAME	PHONE
Water Supply:		Health and Safety Director:	Chuck Myers	914-484-7151
Electric Supply:		Project Manager:	Dan Sheehan	302-884-6919
EPA Release Report #:	800-424-8802	Site Safety Coordinator:	Rosemarie Fehrman	410-230-9954
Pirnie H&S Emergency #:	800-478-6870	Client contact:	Paul Fluck	301-677-9365
Facility Management:		Other *(Specify)*:	Denise Tegtmeyer	410-230-9963
Other *(Specify)*:		State Spill Number:	FGGM Safety Office	301-677-4867
Hospital Name:	Laurel Regional Hospital	Fire Department:	Odenton Volunteer Fire Department	911 / 410-674-4444
Hospital Address:	7300 Van Dusen Road, Laurel MD 20707 301-725-4300	Police Department:	Anne Arundel County Police	911 / 410-222-8050
Name of Contact at Hospital:		State Police:	Maryland State Police	410-333-1971
Name of 24 Hr. Ambulance:	Anne Arundel County Emergency Ambulance - 911	Health Department:	Anne Arundel County Department of Health	410-222-7095
		Poison Control Center:	Maryland Poison Center	410-528-7701
		Occupational Physician:	Dr Jerry Berke	800-3504511

Route and Distance to Hospital:
Head NE on Telegraph Rd,. Turn Left at Annapolis Rd/MD-175. Merge onto Patuxent Pkwy/MD-32. Take exit to Balt/Wash Pkwy/MD-295 S. Take exit toward Laurel. Merge onto Laurel Rd/Laurel Bowie Rd/MD-197. Turn Left at Contee Rd. Hospital is about 2.5 miles down Contee Rd. on the right. Total miles: 15.2. Estimated travel time: 25-35 min.

HEALTH & SAFETY PLAN APPROVALS *Not valid if not signed by Corporate H&S*

	PRINTED NAME	SIGNATURE
Prepared by:	Brian Jordan	

All requirements of the Pirnie Health and Safety Program
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HEALTH AND SAFETY PLAN

PM Signature:	Dan Sheehan
Corporate H&S:	Chuck Myers
Local H&S Coordinator:	John Archibald

OBJECTIVES OF FIELD WORK: *(e.g. collect surface soil samples)*

1. Collect groundwater samples from four monitoring wells
2. Collect water samples from private wells
3.
4.
5.
6.

SITE HISTORY: *Summarize known hazardous conditions. Include spills, previous investigations or agency actions, known injuries, etc.*

Two monitoring wells were installed in 2003 in preparation for the remedial investigation (RI) of the Closed Sanitary Landfill (CSL) Installation Restoration Program (IRP) site at Fort George G. Meade (FGGM). These wells, MW-125d and MW-126d, are located just outside the southeastern border of the installation on the east edge of N Patuxent Rd. As part of this program, four groundwater monitoring wells (identified as 123s, 124s, 125d, and 126d), were installed in 2003 on private property just outside the southeastern border of the installation on the east edge of North Patuxent Road (Work Plan Map 1-1). These are two groups of deep and shallow well clusters (125d/123s and 126d/124s). *Upon completion of the RI in 2004, tetrachloroethylene (PCE), trichloroethylene (TCE) and carbon tetrachloride (CCl_4) were recognized in concentrations below the Federal maximum contaminant level (MCL). In Fall 2008, FGGM re-developed and re-sampled the two existing monitoring wells. This sampling event showed concentrations of CCl_4 from MW-125d and CCl_4, TCE, and PCE from MW-126d all to have increased above the MCL.*

HEALTH AND SAFETY PLAN

SAFETY NARRATIVE: *Summarize Below*

Per U.S. EPA Administrative Order (Docket # RCRA - 03 - 2007 - 0213TH):
- An adequate transportation network is available throughout the site.
- Water, if needed, is available at FGGM.
- Field personnel will carry cell phones for communication purposes.
- Electricity for well pumps will be provided by an onsite generator.
- In the event of an emergency, site personnel will contact 911 and notify Rosemarie Fehrman, Site Safety Coordinator, at 862-432-7728 and contact the installation POC, Paul Fluck, at 301-677-9365.
- In preparation for an emergency, vehicles will remain unlocked with keys inside or under the windshield wiper, and parked in a manner for quit exit. In the event of a lightning storm, field personnel will cease activity for at least 30min after the most recent lightning strike.
- In the event of other severe weather, field personnel will cease activity until weather has cleared.
- All field personnel are required to participate in annual health physicals to monitor possible environmental influence.
- Emergency equipment (first aid kit, blood born pathogen kit, fire extinguisher) will be available on-site.

PERSONNEL AND RESPONSABILITIES	TRAINING	PROJECT OR SITE RESPONSIBILITIES	TASK
Brian Jordan	HAZWOPER 40-hr (08/08) MEDICAL (7/08)	Field / Survey Technician - Geologist / Hydrogeologist	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
Rosemarie Fehrman	HAZWOPER 40-hr (09/07) HAZWOPER 8-hr (01/08) CPR (6/10) FIRST AID (6/10) MEDICAL (11/08)	Field / Survey Technician	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
Denise Tegtmeyer	HAZWOPER 40-hr (07/99) HAZWOPER 8-hr (04/08) CPR(6/10) FIRST AID (6/10)	Task Manager - Field Sampling & Reporting	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6

	MEDICAL (11/08)		
Nicole Walworth	HAZWOPER 40-hr (09/06) HAZWOPER 8-hr (1/07) CPR(6/10) FIRST AID (6/10) MEDICAL (11/08)	Field / Survey Technician - GIS	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
Jeruid Shoemaker	HAZWOPER 40-hr (06/06) HAZWOPER 8-hr (09/08) MEDICAL (04/08)	Data Management & Reporting - Field / Survey Technician	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
Lisa Heffner	HAZWOPER 40-hr (10/03) HAZWOPER 8-hr (11/07) MEDICAL (07/08)	Data Management & Reporting - Field / Survey Technician	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
Tom Quinn	HAZWOPER 40-hr (07/07) HAZWOPER 8-hr (10/07) MEDICAL (06/08)	Field / Survey Technician	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
Greg Firely	HAZWOPER 40-hr (08/05) HAZWOPER 8-hr (11/07) MEDICAL (11/08)	Field / Survey Technician	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
Christopher Ortolano	HAZWOPER 40-hr (06/98) HAZWOPER 8-hr (10/07) MEDICAL (12/08)	Field / Survey Technician	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
Christine McCarthy	HAZWOPER 40-hr (06/06) HAZWOPER 8-hr (10/08) MEDICAL (06/08)	Field / Survey Technician	☐None ☒1 ☒2 ☐3 ☐4 ☐5 ☐6
			☐None ☐1 ☐2 ☐3 ☐4 ☐5 ☐6
			☐None ☐1 ☐2 ☐3 ☐4 ☐5 ☐6

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All requirements of the Pirnie Health and Safety Program Are Incorporated into this Document by Reference

HEALTH AND SAFETY PLAN

HAZARDS OF CONCERN: *Check as many as applicable*

☒ Animal/ Plants	☐ Dust, Harmful	☐ Heat Stress	☐ Ionizing Radiation	☐ Overhead Objects	☒ Slips & Falls
☐ Asbestos/ Lead	☐ Dust Nuisance	☒ Heavy Equipment	☐ Light Radiation *(i.e., Weldin, High Intensity)*	☐ Oxygen Deficient	☐ Terrain
☐ Biological	☒ Electrical	☒ Heavy Lifting	☐ Limited Contact	☐ Poor Visibility	☐ Traffic *(Struck by)*
☐ Chemical Exposure (*See Section 5B/ 5C)*	☐ Excavations (*See Section 13)*	☐ Heavy Machinery	☒ Motorized Traffic	☐ Powered Platforms	☐ Other: (Print)
☐ Confined Space *(See Section 12)*	☐ Explosive/ Flammable	☐ Hot Work	☐ Moving Parts *(LO/TO)*	☐ Radiological	☐ _____
☐ Demolition	☒ Extreme Cold	☐ Hunting Season	☐ Noise *(>85cB)*	☐ Rolling Objects	☐ _____
☐ Drilling	☐ Fall, >6' Vertical	☐ Immersion	☐ Non-Ionizing Radiation	☐ Scaffolding	☐ _____
☒ Drum Handling	☐ Falling Objects	☐ Inorganic Chemicals	☒ Organic Chemicals	☐ Sharp Objects	☐ _____

THIS PLAN INCORPORATES PROCEDURES FOR: *(Click on the relevant topic to download the Hazard Guideline. Check all that apply.)*

☐ Benzene Exposure control	☒ Electrical Safety	☐ Lead Exposure Control	☐ Respiratory Protection
☐ Bloodborne Pathogens	☐ Fall Protection/Ladders/Scaffolds	☐ Lock Out/Tag Out	☐ Trenching and Excavation Safety
☐ Cadmium Exposure Control	☒ Hazard Communication	☒ Personal Protective Equipment	☐ UXO/MEC Safety
☐ Confined Space Entry	☒ Hazardous Waste and Emergency Response	☐ Process Safety Management	☐ Welding/Cutting/ Hot Work
☒ Driver Safety	☐ Hearing Conservation	☐ Radiation Safety	☐

DESCRIPTION OF SITE AND TOPOGRAPHICAL FEATURES:

Include location of principal operations and unusual features (containers, buildings, dikes, power lines, hill slopes, rivers etc.)

The site is located in a residential neighborhood with potentially busy roadways. Buildings in the area are mostly houses with some apartment/condominum complexes and businesses scattered. There is a large warehouse and wooded area towards the northern edge of the study area. The site is relatively flat; however it gently slopes downward to the east.

SURROUNDING POPULATION:

☒ Residential	☒ Commercial	☐ Urban
☐ Rural	☐ Industrial	☐ Other

ANTICIPATED ON SITE CHEMICALS AND ESTIMATED QUANTITY

Solids: *(Quantity/ Concentration)*	**Sludge:** *(Quantity/ Concentration)*	**Solvents:** *(Quantity/ Concentration)*	**Oils:** *(Quantity/ Concentration)*	**Others:** *(Quantity/ Concentration)*

HEALTH AND SAFETY PLAN

Flyash	Pigments	Ketones	Oily Wastes	Acids
Mil or Mine Tailings	Metal Sludge	Aromatics	Gasoline	Picking Liquors
Asbestos	POTW Sludge	Hydrocarbons	Diesel Oil	Caustics
Ferrous Smelter	Distillation Bottoms	Alcohols	Lubricants	Pesticides
Non-Ferrous Smelter	Aluminum	Halogenated	Plolynuclear Aromatics	Dyes or Inks
Metals	Others- Specify	Esters	PCBs	Cyanides
Dioxins	_____	Ethers	Heating Oil	Phenols
Others- Specify	_____	Others- Specify	Others- Specify	Halogens
_____	_____	_____	_____	Others- Specify
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

ANTICIPATED WASTE TYPES:

☒ Liquid ☐ Sludge ☐ Unknown
☒ Solid ☐ Gas ☐ Other: _____

FACILITY PAST AND PRESENT DISPOSAL METHODS AND PRACTICES, IF APPLICABLE:
Potentially contaminated liquids and any solid waste will be stored at the Fort George G. Meade Site and will be disposed of as IDW after characterization.

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONENTRATION *(Which media?)*	8 HR TIME WEIGHTED AVERAGE IN AIR *(PEL/TLV) Specify Units*	IDLH *Specify Units*	WARNING CONENTRATION IF ANY *Specify Units*	SYMPTOMS & EFFECTS OF ACUTE EXPOSURE	MEDIA	PHOTO-IONIZATION POTENTIAL *(FOR VOCs)*
PCE	51 ug/L (GW)		100ppm		Irritation to skin and eyes, feeling of weakness, restlessness, irregular respiration, muscle incordination	GW	11.10eV
TCE	16 ug/L (GW)		1000ppm		Headache, irritation to skin and eyes,feeling of weakness, visual disturbance,	GW	9.45eV

HEALTH AND SAFETY PLAN

					nausea, dermatitis, cardiac arrhythmias, paresthesia, liver injury		
CCL4	51 ug/L		200ppm		Irritation of skin and eyes, central nervious system depression, nausea, liver or kidney injury, drowsiness or dizziness	GW	11.47eV

HEALTH AND SAFETY PLAN

NA = Not Available	NE = None Established	U = Unknown
S = Soil	SW = Surface Water	
A = Air	GW = Ground Water	*Attached a Material Safety Data Sheet for each chemical you will use at the site*
W = Waste	L = Lagoons	
D = Drums	TK = Tanks	

SPECIFIC TASK DESCRIPTIONS	TASK – SPECIFIC HAZARDS	CONTROL MECHANISM
1. Collect samples from four monitoring wells	Other:	
2. Collect tap water samples from residents using well water within a one mile radius of the monitoring wells	Pets Other:	Have owner control pets before entering premisis
3.	Other:	
4.	Other:	
5.	Other:	
6.	Other:	

SPECIALIZED TRAINING REQUIRED:	**SPECIAL MEDICAL SURVEILANCE REQUIEREMENTS:**

OVERALL HAZARD EVALUATON: *(Evaluate each Hazard)* ☐ High ☐ Medium ☒ Low ☐ Unknown

1. Low
2. Low
3.
4.
5.
6.

JUSTIFICATION: *(i.e. why is the task a low, medium or high hazard?)*

1.
2. Field personnel will not enter premisis without owner occupancy
3.
4.
5.
6.

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All requirements of the Pirnie Health and Safety Program
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HEALTH AND SAFETY PLAN

FIRE/ EXPLOSION POTENTIAL: ☐ High ☐ Medium ☒ Low ☐ Unknown

PROTECTIVE EQUIPMENT *Specify by task. Indicate type and / or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

Task 1 LEVEL: ☐A ☐B ☐C ☒D ☒Modified
☒ Primary ☐Contingency

Respiratory ☒Not Needed	**Protective Clothing** ☐Not Needed
☐ SCBA	☐ Fully Encapsulating Suit
☐ Airline	☐ Splash Suite
☐ Full Face	☐ Tyvek Coverall
Specify Cartridge: _____	☐ Saranex Coverall
☐ Escape Mask	☒ Reflective Vest
☐ Other: *Specify* _____	☐ Other: *Specify* _____
Head and Eye ☐Not Needed	**Gloves** ☐Not Needed
☒ Safety Glasses	☒ Nitrile
☐ Face Shield	☒ Work Gloves
☐ Goggles	☐ Latex
☐ Hard Hat	☐ Viton
☐ Other	☐ Other: *Specify* _____
Boots ☐Not Needed	**Miscellaneous**
☒ Leather/Steel Toe	☒ Insect Repellent
☐ Rubber Overboots	☐ USCG *Personal Flotation Device*
☐ Steel Shank	☐ Hearing *Specify NRR* _____
☐ Other: *Specify* _____	☒ Sun Screen
	☐ Other: *Specify* _____

Task 2 LEVEL: ☐A ☐B ☐C ☒D ☒Modified
☐ Primary ☐Contingency

Respiratory ☒Not Needed	**Protective Clothing** ☒Not Needed
☐ SCBA	☐ Fully Encapsulating Suit
☐ Airline	☐ Splash Suite
☐ Full Face	☐ Tyvek Coverall
Specify Cartridge: _____	☐ Saranex Coverall
☐ Escape Mask	☐ Reflective Vest
☐ Other: *Specify* _____	☐ Other: *Specify* _____
Head and Eye ☐Not Needed	**Gloves** ☐Not Needed
☒ Safety Glasses	☒ Nitrile
☐ Face Shield	☐ Work Gloves
☐ Goggles	☐ Latex
☐ Hard Hat	☐ Viton
☐ Other	☐ Other: *Specify* _____
Boots ☐Not Needed	**Miscellaneous**
☒ Leather/Steel Toe	☐ Insect Repellent
☐ Rubber Overboots	☐ USCG *Personal Flotation Device*
☐ Steel Shank	☐ Hearing *Specify NRR* _____
☐ Other: *Specify* _____	☐ Sun Screen
	☐ Other: *Specify* _____

Task 3 LEVEL: ☐A ☐B ☐C ☐D ☐Modified
☐ Primary ☐Contingency

Respiratory ☐Not Needed	**Protective Clothing** ☐Not Needed
☐ SCBA	☐ Fully Encapsulating Suit
☐ Airline	☐ Splash Suite
☐ Full Face	☐ Tyvek Coverall
Specify Cartridge: _____	☐ Saranex Coverall
☐ Escape Mask	☐ Reflective Vest
☐ Other: *Specify* _____	☐ Other: *Specify* _____
Head and Eye ☐Not Needed	**Gloves** ☐Not Needed
☐ Safety Glasses	☐ Nitrile
☐ Face Shield	☐ Work Gloves
☐ Goggles	☐ Latex

Task 4 LEVEL: ☐A ☐B ☐C ☐D ☐Modified
☐ Primary ☐Contingency

Respiratory ☐Not Needed	**Protective Clothing** ☐Not Needed
☐ SCBA	☐ Fully Encapsulating Suit
☐ Airline	☐ Splash Suite
☐ Full Face	☐ Tyvek Coverall
Specify Cartridge: _____	☐ Saranex Coverall
☐ Escape Mask	☐ Reflective Vest
☐ Other: *Specify* _____	☐ Other: *Specify* _____
Head and Eye ☐Not Needed	**Gloves** ☐Not Needed
☐ Safety Glasses	☐ Nitrile
☐ Face Shield	☐ Work Gloves
☐ Goggles	☐ Latex

HEALTH AND SAFETY PLAN

☐ Hard Hat ☐ Other	☐ Viton ☐ Other: *Specify* _____	☐ Hard Hat ☐ Other	☐ Viton ☐ Other: *Specify* _____
Boots ☐Not Needed ☐ Leather/Steel Toe ☐ Rubber Overboots ☐ Steel Shank ☐ Other: *Specify* _____	**Miscellaneous** ☐ Insect Repellent ☐ USCG *Personal Flotation Device* ☐ Hearing *Specify NRR* _____ ☐ Sun Screen	**Boots** ☐Not Needed ☐ Leather/Steel Toe ☐ Rubber Overboots ☐ Steel Shank	**Miscellaneous** ☐ Insect Repellent ☐ USCG *Personal Flotation Device* ☐ Hearing *Specify NRR* _____ ☐ Sun Screen

Task 5	LEVEL: ☐A ☐B ☐C ☐D ☐Modified ☐ Primary ☐Contingency	**Task 6**	LEVEL: ☐A ☐B ☐C ☐D ☐Modified ☐ Primary ☐Contingency
Respiratory ☐Not Needed ☐ SCBA ☐ Airline ☐ Full Face Specify Cartridge: _____ ☐ Escape Mask ☐ Other: *Specify* _____	**Protective Clothing** ☐Not Needed ☐ Fully Encapsulating Suit ☐ Splash Suite ☐ Tyvek Coverall ☐ Saranex Coverall ☐ Reflective Vest ☐ Other: *Specify* _____	**Respiratory** ☐Not Needed ☐ SCBA ☐ Airline ☐ Full Face Specify Cartridge: _____ ☐ Escape Mask ☐ Other: *Specify* _____	**Protective Clothing** ☐Not Needed ☐ Fully Encapsulating Suit ☐ Splash Suite ☐ Tyvek Coverall ☐ Saranex Coverall ☐ Reflective Vest ☐ Other: *Specify* _____
Head and Eye ☐Not Needed ☐ Safety Glasses ☐ Face Shield ☐ Goggles ☐ Hard Hat ☐ Other	**Gloves** ☐Not Needed ☐ Nitrile ☐ Work Gloves ☐ Latex ☐ Viton ☐ Other: *Specify* _____	**Head and Eye** ☐Not Needed ☐ Safety Glasses ☐ Face Shield ☐ Goggles ☐ Hard Hat ☐ Other	**Gloves** ☐Not Needed ☐ Nitrile ☐ Work Gloves ☐ Latex ☐ Viton ☐ Other: *Specify* _____
Boots ☐Not Needed ☐ Leather/Steel Toe ☐ Rubber Overboots ☐ Steel Shank ☐ Other: *Specify* _____	**Miscellaneous** ☐ Insect Repellent ☐ USCG *Personal Flotation Device* ☐ Hearing *Specify NRR* _____ ☐ Sun Screen	**Boots** ☐Not Needed ☐ Leather/Steel Toe ☐ Rubber Overboots ☐ Steel Shank	**Miscellaneous** ☐ Insect Repellent ☐ USCG *Personal Flotation Device* ☐ Hearing *Specify NRR* _____ ☐ Sun Screen

MALCOLM PIRNIE

HEALTH AND SAFETY PLAN

MONITORING EQUIPMENT: Specify by task. Indicate type as necessesary. Attach Additional sheets if needed.			
INSTRUMENT	**ACTION GUIDELINES**		
Combustible Gas Indicator	0-10% LEL 10-25% LEL >25% LEL	*No explosion hazard* *Potential explosion hazard. Reconsider Work Plan. Proceed Cautiously* *Explosion hazard. Evacuate Immediately. Warn Others.*	☒ Not Needed
Oxygen Indicator	19.5-23.5 % < 19.5% >23.5 %	*Oxygen normal* *Oxygen deficient. Evacuate Immediately. Warn Others.* *Explosion hazard. Evacuate Immediately. Warn Others.*	☒ Not Needed
Radiation **Survey Meter**	3 x Background: >2mR/hr:	*Notify RSO if unanticipated. Withdraw and await instructions* *Establish Rad Exclusion Zone*	☒ Not Needed
Photo ionization Detector 10.6eV Lamp Type: _____	0-3 units over ambient 3-5 units over ambient >5 units over ambient	*0-3 meter units over background, continue work* *If sustained for 5 minutes--reconsider work plan. Proceed with caution.* *If sustained for 5 minutes--evacuate or don respiratory protection*	☐ Not Needed
Flame Ionization Detector Type _____ **Combustible Gas Indicator**	0-3 units over ambient 3-5 units over ambient >5 units over ambient	*0-3 meter units over background, continue work* *If sustained for 5 minutes--reconsider work plan. Proceed with caution.* *If sustained for 5 minutes--evacuate or don respiratory protection*	☒ Not Needed
Single Gas Type _____	*Specify:*		☒ Not Needed
Respirable Dust Monitor Type _____	*Specify:*		☒ Not Needed
Other *Specify:* ____ Type _____	*Specify:*		☒ Not Needed
Other *Specify:* ____ Type _____	*Specify:*		☒ Not Needed

HEALTH AND SAFETY PLAN

DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, & SUPPORT ZONES

Personnel Decontamination	**Exclusion Zone**	**Sampling Equipment Decontamination**
Summarize below or attach diagram. *1) Outer garment and work boots may be brushed to remove adhered soil.* *2) Nitrile gloves will be removed and placed into a collection container.* ☐ **Not Needed**	*Summarize below or attach diagram.* ☒ **Not Needed**	*Summarize below or attach diagram.* *Dedicated certified clean pumps will be used for each well, however, the pumps and equipment will be decontaminated after use using the following procedure:* *1) Sampling equipment will be cleaned with a stiff brush in a solution of Liquinox (or equivalent detergent) and potable water. Five gallons of this solution will be circulated through each pump and hose.* *2) After cleaning with detergent, sampling equipment will be rinsed with potable water and then with deionized water. Five gallons of potable water and then deionized water will be circulated through each pump and hose.* *3) Wash and rinse will be drummed for storage and disposal.* ☐ **Not Needed**
Containment and Disposal Method Nitrile gloves will be placed in a trash receptacle. ☐ **Not Needed**	**Containment and Disposal Method** ☒ **Not Needed**	**Containment and Disposal Method** Drums will be disposed of as IDW. ☐ **Not Needed**

HAZARDOUS MATERIALS TO BE BROUGHT TO ONSITE

Preservatives		*Decontamination*		*Calibration*	
☒ Hydrochloric Acid	☐ Zinc Acetate	☐ Alconox ™	☐ Mineral Spirits	☒ 100 ppm isobutylene	☐ Hydrogen Sulfide

HEALTH AND SAFETY PLAN

☐ Nitric Acid	☐ Ascorbic Acid	☒ Liquinox ™	☐ Hexane	☐ Methane	☐ Carbon Monoxide
☐ Sulfuric Acid	☐ Acetic Acid	☐ Acetone	☐ Isopropanol	☐ Pentane	☐ pH Standards
☐ Sodium Hydroxide	☐ Other: _____	☐ Methanol	☐ Nitric Acid	☐ Hydrogen	☐ Conductivity
		☐ Other: _____	☐ Other: _____	☐ Propane	☐ Other: _____

HEALTH AND SAFETY PLAN

SITE MAP: *Show Exclusion Zone, Contamination Reduction Zone, and Support Zones. Indicate Evacuation and Reassembly Points*

See map located in work plan

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN SIGNATURE FORM

Malcolm Pirnie Health and Safety Plan

All on-site Malcolm Pirnie personnel must sign this form indicating receipt of the HASP. Keep this original in site as part of the permanent project files. Send a copy to the Health and Safety Lead for your BU.

SITE NAME: Fort George G. Meade Offpost Well Investigation

SITE LOCATION: Odenton, MD

CERTIFICATION

I understand that I am responsible for my safety and that of others. I agree to comply with the provisions of this HASP for work activities on this project. I agree to report any injuries, illnesses or exposure incidents to the Field Team Leader.

Printed Name	Signature

Printed Name	Signature

TABLE OF CONTENTS

1.0 INTRODUCTION

The privilege to drive a motor vehicle in the United States is regulated at the State level. Individual States set minimum driving ages, license requirements, insurance requirements, and state and federal highway speed limits. Local authorities are responsible for setting speed limits on local roadways. Driving commercial vehicles, trucks, and transporting hazardous materials are regulated by the U.S. Department of Transportation and by State Departments of Transportation if applicable.

Highway traffic incidents continue to lead all other events that resulted in fatal work injuries in 1996. Work-related highway deaths accounted for 22 percent of the 6112 fatal work injuries recorded. Thirty-two percent of these, or 418 fatalities, occurred when employees were driving or riding in cars or vans. Of the 711 occupational fatalities that occurred to workers in the “Managerial and Professional Specialty” class of employment in the same year, approximately 164 of these occurred on the highway.

Malcolm Pirnie employees who drive a motor vehicle during the course of business have the responsibility to be aware of, and follow, federal, state, and local laws and the general safety rules outlined in this program.

2.0 PURPOSE

The purpose of the Malcolm Pirnie Driver Safety Program is publicize some common sense policies and procedures which, if followed, will reduce the risk of employee injury, property damage, and Corporate liability associated with the operation of motor vehicles. This Program will assist Malcolm Pirnie management and staff in reducing risk by:

- Setting policies and procedures for managing the safe use of motor vehicles.
- Educating management and staff on their duties and responsibilities to promote the safe use of motor vehicles.
- Setting some basic rules that must be followed when traveling in motor vehicles.
- Setting rules for the use of personal cars and trucks on Malcolm Pirnie projects.
- Educating management and staff on proper procedures for reporting vehicular accidents and injuries.

3.0 APPLICATION

The policies and procedures in this Program apply to the operation of Malcolm Pirnie owned vehicles, vehicles leased or rented for Malcolm Pirnie business, and personal vehicles when utilized on Malcolm Pirnie business (motor vehicles).

4.0 PROGRAM RESPONSIBILTIES

Individual drivers are responsible for driving in a safe manner and observing all established laws and company policies.

Supervisors and Project Managers are responsible for monitoring employee performance relative to safe driving and compliance with company policies.

Branch Human Resources, Vehicle, Health & Safety and DOT Coordinators are responsible for supporting their respective offices in implementing the Malcolm Pirnie Driver Safety Program. The Corporate Health and Safety Group is responsible for overall program direction and oversight.

The Legal Department is responsible for maintaining the insurance programs, reporting costs related to premiums and liabilities, and coordinating Motor Vehicle Records (MVR) reviews.

The Purchasing Department is responsible for the overall administration of the Malcolm Pirnie Vehicle Leasing Program. This includes coordinating vehicle maintenance and maintaining a national agreement with approved vehicle leasing and rental companies.

5.0 SEAT BELTS

OSHA and an number of other federal and state agencies have determined that the use of seat belts while traveling in motor vehicles can significantly reduce the seriousness of injuries sustained in an accident. Malcolm Pirnie employees will use seat belts when traveling in any motor vehicle.

6.0 GENERAL RULES FOR MOTOR VEHICLE OPERATION

The following are Malcolm Pirnie's basic rules for operating motor vehicles:

- All staff members operating a motor vehicle must possess a current, valid driver's license.

- Staff members who use their personal vehicles for company business will carry the state specific minimum liability and bodily injury insurance and notify their insurance carrier that their vehicle will be used for business, at least part-time.
- The operator of any motor vehicle is responsible for complying with all local traffic regulations, as well as client or property owner requirements concerning motor vehicle operation.
- All employees must notify their direct supervisor within one (1) working day regarding license suspension or revocation.
- Employees shall not operate a motor vehicle under the influence of alcohol or drugs including prescription and over the counter medicines. Reduction in sensory and motor skills begins well below the typical legal limit of 0.10 percent blood alcohol.
- The operator and all passengers shall use seat belts at all times when a motor vehicle is in motion.
- Employees shall not allow a company vehicle (owned, leased or rented) or personal vehicle to be operated on company business by an unauthorized driver (except in the case of an emergency).
- Malcolm Pirnie employees shall drive defensively and courteously at all times.
- Employees will physically inspect company vehicles and test the safety systems (lights, flashers, wipers, etc.) prior to each use.
- Staff members will not leave keys in an unattended vehicle unless specifically requested, for example, by a client while on their property. Operators will not leave the motor running in an unattended vehicle. (Exceptions are allowed for "warming up" when vehicle is in an area visible to the operator).
- Using a cellular phone while driving is discouraged due to the higher rate of traffic accidents that occur during this activity. Drivers are encouraged to safely pull over to the side of the road and stop when using a cellular phone.
- Malcolm Pirnie prohibits the use of radar detectors in all company owned, rented, and leased vehicles in States where these devices are illegal.
- Company vehicles will be returned in the same condition that they were in when they were signed out, inside and outside.
- Traffic accidents, vehicle damage or malfunction must be reported to the responsible Vehicle Coordinator within 24 hours of occurrence. Vehicles with damage or a malfunction that could compromise safe operation will be removed from service immediately and will not be returned to service until repairs are completed.

7.0 DRIVER EVALUATION

7.1 Initial Driver's License Verification

For potential employment candidates, a copy of the candidate's driver's license will be taken as part of the employment application process. A copy of the license will be forwarded to the Legal Department, COR, for a motor vehicles records check.

Candidates with valid driver's licenses will be eligible for hire for positions requiring driving on company business.

7.2 Driver's License and Insurance Verification - Assigned Vehicles

Management and staff assigned a leased vehicle will participate in an annual driver's license verification to determine if they may retain the privilege of operating company vehicles.

To complete the verification, each officer, associate and staff member assigned a leased vehicle will be asked to read this "Driver Safety Program", sign the Malcolm Pirnie "Rules for Motor Vehicle Operation" form, and provide a copy of a valid drivers license to their Vehicle Coordinator prior to receiving a new motor vehicle and each January thereafter. The Vehicle Coordinator will forward copies of the completed form and attachments to Health & Safety, COR, and a copy will be kept in the employee's branch Health & Safety file.

7.3 Pool and Personal Vehicles

All other Malcolm Pirnie staff members who drive company or personal vehicles on company business will participate in an annual driver's license verification and insurance review to determine if they may retain the privilege of driving on company business. The evaluation will occur on the anniversary date of employment.

To complete the evaluation, each employee's supervisor reviews this driver safety program and the "Rules for Motor Vehicle Operation" form with the employee, completes the Driver's License Verification Form, and obtains a copy of the employee's driver's license and insurance card (for those employees who drive personal vehicles on company business. Copies of the completed forms and attachments will be forwarded by the supervisor to Health & Safety, COR, and a copy will be kept in the employee's branch Health & Safety file.

7.4 Motor Vehicle Records Check

To ensure that all employees who drive on company business are qualified to do so, the Legal Department will coordinate a motor vehicle records (MVR) check. MVRs will be obtained for all candidates for employment during the employment process and for all active employees every six months.

Employees with a suspended or revoked license will not be allowed to drive any vehicle on company business.

The Legal Department will report driving license revocations and suspensions to the employee and his or her supervisor within two weeks of receipt.
Employees who fail to notify the company of any accident occurring on company business or fail to notify the company of a license suspension or revocation will be subject to progressive discipline.

7.5 Reinstatement of Driving Privilege

Any employee, whose privilege to drive a motor vehicle on company business has been revoked or denied, and who desires to reinstate this privilege, must apply in writing to their direct supervisor for reinstatement. The supervisor must get approval from the Legal Department before reinstatement.

8.0 SPECIFIC REQUIREMENTS

8.1 General

Vehicles must be properly registered and licensed according to state-specific requirements. Malcolm Pirnie reserves the right to access insurance company and Department of Motor Vehicle computer database information for screening new and current employees.[1]

Malcolm Pirnie reserves the right to screen selected employees who are working on specific contracts to determine substance abuse in accordance with Malcolm Pirnie's Substance Abuse Detection and Deterrence Program and to take the necessary corrective or disciplinary action the Company deems appropriate.

8.2 Transporting Personnel and Equipment

Only authorized employees may utilize Malcolm Pirnie owned vehicles.
Malcolm Pirnie employees may be involved in the transportation of analytical and/or hazardous materials. Hazardous materials must be properly packaged, labeled and transported with the correct emergency information (e.g. MSDS).

Regulated hazardous substances shall not be transported in personal vehicles.

8.3 Vehicles

All company vehicles must be equipped in compliance with state and local laws and regulations. In addition, all company vehicles should carry an ice scraper/snow brush (if applicable), road flares or reflective triangles, and a basic first aid kit.

For leased and owned vehicles, inspection and maintenance logs will be maintained and up-to-date records of repair work performed will be readily accessible.

[1]Malcolm Pirnie adheres to a strict policy of confidentiality in matters pertaining to the accessing of personal / medical information. Only the appropriate authorities may be permitted to acquire this information

9.0 SAFETY GUIDELINES

General safety guidelines are listed below:

- Allot enough time for travel thus avoiding the need to hurry.
- Be well rested and alert.
- Drive defensively.
- Be aware of the surroundings. Notify someone of your destination and anticipated time of arrival.
- Do not pick up hitchhikers.
- Before operating an unfamiliar vehicle, the driver should become acquainted with the operational features of the vehicle.
- Respond to special conditions like rain, ice or poor surfaces. Reduce vehicle speed and proceed with caution.
- Use caution when driving through congested areas, or near where personnel and equipment are working.

10.0 SAFE DRIVING OFF THE JOB

Malcolm Pirnie encourages its employees to practice safe driving techniques at all times - on or off the job. The best defense you have against potential vehicular accidents is your own ability to remain alert and aware when driving. Alcohol, drugs, or medications can affect your ability to concentrate and severely impair your reaction time that may result in injury, disability, or death - not only of the driver, but of passengers as well. This could be friends or family members.

Be alert, be aware, and be safe.

11.0 ACCIDENT/INCIDENT REPORTING

All accidents involving Malcolm Pirnie vehicles must be reported to the Legal, Purchasing, Benefits and the Health & Safety groups within one (1) working day. Accidents resulting a fatality or hospitalization of five or more persons must be reported as soon a possible via the 24-hour emergency number (800 478-6870). Accidents involving rented or employee owned vehicles used on company business must also be reported within one (1) working day.

Malcolm Pirnie carries liability and bodily injury insurance for all company motor vehicles. The Legal Department will have the ultimate responsibility for determining the responsible parties.

Malcolm Pirnie will pay for the insurance deductible up to $500.00 resulting from collision damage to an employee's vehicle while using a personal vehicle on company business. Temporary vehicle costs will not be reimbursed.

The operator or, in the event the operator is injured, the operator’s immediate supervisor, is responsible for ensuring that all vehicle accident reports are processed and submitted to the above-mentioned Corporate Groups

TABLE OF CONTENTS

1.0 INTRODUCTION

This document contains general requirements for all work by Malcolm Pirnie involving the use of electrically powered equipment and systems or work in or near electrical transmission and control equipment. Appendix A contains terms and definitions and Appendix B, the effects of electrical energy on humans. All Project Managers, Project Safety Officers, Staff Supervisors and employees shall comply with these requirements.

2.0 RESPONSIBILITIES

This section describes specific responsibilities of Malcolm Pirnie employees who have key safety roles. The responsibilities of individuals with regard to electrical work are listed below each title.

2.1 PROJECT MANAGERS

Project Managers are responsible for:

- Staffing the project with workers and subcontractors who have the appropriate training and skill sets.
- Providing sufficient resources to meet the requirements of this section.
- Review and approve the installation of temporary wiring.
- Verify that, if new electrical work or modifications to existing electrical systems are made in areas that may expose Malcolm Pirnie employees and subcontractor employees to electrical hazards, the electrical work will be inspected and tested by authorized inspectors prior to use
- Periodically review employee activities in the field to verify that employees are conducting tasks within their competencies.

2.2 PROJECT SAFETY OFFICERS OR EMPLOYEE SUPERVISORS

PSOs or Supervisors are responsible to ensure Malcolm Pirnie employees and subcontractors:

- Comply with the requirements set forth by the OSHA, NEC, and other regulatory agencies.
- Verify that, if new electrical work or modifications to existing electrical systems are made in areas that may expose Malcolm Pirnie employees and subcontractor employees to electrical hazards, the electrical work will be inspected and tested by authorized inspectors prior to use
- Have the appropriate PPE available and use them properly.
- Are performing their tasks in line with their stated competencies.

Determine the work each employee is qualified to perform and make work assignments accordingly.

2.3 EMPLOYEES

- Only perform the tasks for which you are qualified.
- Understand the basic principles of electricity and electrical safety.
- Follow applicable OSHA requirements.
- Use the proper tools and required PPE.
- Request additional training to avoid working beyond your level of qualification or comfort.
- Comply with the requirements set forth by the OSHA and NEC.

3.0 HAZARDS

Electricity is used in many different ways on Malcolm Pirnie projects. Each application has its own combination of hazards that includes the potential of electric shock, fire, and burns. There are often occasions where employees or subcontractors work in the vicinity of electrical transmission or control equipment. Examples of these include overhead and underground transmission cables, capacitors, transformers, MCC switches and equipment controls. Each type of equipment has its own combination of hazards that must be neutralized or addressed.

It is essential for all employees, including subcontractor employees, to be aware of the hazards associated with work on or near electrical systems and use appropriate protective methods to minimize the risk of an injury or accident.

Appendix B contains more detailed information about the effects of electrical energy on humans.

4.0 CONTROLS FOR ELECTRICAL WORK AND ELECTRICAL EQUIPMENT

4.1 GENERAL – EMPLOYEE QUALIFICATIONS

Only qualified and authorized individuals are permitted to perform electrical work on Malcolm Pirnie Projects. A qualified person is one who has the required skills and knowledge to perform electrical work safely. Such individuals must be aware of the hazards associated with electrical work (see Appendix B for details) and the methods for reducing the risk of electrical accidents that can result from unsafe equipment, adverse environmental conditions, and unsafe acts.

Malcolm Pirnie employees are neither considered qualified or authorized until approved by the Manager, Health & Safety. Employees seeking authorization to work on or near electrical equipment will present to the Manager, Health & Safety documented evidence of education, training and hands-on experience. If approved, the employee will be entered into the training database as such and will be available to work on projects working on or near electrical systems.

In support of electrical safety, management shall take a proactive approach when dealing with the root causes of employees' concerns, near-misses, and incidents or accidents involving electrical hazards.

4.2 ELECTRICAL EQUIPMENT CONDITIONS OF APPROVAL AND USE

All electrical equipment, components, and conductors should be listed, labeled, and approved by a Nationally Recognized Testing Laboratory (NRTL) for their intended purpose. Custom-made and installed equipment can be approved for use if built according to specific standards (e.g., Underwriters Laboratories [UL] 508 or one of the ANSI C series standards). Appropriate documentation for such equipment shall be maintained on file.

When building, repairing, or modifying electrical systems, NRTL-approved equipment must be used if available.

4.3 WORK ON ELECTRICAL COMPONENTS AND SYSTEMS

Whenever possible, all circuits or equipment shall be de-energized before beginning any work. Circuits and equipment must be considered energized until isolated, locked out and tagged, and verified with an appropriate testing device. Where it is possible for the circuits to be energized by another source, or where capacitive and/or inductive devices (including cables) may retain or build up a charge, circuits shall be grounded and shorted.

Work on energized circuits shall only be performed by authorized workers, and after developing and implementing the procedures described in Malcolm Pirnie’s Lockout/Tagout Program. (Item 4) In addition, these workers shall use:

- Proper design, fabrication, installation, and documentation techniques.
- Proper operational and maintenance procedures.
- Electrical equipment approved by a nationally recognized testing laboratory (NRTL).
- Proper personal protective equipment (PPE).

Additionally, the following precautions shall be observed to improve safety in the workplace:

- Identify and report to your supervisor or Project Safety Officer potential electrical hazards or unexpected occurrences or incidents (i.e., discharges or arcs when applying grounds to circuits thought to be de-energized), including near misses.
- Anticipate potential electrical exposures and hazards.
- Do not rush to finish a job; never bypass approved procedures.
- Plan and analyze for safety during each step of any electrical work.

- Keep accurate records (e.g. system one-line drawings, panel schedules, etc.) for electrical or electronic systems.
- Use properly rated test equipment and verify its condition and operation before and after use.
- Know applicable emergency and first aid procedures.

4.4 CLEARANCES AND ILLUMINATION FOR ELECTRICAL ENCLOSURES

A clear working space shall be maintained in the front, back, and on each side of all electrical enclosures and around electrical equipment for safe operation and to permit access for maintenance and alteration. Refer to the documents listed in this section as required. (NOTE: The National Electrical Code (NEC) is available from the Manager, Health & Safety and from the Corporate Library):

- NEC Article 110-26, "Spaces about electrical equipment, (600 volts or less)."
- NEC Article 110-32, "Work space about equipment (over 600 volts)."
- NEC Article 110-33, "Entrance and access to work space."
- NEC Article 110-34, "Work space and guarding (over 600 volts)."

In addition to the NEC, the Industrial Electronics Society Lighting Handbook (latest edition) specifies the following requirements for electrical equipment:

- Adequate illumination shall be provided for all working spaces around electrical equipment.
- The control switches for light circuits shall be positioned away from exposed energized circuits and other potential electrical hazards.

4.5 TEMPORARY WIRING

CONSTRUCTION POWER AND LIGHTING

Temporary wiring for electric power and lighting is permitted during periods of construction, remodeling, maintenance, repair, or demolition of equipment or structures and during emergencies. Temporary wiring does not mean a "reduced" level of safety or quality, as this wiring must still conform to certain criteria for electrical work.

Temporary wiring installed by Malcolm Pirnie employees shall have a temporary wiring tag attached to it with the following information:

- Installation date.
- The reason for the temporary wiring (i.e., emergency, temporary (30 days), construction, test, and/or pilot study).
- Name and phone number of the person installing the temporary wiring tag.
- Review/approval and signature of the Project Manager and the Project Safety Officer.

In addition, temporary wiring:

- Shall be approved or identified as suitable for installation and installed in accordance with the rules prescribed in the current edition of the NEC and 29 CFR 1910 and 1926.
- Shall be protected from accidental damage.
- Shall be removed as soon as the prescribed activity is completed. It shall not be used as a substitute for permanent wiring.
- May be used during an "off-shift working hour" emergency.

On the day of installation, a temporary wiring tag shall be completed and attached to the wiring so that it is readily visible. Approvals for the wiring tag must be obtained on the first regular workday after the emergency.

Temporary wiring tags maybe procured from Camille Carollo, H&S, WHI.

Switches or other means shall be installed to permit the disconnection of all ungrounded conductors of each temporary circuit. All lamps used for temporary illumination shall have a suitable fixture or lamp holder with a guard to prevent damage or accidental contact with energized parts.

PILOT STUDIES

Temporary wiring may be used for pilot study equipment. There is no time limit on how long the wiring can remain in place, except that it must be removed upon completion of the work. Temporary wiring tags are required for temporary wiring within pilot systems; and, they are required for the power feeder to the power distribution points of pilot systems. The wiring tag on these systems shall contain the same information as previously described.

4.6 OVERHEAD AND UNDERGROUND UTILITIES

A number of Malcolm Pirnie projects involve invasive activities by subcontractors on sites with little or no reliable information on the location of underground utilities. On these and other projects, overhead power lines cross the site.

Prior to any invasive activity in or near streets, in accordance with the local power utilities policies, a member of the project team must call the local “call before you dig” number and request a utility survey. That team member should get a call number that will serve as proof that the call was made. Even when the work will be done on private property, have the utility companies mark out the street locations may provide information on where any underground utilities enter the property. For work on private property, one member of the project team, either

Malcolm Pirnie or the subcontractor, must engage a private utility marking service to walk the property and detect the locations of anomalies that maybe pipes, electrical line, gas lines, or underground storage tanks.

Someone from the project team must meet the mark out crew at the site to observe the mark out. Rough locations should be drawn on a site map. This is important as unavoidable delays and/or severe weather can erase the site markings and put the field team at risk.

The field team must understand that the mark outs may not be entirely accurate or may miss underground structures entirely. The first 6 feet of a bore hole or excavation should be stopped at one foot intervals and the hole probed with a stake (non-conducting) or a magnetometer for undetected structures. Most utility structures will be buried less than 6 feet underground unless local topography indicates otherwise.

If an underground structure is hit, all personnel must move away from the equipment until the structure can be identified. Active gas and liquid piping will propel their contents out of the hole. Fire may ensue so the utmost care should be taken. Electrical lines may energize the equipment. If the equipment is still running, use a non-conducting pole or stick to press the emergency stop button. The local utility should be called in to assess and control the situation.

If work is to be performed near overhead lines, the lines shall be deenergized and grounded, or other protective measures shall be provided before work is started. If the lines are to be deenergized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to de-energize and ground them.

For overhead lines, OSHA, in 29 CFR 1926.333(C) presents a set of distances outside of which conducting materials may be used in the area of overhead lines. These values are also valid as maximum approach distances that non-qualified employees may approach any electrical equipment with uninsulated components. These values should be taken as minimums since local conditions may make working outside of these distances equally hazardous.

- For voltages to ground 50kV or below - 10 feet (305 cm);
- For voltages to ground over 50kV - 10 feet (305 cm) plus 4 inches (10 cm) for every 10kV over 50kV. (Item 8)

Ladders used in the area of electrical conductors of any type must be equipped with non-conductive side rails. (Item 13)

4.7 EXTENSION CORDS/MULTIPLE OUTLET BOXES/FLEXIBLE CORDS AND CABLES

EXTENSION CORDS

Observe the following precautions when using extension cords. Note that extension cords are not to be used in offices

- All extension cords shall be listed or labeled by a Nationally Recognized Testing Laboratory (NRTL) (UL, FM, etc.).
- Use only three-wire extension cords and cables that conform to the rating, grounding, and non-interchangeability stated in NEC Article 210-7 (Receptacles and Cord Connectors).
- Check extension cords before use to ensure they are adequate for the intended purpose. Always plug high-current equipment (e.g., space heaters, hot plates, and coffee pots) directly into a wall receptacle whenever possible.
- Use only one extension cord for lamps, appliances, or other equipment in conjunction with the power supply cord. Fire Prevention rules prohibit the use of multiple extension cords (daisy chaining) that will increase resistance in an electrical circuit, which in turn will increase heating of conductors, receptacles, and plugs.
- Inspect extension cords for damage before placing them in service and daily during use.

Damaged extension cords will be cut in half and discarded. Replace damaged cords with ones listed by a NRTL.

For receptacles connected to circuits with different voltages, frequencies, or current (ac or dc) on the same premises, use a design such that the attachment plugs on the circuits are not interchangeable. Only high-visibility orange or yellow extension cords shall be used outdoors or in wet indoor environments. The use of portable or integral ground-fault circuit interrupters (GFCIs) is required in all circumstances.

MULTIPLE OUTLET BOXES (POWER STRIPS)

Fuse protected (power surge) power strips are to be used to expand the number of available outlets, to extend the reach of power cords, or to protect electronics from power surges. Power strips do not require a temporary wiring tag.

Observe the following precautions when using multiple outlet boxes:

- The use of home made or shop-built multiple outlet boxes (gang boxes) is prohibited unless each component has been approved by a NRTL for mobile service.

- Each approved multiple outlet box shall be plugged into a wall receptacle. Use of one outlet box to provide power to one or more outlet boxes is not permitted.
- Approved outlet boxes shall not be used to provide power to space heaters, hot plates, coffee pots, or other high-current loads. These types of appliances have caused outlet boxes to burn up.

FLEXIBLE CORDS AND CABLES

Flexible cords and cables shall comply with the requirements in NEC Article 400 (Flexible Cords and Cables). They shall not be:

- Used as a substitute for fixed wiring of a structure.
- Attached to building surfaces.
- Routed through holes in walls, over walls, above ceilings, or floors; or through doorways, windows, or similar openings.
- Concealed behind building walls, ceilings, or floors.
- Wired with a plug or connector that does not have dead-front construction or strain relief. "Dead-front construction" is defined as electrical equipment built so that it is "without live parts exposed to a person on the operations side of the equipment."
- Placed where they could present a trip or fall hazard.
- Used when the cord insulation is damaged, cracked, or spliced; or when the ground pin is missing from the end of the male cord plug.
- Installed in raceways, except as otherwise permitted by the NEC.

Individual conductors of a flexible cord or cable shall not be smaller than those listed in Table 400-5(A) and (B) of NEC Article 400. Article 240-4 of the NEC (Protection of Flexible Cords and Fixture Wires) states that flexible cords, including extension cords, shall be protected against over current in accordance with their amperage ratings (see Tables 400-5(A) and 400-5(B)). NEC Article 400-14 states that flexible cords and cables inserted through holes in covers, outlet boxes, or similar enclosures shall be protected by bushings or fittings.

4.8 POWER PLUGS AND RECEPTACLES

Our clients use many different voltages, frequencies, and current (ac or dc) in power systems and equipment. Thus, it is essential to ensure that such equipment cannot be inadvertently connected to the wrong power source. For specific purposes, voltage and current ratings use a plug or receptacle that fully complies with the requirements in ANSI C73. See the configuration chart (from ANSI C73) in the NFPA National Electrical Code Handbook for information about general-purpose locking and non-locking plugs and connectors.

4.9 GROUND-FAULT CIRCUIT INTERRUPTERS

Ground-fault circuit interrupters (GFCIs) -either circuit breakers or portable ground-fault interrupting receptacles-shall be used for:

- All 125-V single-phase, 15-A and 20-A receptacles within 6 feet of a water faucet or installed outdoors.
- Temporary wiring outdoors.
- Wherever employees will be using electrical equipment around water or in damp environments.
- Construction sites
- Asbestos or lead remediation

Unlike fuses or standard circuit breakers, which are designed to protect equipment from over current, GFCIs are designed to protect personnel from serious injury or death.

Article 305-6 of the NEC (Ground-Fault Protection for Personnel) requires GFCI protection of all 125 V, single phase, 15, 20, and 30-Amp receptacles that are associated with temporary wiring on construction sites. Malcolm Pirnie requires the use of GFCIs for any type of construction work to ensure personnel protection, even if the receptacle is part of the permanent wiring of the building.

NEC Article 210-8 (Ground-Fault Circuit-Interrupter Protection for Personnel) specifies that GFCIs must be installed in the following locations:

- Dwellings where 125-V single-phase, 15-A and 20-A receptacles are installed outdoors.
- Bathrooms, garages, and crawl spaces at or below grade.
- Unfinished basements.
- Where receptacles on countertop surfaces are within 6 ft of a sink.

Thus, all the aforementioned areas within Malcolm Pirnie offices and Project Offices shall have receptacles with GFCI protection.

In addition, all electrical circuits within the area of a pilot study or pilot plant will be equipped with GFCIs with the exception of those situations presented below.

Exceptions to these requirements are:

- Pilot plant or testing laboratory areas where receptacles are required (other than on counter tops) to supply power to specific equipment (i.e., receptacles dedicated to refrigerators or other heavy equipment).
- Line filters and other power supply components in many electronic instruments. These instruments draw sufficient capacitive current to trip a GFCI and therefore are not designed to be connected to GFCI-protected circuits. They also shall not be installed in wet or damp locations.

4.10 PORTABLE ELECTRICAL TOOLS, EQUIPMENT, AND INSTRUMENTS

Portable electrical equipment or tools shall be inspected daily by the user and by the Project Safety Officer to identify defects; defective equipment shall be tagged and removed from service immediately. Portable electrical equipment shall be connected to a portable GFCI (or a circuit that contains a GFCI) when used outdoors, in damp locations, in any unsafe environment, or for indoor or outdoor construction. Ordinarily, the casings for portable electrical equipment are grounded. If it is necessary to operate this type of equipment with other than grounded equipment casings, suitable barriers, guards, or shields shall be installed to protect personnel while working on or near the equipment. In addition, a safety procedure shall be written describing the controls for safe operation of the equipment.

Receptacles and flexible cords can be used to connect electrical appliances and equipment (e.g., fans, machine tools, and pumps) to power sources. Receptacles used on a two-wire, single-phase portable generator (or vehicle-mounted generator) with a rating of not more than 5 kW (where the circuit conductors are insulated from the frame and all other grounded surfaces) do not need to be GFCI protected.

4.11 EQUIPMENT GROUNDING

All electrical apparatus, equipment, and systems shall be grounded in accordance with NEC Article 250 (Grounding) and ANSI standards. The conductor used for grounding shall meet the following criteria:

- Be permanent and continuous.
- Facilitate operation of the circuit's protective devices.
- Have sufficiently low impedance to limit the voltage to ground to a safe level at all frequencies and fault-current conditions anticipated.
- Have the capacity (size and rating) to safely conduct any fault current that may be imposed on it for the time required for protective device operation.

4.12 STATIC ELECTRICITY

A static charge is an imbalance of electrons on objects (matter) that can build up on all matter and transfer from one object to another by conduction or induction. The discharge of static electricity can cause shock or a fire or explosion. Although this type of shock is painful, it is not normally physically hazardous and therefore is not considered reportable as an electric shock. It should be noted, however, that injuries may result from reaction to the shock (i.e., by a person rapidly pulling his/her hand away from a metal object and hitting an elbow against a wall or cabinet).

EQUIPMENT AND PERSONNEL GUIDELINES

When working with electrical equipment, employees shall follow the guidelines below for their own protection and that of the equipment:

- Grounding of the metal parts or enclosures will continuously discharge static. Therefore, wrist straps and other connections used to ground employees shall be solidly grounded. Grounding prevents the wrist strap from becoming a shock hazard in the event of a short circuit from a voltage to the wrist-strap conductor.
- Bonding will equalize the potential between two adjacent noncurrent-carrying metal parts or enclosures. Thus, only approved or listed grounding clamps are acceptable for static bonding and grounding. Alligator clamps are not acceptable.
- Dust is attracted to the face of the video display terminal because of a static charge of approximately 25,000 V. Therefore, never clean the glass face of a computer monitor while the computer is on. When a person touches the screen with a finger, the charge in the portion of the screen touched discharges through the finger with a tiny spark. Electric current does not normally flow through glass, so only the charge on that part of the screen the finger touches is discharged. When cleaning a monitor, however, the entire glass is wet and the charge on the entire screen will discharge to a finger or hand causing a much more painful shock.

Never allow any electrical-powered office equipment to become wet while it is turned on, and never turn on any electronic equipment when it is wet. Even when a computer is turned off for a few minutes, it is best not to touch the monitor's CRT while handling or using other electronic equipment-including the telephone. Wet or dry, a person may receive an electric shock similar to one that can be received by touching a metallic object when walking across carpeting in leather shoes.

NFPA REGULATIONS FOR FIRE AND LIGHTNING

NFPA 77 (Static Electricity) contains requirements for reducing the fire hazard of static electricity. Lightning, an example of static electricity, is covered in NFPA 780 (Lightning Protection Code). This document gives lightning protection requirements for ordinary facilities and for facilities containing flammable vapors, gases, or liquids.

Flammable Vapor - A flammable vapor source can be ignited by static electricity if the following conditions exist simultaneously:

- Generation of a static charge imbalance.
- Static charge accumulation.
- Flammable atmosphere.
- A spark with significant ignition energy or temperature.

Liquids and Finely Divided Solids - Electrostatic charges can be generated by the movement of liquid and powders through pipes, funnels, pumps, filters, or by free-flowing through air. Static charges generated by flowing liquids and powders can be reduced or eliminated by bonding or grounding, or both; by lowering the flow rate; or by reducing the amount of misting, spraying, free-fall, and splashing.

4.13 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment is required when installing, examining, adjusting, servicing, fabricating, testing, or maintaining electrical equipment. The Project Safety Officer shall provide employees with the appropriate PPE, and shall ensure that the equipment is used properly. Alternatively, employees may contact the Health & safety Group for assistance in selecting the appropriate PPE for the operation. Protective footwear; hard hats; and insulated, nonmetallic-framed safety glasses shall meet the requirements of ANSI Z41, ANSI Z87.1, and ANSI Z89.2.

PPE ensembles for typical Malcolm Pirnie activities would include the following items in Table 1. This list should not be considered all-inclusive. The final PPE ensemble will be specified as the results of a hazard analysis specific to the project activities. Jewelry and other conductive materials will not be worn by employees while conducting the following tasks.(Item 14)

Table 1

Activity	Clothing	Eye Protection	Head Protection	Foot Protection
Computer maintenance	Casual business attire	Safety Glasses	Nothing special	Nothing special
Utility Power Electrical Equipment Inspections	Cotton undergarments HRC 2 rated flame retardant shirt, pants or overalls Arc flash protective gloves	Eye shield with chin cup meeting ASTM F2178 Arc Flash protective standards	ANSI Type 1 dielectric front brim hard hat	Safety boots with dielectric full cut overshoe
Pilot Plant Operation/Maintenance	Casual business attire Chemical or dust protective over garments depending upon exposures	Safety glasses Splash-proof safety goggles will be used when transferring hazardous liquids	Hard hat if overhead hazards present	Steel-toed safety shoes Rubber over shoes if working in areas of standing water
Bench assembly and testing of control electronics	Casual business attire	Safety Glasses	Nothing special	Nothing special
Testing or sampling dielectric fluid in transformers or capacitors	Prohibited	Prohibited	Prohibited	Prohibited

5.0 REVIEWS AND INSPECTIONS

Major modifications to new and existing facilities and projects may be inspected by the local jurisdiction to verify compliance with codes and standards. If the modification involves a potential hazard to life, equipment, or property, current safety requirements shall be reviewed and used to mitigate the hazard.

6.0 EMERGENCY ASSISTANCE AND RESCUE

Anyone who witnesses or discovers a serious electric shock that results in any of the conditions listed below shall immediately call the Emergency Rescue (dial 911).

- Obvious serious injury (e.g., loss of consciousness, significant trauma).

- Altered mental status (e.g., confusion, slow/slurred speech).
- Other obvious injury (e.g., laceration, muscle strain, burn).

In addition to calling 911:

- Ensure that all potential sources of energy are safe and in a neutral state, if you are qualified.
- Initiate cardiopulmonary resuscitation (CPR), or find and use the nearest Automatic Electrocardiac Defibulator) (AED) if appropriate. (Only trained personnel should perform these tasks.)
- Notify the victim's Supervisor as soon as possible. (The victim's Supervisor, Health & Safety and General Counsel will want to determine what caused the electric shock.)

6.1 MINOR SHOCKS

All other electric shock victims must be taken to the nearest trauma injury center for evaluation so that potentially damaging effects can be detected early and treated properly. It should be noted that such effects may not be immediately recognized and can appear later (see Appendix B for details). Do not let the shock victim drive himself to the hospital.
Notify the victim's Supervisor as soon as possible. (The victim's Supervisor, Health & Safety and General Counsel will want to determine what caused the electric shock.)

6.2 ANALYSIS OF ELECTRICAL INCIDENTS

Serious and potentially lethal incidents, including near misses that could result in a serious or potentially lethal shock, shall undergo an incident analysis in accordance with the Accident Investigation Procedure in the *Health & Safety Manual*. This analysis shall be directed on a case-by-case basis by the Manager, Health & Safety in consultation with General Counsel.

Properly secure the area once the victim is under care, leaving items and equipment in the same position as much as possible. Try to remember the original position of items that may have been moved during response to the accident.

Record the time, date, and location of the accident; the name of the victim and any witnesses; who was notified; the voltage and current; the contact parts of the body; what equipment or system was being serviced; and the shock reaction and duration of the shock.

7.0 SPECIFIC TRAINING

7.1 ELECTRICAL WORKERS

Trades people who meet the qualifications of "Electrical Worker" or "Electrician" must be utilized on Malcolm Pirnie projects. These may be trades people employed by the facility Owners, the Owner's Contractors, or subcontractors to Malcolm Pirnie.

OSHA and the NEC both require that employees who perform electrical work shall be trained to recognize the hazards associated with their work environment and use appropriate procedures and protective equipment to minimize the risk of an accident or injury.

Project Managers or Project Safety Officers shall verify that, if new electrical work or modifications to existing electrical systems are made in areas that may expose Malcolm Pirnie employees and subcontractor employees to electrical hazards, the electrical work will be inspected and tested by authorized inspectors prior to use.

Training requirements are identified in OSHA 29 CFR1910.331-360 and NFPA 70E, Chapter 1.

Project Managers will not assign Malcolm Pirnie employees to tasks that involve exposure to utility voltage electrical hazards without providing written evidence of training and competency in the specific equipment and tasks proposed to the Manager, Health & Safety prior to assignment. Much of the experience required for an employee to be considered qualified is specific to the equipment and tasks involved.

Electrical workers shall be trained in and familiar with the following subject areas:

- The safety-related work practices required by 29 CFR 1910, Subparts J and S; and 29 CFR 1926, Subparts K and V .
- Techniques necessary to de-energize electrical systems, identify live parts of equipment, and determine the nominal voltage of exposed live parts and clearance distances specified in the Standards.
- Procedures for locking out and tagging energized electrical circuits and equipment safely.

Electrical workers or electricians may need to be licensed by local agencies. Licensed electricians will be preferentially utilized on Malcolm Pirnie projects.

7.2 NON-ELECTRICAL WORKERS

Malcolm Pirnie employees will usually be classified as Non-electrical Workers. OSHA requires training for non-electrical workers whose job assignments require them to be close to exposed parts of electrical circuits operating at 50 V or more.

Please contact Health & Safety, WHI to arrange Electrical Hazards Awareness training to affected employees.

7.3 TRAINING (ITEM 1)

Non-electrical workers whose job assignment requires them to work close to exposed electrical circuits operating at 50 V or more to ground (in accordance 29 CFR 1910.332) will receive training in safety related work practices that pertain to their specific task assignments including the following subject areas:

- The proper handling of portable tools and appliance cords.
- Procedures for resetting over current protective devices.
- Techniques for locating and working safely near overhead and buried conductors.
- The meaning of electrical safety warnings and barriers.
- Electrical hazards associated with water.
- The proper response to electric shock.
- Utility clearance distances.
- Underground utility detection procedures.

Appendix A

Terms and Definitions

The following terms and acronyms are used in this document and the supporting appendices.

Affected employee - Any employee (including subcontractors) whose job requires him/her to operate or use a machine or work in an area where service or maintenance of equipment is being performed.

ac - Alternating current.

ANSI - American National Standards Institute.

Authorized person - Any employee (including subcontractors) with acquired skills and training who has been approved or assigned by the supervisor to perform specific work or tasks.

Bonding - The permanent joining of metallic parts to form an electrically conductive path that will ensure electrical continuity and the capacity to conduct safely any current likely to be imposed.

CFR - Code of Federal Regulations.

Competent person - A person who is (1) capable of identifying existing and predictable hazards in workplaces; and (2) authorized and qualified by management to take prompt corrective measures to eliminate hazards, provide first aid, and notify the appropriate personnel when an accident or incident occurs.

CPR - Cardiopulmonary resuscitation.

Dead-front construction - Electrical equipment built so that, in NEC 70 Article 100's definition, it is "without live parts exposed to a person on the operating side of the equipment." Article 384 (Switchboards and Panel Boards), in paragraph 384-3.(a), requires that "barriers shall be placed in all service switchboards that will isolate the service bussbars and terminals from the remainder of the switchboard."

dc - Direct current.

Electrical equipment - A general term for material, fittings, devices, appliances, fixtures, apparatus, and the like that are used as a part of or in connection with an electrical installation. The term applies to both power-generation equipment and electronics equipment.

Electrical hazard - Any situation in which an employee or any conductive tool or object in contact with the employee could contact or approach closer than the safe clearance distance of any live part or other energized conductor. Any situation in which electrical equipment is likely to cause a fire because of defective components or design. Examples of electrical hazards include inadequate working clearance while working on energized circuits, exposed energized parts, electrical equipment inadequately guarded or enclosed, electrical equipment in an unsafe environment, and unsafe electrical equipment.

Generally, electrical equipment that is not in compliance with OSHA regulations or NEC standards presents a potential hazard.

Electrical worker - An electrical worker is a person trained, qualified, and authorized to work on electrical equipment. He/she is usually hired specifically for this purpose.

Facility power - Main disconnects, panel boards, switches, and associated wiring are considered facility/building power and are typically less than 600 V ac. These systems are designed and installed to operate facilities in these buildings (i.e., lighting, heating, air conditioning, or standby power supply and circuitry).

GFCI - Ground-fault circuit interrupter.

Grounded - Connected to earth or to some conducting body that serves in place of the earth. Physically and intentionally connected to the earth through a ground connection of sufficient low impedance and with sufficient current-carrying capacity to prevent the buildup of voltages that may result in undue hazard to connected equipment or persons. (See ungrounded.)

Joule (J) - Watt-second (power x time); a unit of energy.

Labeled - Equipment or materials to which a label, symbol, or other identifying mark has been applied by an NRTL.

Listed - Equipment or materials included in a list published by an NRTL.

Live/energized parts - The current edition of 29 CFR 1910 defines a "live part" as an electrically conducting part carrying more that 50 V ac or dc. (A part may be designated as "not live" if the current from the part to ground through 1500 ohms non-inductive resistance shunted by a capacitance of 0.15 µf cannot exceed 0.5 mA, even though the part carries voltage equal to or greater than that specified for a live part.)

Lockout and tag procedure – Malcolm Pirnie general procedure for affixing appropriate locks and tags to energy-isolating devices to prevent inadvertent energizing or start-up of machines or equipment while service and maintenance is being performed. Lockout devices prevent the release of energy that could cause injury or death.

Minimum work distance or clearance - A minimum separation distance between a qualified electrical worker (or any conducting object touching the worker) and any energized component. Also, a mandatory separation distance between any energized component and vehicles or machinery. See 29 CFR 1910.303, and 29 CFR 1910.304.

NEC - National Electrical Code.

NEMA - National Electrical Manufacturers Association.

NFPA - National Fire Protection Association.

Nationally recognized testing Laboratory (NRTL) - An organization that is concerned with product evaluation and maintains periodic inspection of listed equipment and materials. The NRTL ensures that the equipment or materials meet appropriate designated standards and that they have been tested and found to be suitable for use in a specified manner. (Refer to 29 CFR 1910.7, "Definition and Requirements for a Nationally Recognized Testing Laboratory.")

Nominal system voltage - A nominal value assigned to a circuit or system to conveniently designate its voltage class. The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of the equipment. (Refer to ANSI C84.1, "Electric Power Systems and Equipment--Voltage Ratings [60 Hz]" for details.)

OSHA - Occupational Safety and Health Administration.

PPE - Personal protective equipment.

Project Safety Officer - The person responsible for ensuring the health and safety of workers. Specific responsibilities include

- Understanding potential hazards of the work.
- Ensuring that an employee is qualified by knowledge, training, and experience; that he/she has successfully demonstrated the ability to safely complete the work; and that the employee is authorized to perform the work.
- Having a complete understanding and the ability to reach agreement with the qualified person about the work to be performed, the sequence in which it should be done, and the potential and present hazards involved--having outlined those hazards and/or limitations of tasks to the extent considered necessary to ensure the worker's health and safety.

Qualified person - A person who has been determined by his/her supervisor and the Manager, Health & Safety, to have the skills, knowledge, and abilities to safely perform the work to which he/she is assigned. Qualifications may include a recognized degree, certificate, or professional standing--through extensive knowledge, training, and experience--or that one has successfully demonstrated the ability to resolve problems relating to the subject matter or work to the satisfaction of his/her supervisor.

Strain relief - A mechanical device that prevents force from being transmitted to the connections or terminals of a cable.

Temporary wiring - Electrical wiring that is temporarily installed for a limited time to complete a specific task (e.g., construction of a new facility or performance of pilot studies). Temporary wiring methods must apply sound engineering practices to ensure adequate electrical safety of temporary wiring installations. Temporary wiring shall conform to the requirements in Section 3.5 of this document, Article 305 of the NEC, and the respective subparts of 29 CFR 1910 and 29 CFR 1926.

Ungrounded - A condition having no physical connection or continuity with earth ground. A condition of insulation or isolation. (See grounded.)

Utility power - Utility, transmission, and distribution of electrical power systems typically above 600 V ac (i.e., substations, vaults, transformers, switch gear) prior to the final point of transformation and distribution. These electrical systems and equipment then furnish electrical power to buildings and facilities through an electric service entrance. Malcolm Pirnie employees may inspect but are **not** authorized to work on these high-voltage systems.

Appendix B

Effects of Electrical Energy on Humans

B.1 Physiological Effects

Electricity flowing through the human body can shock, cause involuntary muscle reaction, paralyze muscles, burn tissues and organs, or kill. The typical effects of various electric currents flowing through the body on the average 150-lb male and 115-lb female body are given in Table B-1.

BURNS.

Although a current may not pass through vital organs or nerve centers, internal electrical burns can still occur. These burns, which are a result of heat generated by current flowing in tissues, can be either at the skin surface or in deeper layers (muscles, bones, etc.), or both. Typically, tissues damaged from this type of electrical burn heal slowly.

Burns caused by electric arcs are similar to burns from high-temperature sources. The temperature of an electric arc, which is in the range of 4,000-35,000°F, can melt all known materials, vaporize metal in close proximity, and burn flesh and ignite clothing at distances up to 10 ft from the arc.

Table B-1. Effects of electric current on the human body (Ref. 1).

Effect/feeling	Direct current (mA)		Alternating current (mA)				Incident severity
			60 Hz		10,000 Hz		
	150 lb	115 lb	150 lb	115 lb	150 lb	115 lb	
Slight sensation	1	0.6	0.4	0.3	7	5	None
Perception threshold	5.2	3.5	1.1	0.7	12	8	None
Shock not painful	9	6	1.8	1.2	17	11	None
Shock painful	62	41	9	6	55	37	Spasm, indirect injury
Muscle clamps source	76	51	16	10.5	75	50	Possibly fatal
Respiratory arrest	170	109	30	19	180	95	Frequently fatal
$\geq$0.03-s vent. fibril.	1300	870	1000	670	1100	740	Probably fatal
$\geq$3-s vent. fibril.	500	370	100	67	500	340	Probably fatal
$\geq$5-s vent. fibril.	375	250	75	50	375	250	Probably fatal
Cardiac arrest	--	--	4000	4000	--	--	Possibly fatal
Organs burn	--	--	5000	5000	--	--	Fatal if it is a vital organ

DELAYED EFFECTS.
Damage to internal tissues may not be apparent immediately after contact with the current. Internal tissue swelling and edema are also possible.
CRITICAL PATH.
The critical path of electricity through the body is through the chest cavity. At levels noted in Table B-1, current flowing from one hand to the other, from a hand to the opposite foot, or from the head to either foot will pass through the chest cavity paralyzing the respiratory or heart muscles, initiating ventricular fibrillation and/or burning vital organs.

B.2 Biological Effects of Electrical Hazards

INFLUENTIAL VARIABLES. The effects of electric current on the human body can vary depending on the following:

- Source characteristics (current, frequency, and voltage of all electric energy sources).
- Body impedance and the current's pathway through the body.
- How environmental conditions affect the body's contact resistance.
- Duration of the contact.

SOURCE CHARACTERISTICS.

An alternating current (ac) with a voltage potential greater than 550 V can puncture the skin and result in immediate contact with the inner body resistance. A 110-V shock may or may not result in a dangerous current, depending on the circuit path which may include the skin resistance. A shock greater than 600 V will always result in very dangerous current levels. The most severe result of an electrical shock is death.

Conditions for a serious (potentially lethal) shock across a critical path, such as the heart, are:

- More than 30-V root mean square (rms), 42.4-V peak, or 60 V dc at a total impedance of less than 5000 ohms.
- 10 to 75 mA.
- More than 10 J.

Conditions for a potentially lethal shock across the heart are:

- More than 375 V at a total body impedance of less than 5000 ohms.
- More than 75 mA.
- More than 50 J.

The worst possible frequency for humans is 60 Hz, which is commonly used in utility power systems. Humans are about five times more sensitive to 60-Hz alternating current than to direct current. At 60 Hz, humans are more than six

times as sensitive to alternating current than at 5000 Hz--and the sensitivity appears to decrease still further as the frequency increases. Above 100-200 kHz, sensations change from tingling to warmth, although serious burns can occur from higher radio-frequency energy.
At much higher frequencies (e.g., above 1 MHz), the body again becomes sensitive to the effects of an alternating electric current, and contact with a conductor is no longer necessary; energy is transferred to the body by means of electromagnetic radiation (EMR).

BODY IMPEDANCE.
Three components constitute body impedance: internal body resistance and the two skin resistances at the contact points with two surfaces of different voltage potential. One-hand (or single-point) body contact with electrical circuits or equipment will prevent a person from completing a circuit between two surfaces of different voltage potential. Table B-2 provides a listing of skin-contact resistances encountered under various conditions. It also shows the work area surfaces and wearing apparel effects on the total resistance from the electrical power source to ground. This table can be used to determine how electrical hazards could affect a worker in varying situations.

Table B-2. Human resistance (Q) for various skin-contact conditions (Ref. 2).

Body contact condition	Dry (ohms)	Wet (ohms)
Finger touch	40,000-1,000,000	4,000-15,000
Hand holding wire	15,000-50,000	3000-5000
Finger-thumb grasp	10,000-30,000	2000-5000
Hand holding a pliers	5000-10,000	1000-3000
Palm touch	3000-8000	1000-2000
Hand around 1.5-in. pipe or drill handle	1000-3000	500-1500
Two hands around 1.5-in. pipe	500-1500	250-750
Hand immersed	--	200-500
Foot immersed	--	100-300

LIFE-THREATENING EFFECTS.

Charles F. Dalziel,[1] Ralph H. Lee,[2] and others have established the following criteria for the lethal effects of electric shock:

- Currents in excess of a human's "let-go" current ($\geq$16 mA at 60 Hz) passing through the chest can produce collapse, unconsciousness, asphyxia, and even death (see also Table B-1).
- Currents ($\geq$30 mA at 60 Hz) flowing through the nerve centers that control breathing can produce respiratory inhibition, which could last long after interruption of the current.
- Cardiac arrest can be caused by a current greater than or equal to 1 A at 60 Hz flowing in the region of the heart.
- Relatively high currents (0.25-1 A) can produce fatal damage to the central nervous system.
- Currents greater than 5 A can produce deep body and organ burns, substantially raise body temperature, and cause immediate death.
- Delayed reactions and even death can be caused by serious burns or other complications.

The most dangerous current flow via the chest cavity is through the heart when the shock occurs in the time relative to the normal heart rhythm. This current may cause ventricular fibrillation, which is defined as repeated, rapid, uncoordinated contractions of the heart ventricles. Ventricular fibrillation that alters the heart's normal rhythmic pumping action can be initiated by a current flow of 75 mA or greater for 5 seconds (5-s) or more through the chest cavity.

Probability of Ventricular Fibrillation.

> To determine the 5-s current flow (in mA) necessary to cause a 0.5% probability of ventricular-fibrillation, multiply a person's weight (in lb) by 0.49. To determine the 5-s current flow (in mA) necessary to cause a 99.5% probability of ventricular fibrillation, multiply a person's weight (in lb) by 1.47.

B.3 Determining How Much Current Is Passing through a Body

> Use the information in Tables B-l through B-3 to project how electrical hazards could affect a worker in varying situations when protective equipment and apparel are in series with current flowing through a body. To determine how much current, I, is passing along a body path, use the formula I = E/R. The voltage, E, can be obtained using an appropriate voltmeter. The total body resistance, R, can be determined by combining the appropriate resistance from Table B-2 with that from Table B-3.

Table B-3. Resistance values for equal areas (130 cm^2) of various work-area materials (Ref. 2).	
Material	**Resistance (Q)**
Rubber gloves or soles	2.0×10^7
Dry concrete above grade	1.0×10^6 to 5.0×10^6
Dry concrete on grade	2.0×10^5 to 1.0×10^6
Leather sole, dry, including foot	1.0×10^5 to 5.0×10^5
Leather sole, damp, including foot	5.0×10^3 to 2.0×10^4
Wet concrete on grade	1.0×10^3 to 5.0×10^3

References

1. Charles F. Dalziel, "The Effects of Electric Shock on Man," Industrial Radio Engineers Transactions on Medical Electronics (May 1956).
2. Ralph H. Lee, "Human Electrical Sheet" while an IEEE Fellow at E. I. duPont de Nemours & Co.; and "Electrical Safety in Industrial Plants," in IEEE Spectrum, June 1971.

TABLE OF CONTENTS

PAGE

APPENDICES

1.0 INTRODUCTION

Malcolm Pirnie's Hazard Communication Program was developed to meet the requirements of the OSHA Hazard Communication Standard, Title 29 Code of Federal Regulations 1910.1200 et seq. A copy of this standard is provided in Appendix A.

OSHA requires that employers make information available to staff members about hazardous chemicals they may be exposed to in the workplace. This information includes, but is not limited to, toxicology, physical and chemical hazards, means of detection, and protection against exposure.

Malcolm Pirnie makes this information available to staff members through this written hazard communication program, lists of chemicals in use, current copies of Material Safety Data Sheets (MSDSs), container labeling, and staff training.

The OSHA Hazard Communication Standard recognizes that Malcolm Pirnie may be the only employer on some work sites, and one of several employers on others. This Hazard Communication Program has provisions for requesting and communicating information on hazardous chemicals others bring to the work site that Malcolm Pirnie staff may be exposed to during the course of their duties.

For this reason, Malcolm Pirnie maintains a copy of this program at all Malcolm Pirnie work sites, whether or not the firm is responsible for the presence of hazardous chemicals at the site. Some states or local municipalities may have specific Right-To-Know or Community Right-To-Know requirements not addressed in this Hazard Communication Program. Accordingly, Office Managers, Project Managers, or their designees should determine the specific requirements of the localities where they operate.

2.0 ORGANIZATION AND RESPONSIBILITIES

The Manager, Health and Safety, WHI, is responsible for Hazard Communication Program content.

Office Managers are responsible for seeing that the program is implemented in their offices. They may delegate the administration of the program to a staff member they designate as the Hazard Communication Coordinator. This individual is typically the local Health and Safety Coordinator/Contact.

Project Managers are responsible for Hazard Communication Program implementation on their projects.

2.1 Manager, Health and Safety

The Manager, Health and Safety, WHI, is responsible for:

- Preparing and updating the written program, the Hazard Communication labeling program, and Hazard Communication training materials.
- Maintaining corporate Hazard Communication training records.
- Serving as a technical resource on chemical safety for technical and administrative staff.
- The implementation and execution of the corporate aspects of this program.

2.2 Office Managers

The Office Managers are responsible for:

- Designating a staff member (typically the Health and Safety Coordinator/Contact) to serve as Hazard Communication Coordinator.
- Supporting the Hazard Communication Coordinator by providing:
  - A Material Safety Data Sheet (MSDS) station at a visible location in the office;
  - The overhead time required to maintain the MSDS station and labeling program; and,
  - Visible and continuous support for the Program.
  - Ensuring that all staff who may be exposed to hazardous chemicals or materials receives appropriate hazard communication training before they start a task or assignment.

2.3 Hazard Communication Coordinators

Hazard Communication Coordinators are responsible for:

- Maintaining a current copy of the written Hazard Communication Program, and the OSHA Hazard Communication Standard in the MSDS station.
- Developing and maintaining a comprehensive list of hazardous chemicals based upon the MSDSs.
- Maintaining current MSDSs for hazardous chemicals used by project and office staff.
- Gathering and filing MSDSs for hazardous chemicals contractors, vendors and cleaning services use at their location.
- Inspecting incoming shipments of hazardous chemicals from manufacturers, wholesalers, retailers, formulators, laboratories, and others, for proper labeling, after being notified of their arrival.
- Providing or arranging for training for office and project staff on the hazards of chemicals in the work place, for all potentially exposed employees.
- Providing records of Hazard Communication training received by each employee, including type of training, date and name of instructor to Health & Safety, COR.

2.4 Project Managers

Project Managers are responsible for:

- Designating a project safety officer knowledgeable in the requirements of this Program.
- Assuring that the project safety officers implement the elements of this Program as they pertain to each project.

2.5 Project Safety Officers

Project Safety Officers are responsible for:

- Bringing a copy of the following documents to the project site:
  - The written Hazard Communication Program;
  - The OSHA Hazard Communication Standard; and,
  - Current Material Safety Data Sheets for each hazardous chemical Malcolm Pirnie introduces to the site.
- Developing and maintaining a comprehensive list of hazardous chemicals Malcolm Pirnie introduces to the job site, and making it accessible to all staff on the site.
- Notifying the designated Hazard Communication Coordinator when shipments of hazardous chemicals arrive at the site and giving Materials Safety Data Sheets (MSDSs) which accompany incoming shipments to the Hazard Communication Coordinator for review and filing.
- Contacting the source of the hazardous chemicals if the MSDSs are not complete or if an MSDS is not supplied with an initial shipment.
- Ensuring that temporary and permanent hazardous chemical containers are labeled.
- At multi-employer sites, telling the other employers the location of the written Malcolm Pirnie Hazard Communication Program and copies of MSDSs for the site.
- Communicating with other employers e.g., Owner, Contractors, Subcontractors, to obtain information about the location of their written hazard communication program(s), labeling program, and Material Safety Data Sheets, and, if applicable, information on the hazardous chemicals they may produce or introduce to the job site that Malcolm Pirnie employees may be potentially exposed to.

2.6 Project and Office Staff

Project and office staffs are responsible for:

- Reading and understanding the provisions of this Program.
- Reviewing the MSDSs for each hazardous chemical used in the workplace prior to handling or contact.

- Using proper labels for temporary containers.
- Alerting the project safety officer or the office Hazard Communication Coordinator to the arrival of new or additional shipments of hazardous chemicals to the office or worksite.

3.0 WRITTEN HAZARD COMMUNICATION PROGRAM

3.1 Program Availability

Copies of the written Hazard Communication Program and the OSHA Hazard Communication Standard are maintained at an accessible MSDS station. MSDS stations are designated in each permanent or long-term company location, including permanent offices, field offices, and field trailers.

At temporary job sites, if Malcolm Pirnie is bringing hazardous chemicals to the work site or if, based on past experience, another employer is expected to bring hazardous chemicals to the work site, a copy of this written Hazard Communication Program and relevant MSDSs are maintained on-site for the duration of field activities.

If Malcolm Pirnie is the only employer on a site, and if no hazardous chemicals are being brought to the site, it is strongly suggested that a copy of this written program be maintained on-site during field activities. However this is not a requirement.

4.0 COMPREHENSIVE LIST OF HAZARDOUS CHEMICALS

4.1 List Development

Complete the Comprehensive List of Hazardous Chemicals form provided in Appendix B, list each product containing a hazardous chemical, as defined in Appendix A of this section, 29 CFR 1910.1200 (d). Use the trade or common name of the product, the manufacturer, the hazardous chemical ingredients it contains, and the location where it is used and/or stored. Use as many lines as necessary. This list is to be updated as required.

A copy of the Comprehensive List of Hazardous Chemicals shall be maintained at the MSDS Stations of company and field locations, together with the written Hazard Communication Program.

5.0 MATERIAL SAFETY DATA SHEETS (MSDSs)

Malcolm Pirnie asks that its suppliers provide MSDSs for any purchased materials that contain hazardous chemicals as defined by OSHA. This request is made through language on Malcolm Pirnie contracts or verbally by staff members ordering materials, at the time an order is placed or a purchase made. MSDSs are kept for every chemical used and are made available to employees at company locations and work sites.

5.1 Establishing An MSDS Station

Office Managers shall provide sufficient space and resources to establish an MSDS Station within their company or field locations. Office MSDS Stations should consist of a labeled three ring binder and a sign (Laboratory Safety Supply 1992 model No. JX-12441 or equivalent). In temporary locations, an MSDS Station may be a bulletin board or a three-ring binder kept on-site.

Each MSDS Station shall be located in an accessible, common area such as a break room, copier room, or site trailer. It shall also contain a copy of: the written Hazard Communication Program, the OSHA Hazard Communication Standard, and the Comprehensive List of Hazardous Chemicals.

Original Material Safety Data Sheets are preferred, but copies may be substituted. Copies are to be current (dated within three years) and published by the manufacturer, importer, or formulator of the hazardous chemical. For small projects, or projects of short duration, the contents of the MSDS Station, described above, may be included with the site-specific Health and Safety Plan or other project documents.

5.2 Using A MSDS

It is in the company's best interest to make sure that everyone who uses a chemical product understands its dangers and the precautions they must take while using the product. The sheets also contain useful information for responding to an exposure or release.

A Material Safety Data Sheet (MSDS) is supplied to the company when a substance is purchased that contains a hazardous chemical(s) as defined by OSHA (The Occupational Safety and Health Administration). The delivery of a substance must not be accepted until the MSDS sheet has been received.

There is no specific format for providing this information; however, MSDSs typically consist of the following general sections. The sections listed on your specific MSDSs may be different from those listed below. The bulleted information presents a list of typical information contained in each of the sections.

5.3 Section 1 - General Information

- Name of Manufacturer
- Manufacturer's Address
- Emergency Phone Number
- Trade named of Product(s) with applicable stock number(s)
- Product name
- Product formula
- CAS Registry No.

5.4 Section 2 - Hazardous Components

- Chemical components of the product are listed if they present a physical or health hazard and are present at or above 1% in the mixture.
- Chemical components identified as carcinogens by NTP, IARC, and OSHA are listed if they are present at or above 0.1% in the mixture.
- Other components are listed if deemed appropriate.
- Identities of components listed generically are declared trade secrets by the raw material suppliers.
- Exposure recommendations are for individual components. Unless specifically listed as an OSHA Permissible Exposure Limit (PEL) and/or an American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), all exposure limits are those on which OSHA and ACGIH concur.

5.5 Section 3 - Physical and Chemical Data

- Appearance and Odor - Physical appearance, color and smell.
- Boiling Point - If unknown, the lowest value of the component is listed for mixtures.
- Vapor Pressure - If unknown, the lowest value of the component is listed for mixtures.
- Vapor Density - Compared to Air. Expressed as lighter as or heavier than air if the vapor density of the product is not known.
- Evaporation Rate - Indicated as faster than or slower than Ethyl Ether or Butyl Acetate.
- Melting Point
- Specific Gravity
- Decomposition Temperature
- Solubility in Water
- Corrosion Rate
- Flash Point

5.6 Section 4 - Fire and Explosion Hazard Data

- Flash Point - Method Identified
- Flammability Limits - The lowest value and highest value of the individual components are listed for mixtures.
- National Fire Protection Association (NFPA) Rating
- Extinguishing Media - National Fire Protection Association Criteria
- Special Fire Fighting Procedures - Minimum equipment to protect firefighters from toxic products of vaporization, combustion, or decomposition in fire situations.
- Unusual Fire & Explosion Hazard - Known or expected hazardous products resulting from heating, burning, or other reactions.
- Category - The classification required by Department of Transportation (DOT) for shipping by road.

5.7 Section 5 - Reactivity Data

- Stability - Presents conditions to avoid preventing hazardous or violent decomposition.
- Conditions to avoid - Lists conditions to avoid so that hazardous reactions are avoided.
- Hazardous Polymerization - Conditions to avoid preventing hazardous polymerization that could result in a large release of energy.
- Materials to avoid/Incompatibles
- Hazardous decomposition products

5.8 Section 6 - Health Hazard Data

- Threshold Limit Value/Time Weighted Average (TLV/TWA)
- Permissible Exposure Limit (PEL)
- Toxicity (LD_{50} - Lethal Dose for 50% of the test population)
- Carcinogenicity
- Effects of Overexposure (Acute) - Potential local and systemic effects due to single or short-term overexposure to the eyes and skin, or through inhalation or ingestion.
- Signs and Symptoms of Exposure - Warning signs, which may indicate exposure to the skin or eyes, or through inhalation or ingestion.
- Target Organs
- Medical Conditions Generally Aggravated by Overexposure - Preexisting conditions that may contribute to the effects of overexposure to the eyes and skin, or through inhalation or ingestion.
- Primary Route(s) of Entry - Based on properties of the product and expected use.
- Emergency and First Aid Procedures - Procedures to be followed when dealing accidental overexposure.

5.9 Section 7 - Precautions for Safe Handling, Storage and Use
(Control and Protective Measures)

- Protective equipment, which may be needed to handle the product.
- Ventilation - Identifies forced mechanical ventilation that is required.
- Respiratory Protection
- Eye/Skin Protection

5.10 Section 8 - Spill and Disposal Procedures

- Lists reasonable precautions to take and methods of containment, cleanup and disposal.
- Resource Conservation and Recovery Act (RCRA) hazardous wastes and Comprehensive Environmental Response, Comprehension and Liability Act (CERCLA) hazardous substances are listed in this section.
- Landfill Ban Item - Identifies materials subject to RCRA Landfill ban.

5.11 Section 9 - Hazardous material Identification (Label Data or Transportation)

- Hazardous materials identification system rating, based on ratings of individual components
- Shipping Name
- Emergency Response Code
- Department of Transportation (DOT), International Maritime Organization (IMO), International Air Transport Association (IATA), American Fertilizers Institute (AFI) hazard class designations/information.
- Reportable Quantities

5.12 Section 10 - Special Precautions and Comments

- Presents relevant information not previously mentioned.

5.13 Removing MSDSs

If a product is no longer used or if its MSDS has become dated, the Hazard Communication Coordinator removes the corresponding MSDS from the station and places it in a permanent MSDS file labeled with the actual or approximate dates the chemical was used.

5.14 Updating MSDSs

MSDSs are to be updated whenever:

- New information on the hazards of chemicals present in the work place becomes available.
- Relevant occupational exposure standards change.
- The issue date of the MSDS is more than three years old.

5.15 Help Obtaining MSDSs

MSDSs must be readily accessible to Malcolm Pirnie staff plus staff of any other employer at the work place during regular work shifts. If, after repeated attempts, an MSDS cannot be obtained from the manufacturer or supplier, contact the Manager, Health and Safety, WHI, for assistance. A written request for help in obtaining the required MSDSs will be made to the Assistant Secretary of Labor for Occupational Safety and Health (OSHA) and the Director of the National Institute for Occupational Safety and Health (NIOSH).

5.16 Chemical Data Sheets No Substitute for MSDSs

Chemical hazard data retrieved from electronic data bases may be useful in assessing hazards posed by on-site chemical contamination. But these chemical "data sheets" may not be substituted for original, current MSDSs published by the manufacturer, importer, or formulator. Data sheets lack the correct name of the manufacturer and emergency phone number.

6.0 LABELS

All containers of hazardous chemicals received from manufacturers, importers, or distributors of hazardous chemicals, or others, shall be properly labeled.

6.1 Label Requirements

A proper label provides the following information:

- The identity of the hazardous chemical(s) in the container.
- The name and address of the chemical manufacturer, importer, formulator, or other responsible party.
- Appropriate hazard and target organ warnings.

Affixed labels on incoming containers will not be removed or defaced. When labels are or have become illegible, legible replacement labels will be affixed over the original label.

All containers must be legibly labeled in English. In the event that non-English speaking employees or employers are onsite, duplicate labels providing above required information presented in their language must be affixed to appropriate containers.

Each container of hazardous chemicals (hazardous waste and environmental samples are exempt) shipped to or from Malcolm Pirnie shall be checked by the Hazard Communication Coordinator or the Project Safety Officer for proper container labeling as described above.

6.2 Hazardous Materials Identification Guide (HMIG) Labeling System

The HMIG labeling system identifies chemicals with standard hazard ratings from 0 - 4 for health, flammability and reactivity, plus alphabetical designations for required personal protective equipment. A complete explanation of the rating and PPE designations can be found at the end of this section in Appendix C.

Malcolm Pirnie staff shall apply labels to temporary or portable containers, using the Hazardous Materials Identification Guide (HMIG) labeling system described in Appendix C. Labels shall contain at least the information provided on Laboratory Safety Supply 1993 type QA-809 label or equivalent. Appendix C also has examples of pre-completed labels that may be copied and applied to commonly used chemicals.

6.3 Hazardous Waste Sample Labeling

OSHA exempts shipments of hazardous waste samples from hazard communication labeling requirements. However, Department of Transportation (DOT) labeling requirements (49 CFR 173 et. al.) may apply to DOT defined hazardous substances shipped in large quantities. Hazardous materials or compressed gases shipped by air or common carrier will have special packaging, marking, and labeling requirements. Only trained HazMat employees may offer Hazardous Materials or Dangerous Goods for shipment on behalf of Malcolm Pirnie. Contact the Health and Safety, WHI for more information.

6.4 Temporary Containers Must Be Labeled

When transferring chemicals from a labeled container to a portable container intended for immediate use, a label identifying the contents e.g., Acetone, must be applied. Project staff are responsible for properly emptying, cleaning, removing the label, and disposing of the portable container immediately after use.

6.5 Longer-term Containers Require HMIG Labels

When transferring chemicals from a labeled container to a portable container intended for longer than immediate use, or use by more than one employee, a completed HMIG label should be used.

7.0 MULTI-EMPLOYER/MULTI-LOCATION PROJECT SITES

7.1 Informing Other Employers

Project Safety Officers shall provide other employers at the work place with appropriate hazard communication information about hazardous chemicals Malcolm Pirnie introduces to the work site that their staff could be exposed to. Other employers will be presented with a copy of the written Hazard Communication Program upon request.

This hazard communication information shall include:

- Requirements and location of Malcolm Pirnie's written Hazard Communication Program.
- Locations of MSDSs or MSDS station.
- Location of Comprehensive Hazardous Chemical List.

For hazardous chemicals Malcolm Pirnie introduces to a work site, any precautionary measures being taken to protect Malcolm Pirnie staff from harmful exposure under normal operating conditions, and foreseeable emergencies.

7.2 Obtaining Information from Other Employees

Project Managers will support the efforts of the Project Safety Officer to obtain appropriate hazard communication information about hazardous substances used by other employers that Malcolm Pirnie staff may be exposed to.

This information should include:

- The location of the other employer(s) written Hazard Communication Programs, their Comprehensive List(s) of Chemicals, MSDSs or MSDS Station, and an explanation of the labeling system the other employer(s) use.
- Precautionary measures Malcolm Pirnie staff should take to protect themselves from harmful exposure to these hazardous chemicals under normal operating conditions, and foreseeable emergencies.

Appendix D at the end of this section has sample letters appropriate for soliciting this information from owners and other contractors.

7.3 Multi-location Project Sites

In the event that Malcolm Pirnie employees must travel between different work sites, the written Hazard Communication Program may be kept at a primary job site. When no primary work site has been designated, the employee must bring the written Hazard Communication Program with them.

8.0 NON-ROUTINE TASKS

The Project Manager must consult with the Hazard Communication Coordinator or the Project Safety Officer when planning a non-routine task to ensure that employees are informed of the hazards associated with these tasks and that appropriate personal protective equipment is provided.

Before work begins, a meeting between the Project Safety Officer and the potentially exposed employee(s) will be held to discuss the hazards and appropriate personal protective equipment required to complete the task. Information will be presented in the language of non-English speaking employees as well.

9.0 HAZARD COMMUNICATION TRAINING

Malcolm Pirnie employees complete initial Hazard Communication Training at the beginning of their employment and before starting tasks or assignments that may expose them to hazardous chemicals.

Project staff who work with or are potentially exposed to hazardous chemicals in the work place will receive additional training by the Project Safety Officer on their safe use. Office Managers and Project Managers shall provide resources sufficient to assure the availability of this training.

Hazard Communication Coordinators are responsible for conducting Hazard Communication Training or arranging for it to be provided. Both the training and associated materials may be developed locally to supplement materials provided by the Manager, Health and Safety, WHI.

9.1 Hazard Communication Training Program for Hazardous Chemicals Malcolm Pirnie introduces to the Workplace, Minimum Requirements

The Hazard Communication Training program for hazardous chemicals Malcolm Pirnie introduces to the work place emphasizes the following:

- Summary of the Hazard Communication Standard (see Appendix A, this section).
- Requirements and location of Malcolm Pirnie's written Hazard Communication Program.
- Development and location of hazardous chemical list.

- Use, locations, reading and interpreting MSDSs and how employees can obtain more hazard communication information.
- Reading, interpreting, and preparing HMIG container labels.
- Measures employees can take to protect themselves against the physical and health hazards of chemicals in the work place, including appropriate work practices or methods for using and handling chemicals, emergency response procedures, and, as required, the proper use and maintenance of personal protective equipment.
- Chemical and physical properties of hazardous chemicals e.g., flash point, and reactivity. Also, ways to detect the presence or release of hazardous chemicals in the work place, e.g., the visual appearance or odor of hazardous chemicals released. Also, air sampling devices to determine exposure concentrations.
- Health hazards, including signs and symptoms of exposure, associated with exposure to chemicals, and medical conditions aggravated by chemical exposure.

9.2 Hazard Communication Training Program for Hazardous Chemicals Other Employers introduce to the Work Place, Minimum Requirements

The Hazard Communication Training program for hazardous chemicals other employers introduce to the work place emphasizes the following:

- Information about hazardous chemicals Malcolm Pirnie staff may be exposed to at the work site, including ways to detect their presence, and exposure to them.
- An explanation of the other employers' labeling system.
- Information about precautionary measures Malcolm Pirnie staff members can take to protect themselves during normal operating conditions and in emergencies.
- The location of MSDSs for hazardous chemicals other employers introduce to a work site.

9.3 Hazard Communication Training Program Review

The Manager, Health and Safety, WHI, or designate shall review Malcolm Pirnie's Hazard Communication Training program and advise Office Managers on training or retraining needs.

Employees who may be exposed to hazardous chemicals are to be retrained whenever the chemical hazards change, and when Malcolm Pirnie introduces a new chemical hazard to the work place.

The Hazard Communication Training program assessment process includes periodically obtaining opinions from employees about the quality of the training they receive.

10.0 RECORDS RETENTION

Project Managers are also responsible for health and safety data storage after their projects are complete. Specific changes to the Hazard Communication Program developed for the project, correspondence, and copies of the MSDSs and other pertinent data on hazardous chemicals Malcolm Pirnie or others introduced to the job site are to be retained and stored together with the other project documents. Copies of occupational exposure data are to be filed in the employee's Health and Safety File with a copy forwarded to the Administrator, Health and Safety, WHI, for evaluation and retention.

APPENDIX A

THE OSHA HAZARD COMMUNICATION STANDARD
29 CFR 1910.1200

APPENDIX B

COMPREHENSIVE LIST OF HAZARDOUS CHEMICALS

MALCOLM PIRNIE

COMPREHENSIVE LIST OF HAZARDOUS CHEMICALS

LOCATION: Various Malcolm Pirnie Locations **PAGE** 1 **OF** 1

COMPLETED BY: Camille Carollo

DATE: 2/1/05

TRADE OR COMMON NAME	MANUFACTURER'S NAME AND ADDRESS	HAZARDOUS INGREDIENTS	STORAGE OR LOCATION OF USE
Alconox	Varies	Alconox	Various Locations
Gasoline	Varies	Gasoline	Various Locations
Hexane	Varies	Hexane	Various Locations
Hydrochloric Acid	Varies	Hydrochloric Acid	Various Locations
Isobutylene	Varies	Isobutylene	Various Locations
Nitric Acid	Varies	Isobutylene	Various Locations
Sodium Hydroxide	Varies	Sodium Hydroxide	Various Locations
Sulfuric Acid	Varies	Sulfuric Acid	Various Locations

APPENDIX C

HAZARD MATERIALS IDENTIFICATION GUIDE (HMIG) LABELING SYSTEM WITH EXAMPLES

HAZARDOUS MATERIALS IDENTIFICATION GUIDE (HMIG) LABELING SYSTEM[1]

This hazardous chemical labeling system uses the familiar colors and numbering system of the National Fire Prevention Association (NFPA) hazard diamond modified to quickly rate **ACUTE**[2] occupational and general physical hazards chemicals can pose. The potential health effects, flammability, and reactivity of a hazardous chemical are coded using a 0 - 4 numerical code system in blue, red and yellow boxes on the label. The numerical codes and corresponding general definitions are:

4	**Extreme**
3	**Serious**
2	**Moderate**
1	**Slight**
0	**Nominal**

The original MSDS for the chemical or mixture should be consulted to determine what degree (number) should be applied to the label. The toxicological information presented on the MSDS and in other chemical references can be compared to the ranges for LD_{50}; LC_{50}; and LD_{50} Skin listed in each degree. References such as the Merck Index, the Chemical Dictionary, the NIOSH Pocket Guide, the DOT Emergency Response Guidebook, and others can be used if the MSDS is incomplete. Approximate health factors (some interpretation by the Hazard Communication Coordinator is necessary with any of these systems) may be found in the NFPA hazard diamond ratings (see NFPA 49,) the NIOSH Pocket Guide, Irving Sax Toxicological Properties of Chemical Substances, and others. Wallet cards that provide a ready reference to the HMIG Labeling System are available from the Administrator, Health and Safety, WHI.

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[1] Copyright product of Lab Safety Supply

[1] Hazards such as carcinogenicity, mutagenicity and teratogencity are **not** adequately addressed by these numerical hazard systems.

HEALTH HAZARD/BLUE BOX

***4* - Extreme:** materials that could cause death or major residual injury after very short exposure, even with prompt medical treatment. Materials considered too dangerous to approach without specialized equipment, and that can penetrate most protective clothing. Materials that, under normal or emergency conditions, are extremely hazardous when inhaled, or absorbed through the skin, or through other contact. LD_{50} <0.001 g/kg; LC_{50} <10 ppm; LD_{50} Skin <0.005 g/kg

***3* - Serious:** materials that could cause serious temporary or residual injury after very short exposure even with prompt medical treatment. Materials requiring protection from all bodily contact. Materials giving off highly toxic combustion products. Materials corrosive to living tissue or toxic by skin absorption. LD_{50} 0.001-0.05 g/kg; LC_{50} 10-1100 ppm; LD_{50} Skin 0.005-0.043 g/k

***2* - Moderate:** materials that could cause temporary incapacitation or possible residual injury after intense or continued exposure without prompt medical treatment. Materials requiring the use of respiratory protection with independent air supply. Materials that give off toxic vapors lacking warning properties under normal or emergency conditions. LD_{50} 0.05-0.5 g/kg; LC_{50} 100-1,000 ppm; LD_{50} Skin 0.044-0.340 g/kg

***1* - Slight:** materials that would cause irritation upon exposure, but minor residual injury even without medical treatment. Materials that require the use of an approved, air-purifying respirator. Materials that could cause skin irritation without tissue destruction. LD_{50} 0.5-5.0 g/kg; LC_{50} 1,000-10,000 ppm; LD_{50} Skin 0.35-2.81 g/kg

***0* - Minimal:** materials that pose no hazard under normal occupational conditions. LD_{50} 5.0-15.0 g/kg; LC_{50} 10,000-100,000 ppm; LD_{50} Skin 2.82-22.6 g/kg

FLAMMABILITY/RED BOX

***4* - Extreme:** materials that rapidly and completely vaporize at atmospheric pressure and normal ambient temperature, or that are readily dispersed in air, and burn readily. Includes cryogenic materials, Class 1A flammable liquids. Materials that, because of their physical form or environmental conditions, form explosive mixtures with air and disperse readily in air, e.g., dusts of combustible solids and mists of flammable or combustible liquid droplets.

***3* - Serious:** liquids and solids that can ignite under all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or are readily ignited under almost all conditions though they are unaffected by ambient temperatures. Includes Class 1B and 1C flammable liquids. Solid materials in the form of course dusts that may burn rapidly but generally do not form explosive atmospheres in air. Materials that burn with extreme rapidity, usually by reason of self-contained oxygen. Materials that ignite spontaneously when exposed to air.

***2* - Moderate:** materials that must be moderately heated, or exposed to relatively high ambient temperatures before they ignite. Under normal conditions, materials in this degree would not form hazardous atmospheres in air, but under high ambient temperatures or under moderate heating, they may release vapor sufficient to produce hazardous atmospheres with air. Includes liquids with a flash point between 100^{o}F and 200^{o}F, and solids and semisolids that readily give off flammable vapors.

***1* - Slight:** materials that must be preheated before they ignite. Materials in this degree require considerable preheating, under all ambient temperature conditions, for ignition and combustion to take place. Includes materials that will burn in air when exposed to a temperature of 1500^{o}F for five minutes or less; liquids, solids and semisolids with a flashpoint in excess of 200^{o}F; most combustible materials.

***0* - Minimal:** materials that will not burn. Includes materials that will not burn in air when exposed to a temperature of 1500^{o}F for five minutes.

REACTIVITY/YELLOW BOX

***4* - Extreme:** materials fully capable of detonation, explosive decomposition, or explosive reaction at normal temperatures and pressures. Materials sensitive to mechanical or localized thermal shock at normal temperatures and pressures.

***3* - Serious:** materials capable of detonation or explosive reaction, that require a strong initiating source or that must be heated under confinement before initiation. Includes materials sensitive to mechanical or localized thermal shock at elevated temperatures and pressures, or that react explosively with water or other chemicals with no heat or confinement requirement.

***2* - Moderate:** materials that are normally unstable and readily undergo violent chemical change, but do not detonate. Includes materials that undergo chemical change with rapid release of energy at normal temperatures and pressures, or undergo violent chemical change at elevated temperatures and pressures. Also, materials that may react violently with water or other chemicals, or may form potentially explosive mixtures with water or other chemicals.

***1* - Slight:** materials that are normally stable, but become unstable at elevated temperatures and pressures or that react with water and other chemicals with some release of energy, but not violently.

***0* - Minimal:** materials that are normally stable, and not reactive with water or other chemicals.

PPE

The HMIG system uses a series of codes and icons to describe various personal protective equipment ensembles. The original MSDS for the chemical or mixture should be consulted to determine what code to apply to the label.

A - Safety Glasses

B - Safety Glasses, Gloves

C - Safety Glasses, Gloves, Overgarment

D - Face Shield, Gloves, Overgarment

E - Safety Glasses, Gloves, Dust Mask

F - Safety Glasses, Gloves, Overgarment, Dust Mask

G - Safety Glasses, Gloves, Organic Vapor Respirator

H - Safety Goggles, Gloves, Overgarment, Organic Vapor Respirator

I - Safety Glasses, Gloves, Dust, Mist, Fume Respirator

J - Safety Goggles, Gloves, Overgarment, Dust, Mist, Fume Respirator

K - Air Supplied Respirator, Gloves, Overgarment with Hood, Protective Overboots

X - Special Ensemble, refer to Health and Safety Plan


HEXANE
ROUTE OF ENTRY
[X] Eye Contact
[X] Inhalation
[ ] Injection
[ ] Skin Absorption
[X] Skin Contact
CHRONIC HEALTH EFFECTS
[ ] No Chronic Health Hazard
[ ] Carcinogen
[ ] Dermatitis
[X] Irritant
[ ] Mutagen
[ ] Reproductive Toxin
[ ] Sensitizer
[ ] Teratogen
[ ] Corrosive
PHYSICAL HAZARDS
[ ] No Physical Hazards
[ ] Combustible
[ ] Explosive
[X] Flammable
[ ] Organic Peroxide
[ ] Oxidizer
[ ] Pressure Hazard
[ ] Pyrophoric Liquid
[ ] Radioactive
[ ] Water Reactive
TARGET ORGANS
[ ] Bladder
[ ] Blood
[ ] Bone Marrow
[ ] Brain
[ ] Cardiovascular System
[X] Eyes
[ ] Gastrointestinal System
[ ] Heart
[ ] Kidneys
[ ] Liver
[X] Lungs
[ ] Mucous Membranes
[ ] Musculo-Skeletal System
[X] Nervous System
[ ] Reproductive System
[X] Respiratory System
[X] Skin
[ ] Teeth
HEALTH 2
FLAMMABILITY 3
REACTIVITY 0
PROTECTIVE EQUIPMENT H
A
B
C
D
E
F
G
H
I
J
K
X
Ask your supervisor for special handling instructions


ASCORBIC ACID
ROUTE OF ENTRY
Eye Contact
Skin Absorption
Inhalation
Skin Contact
Injection
CHRONIC HEALTH EFFECTS
No Chronic Health Hazard
Carcinogen
Reproductive Toxin
Dermatitis
Sensitizer
Irritant
Teratogen
Mutagen
Corrosive
PHYSICAL HAZARDS
No Physical Hazards
Combustible
Pressure Hazard
Explosive
Pyrophoric Liquid
Flammable
Radioactive
Organic Peroxide
Water Reactive
Oxidizer
TARGET ORGANS
Bladder
Lungs
Blood
Mucous Membranes
Bone Marrow
Musculo-Skeletal System
Brain
Cardiovascular System
Nervous System
Reproductive System
Eyes
Gastrointestinal System
Respiratory System
Heart
Skin
Kidneys
Teeth
Liver
HEALTH
1
FLAMMABILITY
0
REACTIVITY
1
PROTECTIVE EQUIPMENT
B
A
B
C
D
E
F
G
H
I
J
K
X

APPENDIX D

APPROVED LETTER FORMATS, MULTI-EMPLOYER WORK SITES

- Malcolm Pirnie Introduces Hazardous Chemicals to a Work Site
- Request for Location of Other Employer's MSDSs
- Follow-up Request for Location of Other Employer's MSDSs, no Response Received
- Follow-up Request for Location of Other Employer's MSDSs, no Response Received, Subcontractor involved

MALCOLM PIRNIE INTRODUCES HAZARDOUS CHEMICALS TO A WORK SITE

Date:

(Name and Address of Owner[1])

Re: OSHA Hazard Communication Standard

Dear *(name of owner)*:

The OSHA Hazard Communication Standard requires that each employer on a multi-employer work-site provide the other employers on the site with information about any hazardous chemical that may be produced or introduced onto the site.

As you are aware, employees of our company will be working at the *(name of site)* site. During the course of their work, our employees may be in proximity to hazardous chemicals that you may produce or introduce onto the site. Additionally, during the course of their work, your employees may be in proximity to hazardous chemicals that we may introduce to the site.

We are enclosing herewith information on the hazardous chemicals our company will introduce onto the site. *(See attached Appendix A)*.

We request the following information regarding your site, as required by the OSHA Hazard Communication Standard. Please advise us as to: where your Material Safety Data Sheets (MSDSs) are kept, any information regarding precautionary measures needed to protect our employees from exposure to hazardous chemicals under normal operating conditions and in any foreseeable emergency situations, and your labeling system for any hazardous chemicals at the site. Please respond in writing and direct all correspondence to the address below.

Thank you for your response to this request. If you have any questions, please contact *(insert your name)* at *(telephone number)*.

Very truly yours,

MALCOLM PIRNIE, INC.

(Your Name)
(Your Title)

Enclosure[2]

(Project Number)

Note:

[1] On projects involving the rehabilitation of a water or wastewater treatment plant, Owner will have treatment chemicals and probably will start introducing treatment chemicals and other hazardous chemicals to the project site as the project approaches Substantial Completion.

[2] Attach Exhibit A from site Hazard Communication Program

REQUEST FOR LOCATION OF OTHER EMPLOYER'S MSDS's

Date:

(Name and Address of Other Employer)

Re: OSHA Hazard Communication Standard
Title 29 CFR 1910.1200

Dear *(name of employer)*:

Employees of our company will be working on the (name of site) site at the same time as your company. During the course of their work, our employees may be in proximity to hazardous chemicals your company may produce or introduce onto the site. In order to comply with the OSHA Hazard Communication Standard, all employers who could cause hazardous exposure to another company's employees are required to provide information about the hazardous chemicals on site.

We are enclosing herewith information on the hazardous chemicals our company will introduce onto the site. *(See attached Appendix A).*

Please advise us as to: where your Material Safety Data Sheets (MSDSs) are kept, any information you may have regarding precautionary measures needed to protect our employees under normal operating conditions and in any foreseeable emergency situations, and your labeling system used on site. Please respond in writing and direct all correspondence to the address below.

Thank you for your response to this request. If you have any questions, please contact *(insert your name)* at *(telephone number).*

Very truly yours,

MALCOLM PIRNIE, INC.

(Your Name)
(Your Title)

Enclosure[1]

c: [2]

Note: [1] Attach Exhibit A from site Hazard Communication Program.

[2] When letter is sent to a Subcontractor, send a copy to the appropriate C

(Project Number)

FOLLOW-UP REQUEST FOR LOCATION OF OTHER EMPLOYER'S MSDSS, NO RESPONSE RECEIVED

Date:

(Name and Address of Owner)

Re: OSHA Hazard Communication Standard
Title 29 CFR 1910.1200

Dear *(name of owner)*:

By letter dated (date), we requested that you advise us as to where MSDSs are kept for all hazardous chemicals that you produce or introduce onto the (name of site) site. We also requested information regarding any precautionary measures to protect our employees during normal operations and in foreseeable emergencies, and your labeling system used on the site. To date, we have received no response.

In order for you and Malcolm Pirnie, Inc. to be in compliance with the OSHA Hazard Communication Standard, we must receive the requested information.

Your cooperation and prompt attention to this matter is appreciated.

Very truly yours,

MALCOLM PIRNIE, INC.

(Your Name)
(Your Title)

(Project Number)

FOLLOW-UP REQUEST FOR LOCATION OF OTHER EMPLOYER'S MSDSS, NO RESPONSE RECEIVED, SUBCONTRACTOR INVOLVED

Date:

(Name and Address of Other Employer)

Re: OSHA Hazard Communication Standard
Title 29 CFR 1910.1200

Dear *(name of employer)*:

By letter dated *(date)*, we requested that you advise us as to where MSDSs are kept for all hazardous chemicals that you produce or introduce onto the *(name of site)* site. We also requested information regarding any precautionary measures to protect our employees during normal operations and in foreseeable emergencies and your labeling system used on the site. To date, we have received no response.

In order for you and Malcolm Pirnie, Inc. to be in compliance with the OSHA Hazard Communication Standard, we must receive the requested information.

Your cooperation and prompt attention to this matter is appreciated.

Very truly yours,

MALCOLM PIRNIE, INC.

(Your Name)
(Your Title)

c:[1]

(Project Number)

Note: [1]When letter is sent to a Subcontractor, send a copy to the appropriate Contractor.

TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this Hazardous Waste Operations Program is to outline procedures Malcolm Pirnie will take to identify, evaluate and control safety and health hazards and provide for emergency response when working on uncontrolled hazardous waste sites. This program provides for the development of site and project specific health and safety plans, a project chain-of-command, task hazard evaluation and controls, training, medical surveillance, and record keeping procedures. The Program draws extensively from other Malcolm Pirnie Health Safety Program elements.

2.0 REFERENCES

Malcolm Pirnie is committed to conducting its operations in accordance with all federal, state, and local health and safety standards, regulations and laws. Some of those specific to this Hazardous Waste Operations and Emergency Response include:

- 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response.
- USACE EM385-1-1 November 2003

3.0 APPLICATION

Malcolm Pirnie project teams will develop a site-specific safety and health plan (SSHP) for each field project that meets the following definitions:

- Clean-up operations required by a governmental body, whether Federal, state local or other involving hazardous substances that are conducted at uncontrolled hazardous waste sites (including, but not limited to, the EPA's National Priority Site List (NPL), state priority site lists, sites recommended for the EPA NPL, and initial investigations of government identified sites which are conducted before the presence or absence of hazardous substances has been ascertained);
- Corrective actions involving clean-up operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C. 6901 et seq);
- Voluntary clean-up operations at sites recognized by Federal, state, local or other governmental bodies as uncontrolled hazardous waste sites;
- Operations involving hazardous waste that are conducted at treatment, storage, disposal (TSD) facilities regulated by 40 CFR Parts 264 and 265 pursuant to RCRA; or by agencies under agreement with U.S.E.P.A. to implement RCRA regulations; and
- Emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to the location of the hazard.

Malcolm Pirnie also requires that project teams follow this program on projects may result in potential exposures to site contamination. These projects include landfill evaluations and projects where the client requires the development and implementation of SSHP.

Malcolm Pirnie projects do not typically generate or require employees to handle or dispose of hazardous waste. Remediated materials generated during remediation projects are not typically managed under the Resource Conservation and Recovery Act (RCRA). In the event that Malcolm Pirnie employees must manage hazardous waste, please refer to the Malcolm Pirnie Hazardous Waste Management Program.

4.0 SAFETY AND HEALTH RISK ANALYSIS

4.1. Project Tasks

Malcolm Pirnie Health & Safety Plans (HASPs) will include a description of the work to be accomplished and a delineation of field tasks. An evaluation of these field tasks becomes the basis of the Hazard Analysis. Suitable control strategies are devised to mitigate each hazard defined for each task.

4.2. Safety and Hazard Analysis

The following sections provide some general information on some of the typical field task hazards encountered by Malcolm Pirnie employees doing hazardous waste site investigative projects.

4.3. General Physical/Biological Hazards

Anticipated physical/biological hazards include:

- Heat stress (high ambient temperature);
- Noise;
- Slip, Trip and Fall;
- Equipment Operation;
- Electrical;
- Utility avoidance (overhead and underground);
- Falling objects; and
- Biological hazards.

4.3.1. Heat Stress

Whenever feasible, the level of protection established for workers will be based upon quantitative determinations of the radiological and chemical agents and physical stresses present in the work environment. It is proposed that work will be conducted during the summer months; therefore, heat exposure is an issue of concern.

Heat stress is probably one of the most common and potentially serious illnesses at hazardous waste sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning, and age. The effects of heat stress can range from mild symptoms, such as fatigue, irritability, and decreased mobility, to death. The body's response to heat stress includes the following:

- **Heat Rash**: A result of continuous exposure to heat and humidity, heat rash decreases the body's ability to tolerate heat.
- **Heat Cramps**: A result of profuse perspiration with inadequate fluid intake and chemical replacement, heat cramps are signaled by muscle spasms and pain in the abdomen and the extremities.
- **Heat Exhaustion**: A result of increased stress on various organs. The signs of heat exhaustion include shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.
- **Heat Stroke**: The most severe form of heat stress, heat stroke must be relieved immediately to prevent severe injury or death. The signs of heat stroke are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; and coma. The body must be cooled and medical attention sought immediately.

Measures to prevent heat stress include regular work breaks during field activity, regular fluid replenishment, and the availability of shelter (i.e., shaded area). All personnel will be made aware of the symptoms of heat stress. Should one or more symptoms be detected, the affected worker will be assisted to seek shade, drink plenty of fluids, and seek medical attention, if required.

Several screening techniques can be used to detect early warning signs of heat stress. The following method, based on body temperature measurements, is simple and straightforward and may be conducted by the SSO. Body temperature may be measured with a digital-readout clinical ear thermometer with disposable tips.

Body temperature may be measured for three minutes with an ear thermometer at the end of each work period and before drinking. Temperature at the end of the work period should not exceed 99.6°F. If the temperature does exceed 99.6°F, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the temperature exceeds 99.6°F at the beginning of the next rest period, however, the following work cycle should be further shortened by 33%.

Temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6°F. No worker may be permitted to continue wearing semi-permeable or impermeable garments when his/her temperature exceeds 100.6°F.

4.3.2. Noise

OSHA requires the use of hearing protection by all employees when noise levels exceed 85 decibels. This limit may be exceeded on or near heavy equipment. A sound level meter (SLM), operating in the dBA mode, will be used when personnel are working near heavy equipment. Site workers will wear hearing protection when the noise levels exceed 85 decibels. In addition, all Malcolm Pirnie personnel must undergo an initial employment, annual, and employment termination examination, during which a hearing test is conducted.

4.3.3. Slip, Trip and Fall Hazards

Ground irregularities due to topography or protruding materials (e.g., nails in boards, broken glass) may pose a fall, slip or trip hazard to workers. Leather shoes with puncture proof inserts will be worn by personnel to protect against sharp objects which may be protruding from the surface or when using heavy equipment. There are potential hazards from the presence of wet areas, puddles, oil and grease, debris, loose or sandy soils, or other obstructions that may be within the passageways or walkways. Field personnel will be briefed by the SSO each morning on the location and type of obvious hazards in the work areas. Site workers are to take care in areas where ground irregularities or protruding objects exist and may not be observed due to vegetation.

4.3.4. Equipment Operation

To prevent entrainment in moving machinery, Malcolm Pirnie employees will maintain a safe distance from heavy machinery. Malcolm Pirnie employees will remain outside the swing radius of heavy equipment. The PSO or designee will remind all site workers each morning about the hazards of moving equipment. Subcontractors will place a worker near moving heavy equipment to guide the operator and warn others.

4.3.5. Utility Avoidance (overhead and underground)

Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. The location of underground utilities will be determined prior to excavation or drilling. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the One Call Markout Ticket will be retained. The Utility Association "Call Before You Dig" (instate) hotline number is 1-800-XXX-XXXX. On commercial or industrial properties where public utility companies may not have information on buried utilities, a Level 2 survey will be conducted to locate all aboveground and below ground utilities. A Level 2 survey will consist of the use of remote sensing devices (e.g., electrical resistivity, ground penetrating radar, magnetometer, etc.). On residential properties, a metal detector will be utilized to locate any buried tanks (i.e., oil) and/or subsurface piping associated with the property's heating system.

4.3.6. Electrical

Electrical storms (thunderstorms) may pose an electrocution hazard. During thunderstorms, all heavy equipment will be shut down, drilling activities will be terminated and all personnel on-site will take refuge in buildings.

All electrical equipment, power tools, and extension lighting used on this site will be low voltage or protected by ground fault circuit interrupters (GFCIs).

4.3.7. Vehicular Traffic

Vehicular traffic will pose a hazard during some Hazardous Waste site tasks conducted in public streets. The local police department will be contacted prior to these activities, in order to make arrangements to close streets to all but local traffic. Traffic cones will be set across all street intersections to restrict the flow of traffic into the work areas. In addition, warning signs (e.g., Work Ahead) will be posted at all street intersections. All personnel will wear bright-colored, reflective traffic safety vests while performing street scanning activities.

4.3.8. Falling Objects

There maybe a danger of falling objects on a particular project. In these cases, the entire area inside the exclusion zone is a hard hat area. Hard hats will also be worn within 50 feet of drilling operations or other activities posing an overhead hazard.

4.3.9. Biological Hazards

Persons working on Hazardous Waste sites should be aware of the presence of biological hazards including snakes, poisonous plants and poisonous insects. With the exception of some rare species of poisonous snakes, snakes will not attack unless provoked. All snakes encountered should be avoided. If a snake is discovered, the PSO should be immediately informed of the snake's location, size and type, if known. In most cases, only a brief interruption of work will be necessary to allow the snake to vacate the work area on its own.

Poison ivy is a climbing plant with ternate leaves (arranged in threes), with white berries. Poison oak is similar to poison ivy, but its leaves appear oak-like in form. The leaves of these poisonous plants produce irritating oil causing an intensely itching skin rash and characteristic bullous lesions. These plants are to be avoided.

Working in tall grass, especially in or at the edge of wooded areas, increases the potential for ticks to bite workers. Ticks can be particularly numerous in the spring and fall. Ticks are vectors of many different diseases including Rocky Mountain spotted fever, Q fever, tularemia, Colorado tick fever and Lyme disease. Ticks attach to the skin and intravenously feed on blood, creating an opportunity for disease transmission. Covering exposed areas of the body and the use of insect repellent containing N,N-Diethyl-m-toluamide (DEET) help prevent tick bites. Periodically during the workday, employees should inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.
- Do not twist the tick as you pull and do not squeeze its body. That may actually inject bacteria into your skin.
- Thoroughly wash your hands and the bite areas with soap and water. Then apply an antiseptic to the bite area.
- Save the tick in a small container with the date, the body location of the bite and where you think the tick came from.
- Notify the PSO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States. Ticks transmit other diseases similar to Lyme disease, which present similar symptoms and long-term consequences. All personnel sustaining a tick bite should consult a physician.

5.0 SOCIAL CONDITIONS

Malcolm Pirnie field personnel are to be knowledgeable of the general conditions currently existing within their study areas. Malcolm Pirnie personnel should be cognizant of their surroundings at all times while in the field. If deemed necessary, Malcolm Pirnie field personnel will be accompanied by armed security guards during excursions to site properties during field activities. Local law enforcement authorities will be contacted prior to the commencement of field activities, and letters conveying general project information will be distributed to public officials and property owners. Actions required of all Malcolm Pirnie personnel include conducting field activities with at least two field team members, finishing all field activities during daylight hours, and limiting the public visibility of Malcolm Pirnie field personnel while activities are being conducted. In addition, all field personnel will be required to carry two-way radios, have access to a cellular phone, and have identification badges identifying themselves as Malcolm Pirnie employees.

6.0 HEALTH AND SAFETY ORIENTATION TRAINING

Required OSHA training will be conducted by qualified trainers that have successfully completed an appropriate program for training or have adequate academic credentials and instructional experience.

Malcolm Pirnie and subcontractor personnel involved with the investigation activities are required to have completed the 40-hour hazardous materials health and safety training as specified in 29 CFR 1910.120. This training, designed to orient personnel potentially exposed to hazardous substances, health hazards, or safety hazards, includes the following:

- Safety and health risk analysis;
- Use of PPE;
- Work practices by which the employee can minimize risks from hazards;
- Safe use of engineering controls and equipment;
- Medical surveillance requirements including recognition of symptoms and signs which might indicate overexposure to hazards;
- Procedures for environmental monitoring, site control and decontamination; and
- Emergency response plans.

All personnel will also have proof of attendance at an annual 8-hour Health and Safety refresher course if their 40-hour course was completed more than a year prior to the start of field activities. In addition, a minimum of two field personnel with current First Aid/ CPR/Bloodborne Pathogens Training (FA/CPR/BBP) will be present on-site during all field activities. A copy of all current training certificates will be kept in the project field notebook.

For those projects with potential radiological exposure from contaminants in the ground, a project-specific radiation orientation program will also be developed and presented to all field personnel before any work begins.

7.0 SPECIALIZED TRAINING

Malcolm Pirnie, subcontractor, and other field personnel are to be knowledgeable in the particular hazards that may be encountered during this project and be familiar with safe operating procedures. This will be accomplished through the review of this HASP, specialized training prior to the commencement of the field work, an audit of field activities and safety meetings during the program, as discussed below.

Field personnel should have a minimum of three days of actual field experience under a skilled supervisor and be familiar with emergency response procedures outlined in the HASP. The PSO and all supervisory personnel will have additional training, including FA/CPR/BBP and 8-hour hazardous materials supervisory training. Subcontractors will be responsible for ensuring that their employees receive specialized training for their job functions and responsibilities.

7.1. Pre-Investigation Health and Safety Briefing

Malcolm Pirnie and subcontractor personnel involved with the project will attend a site-specific health and safety briefing prior to initiation of the field activities. The topics to be discussed will include:

- Characteristics and potential hazards of contaminants known to be present at the site;
- Personal protective clothing: function, donning/doffing;
- Respirators: selection, use, care;
- Personal hygiene;
- Environmental monitoring;
- Decontamination procedures;
- Site control and work zone designations;
- General safety concepts;
- Emergency recognition and prevention;
- Heat stress;
- Signs and symptoms of over exposure to site specific chemical hazards;
- Hazard communication
- Emergency response plan; and
- Site contingency plans.

7.2. Site/Radiation Orientation Program

For applicable projects, the Site/Radiation Orientation Program will be provided to on-site Malcolm Pirnie and subcontractor personnel. The orientation, which will be in compliance with USACE Safety and Health Requirements Manual EM 385-1-1, November 2003, will cover the following topics:

- Basic principles of radiation
- Health effects
- Radiation detection.
- Contamination control/emergency response
- Transportation of radioactive materials
- Radiation risk communication

7.3. Health and Safety Field Audit

The PSO shall observe field investigation activities and prepare a Health and Safety Field Audit Report (HSFAR), which addresses hazardous waste operations from a safety perspective. The audit will evaluate the health and safety activities implemented by the field sampling team in accordance with the HASP. Any minor deficiencies that are noted during the audit will be corrected in the field as they occur. If major deficiencies are noted during the audit (those that cannot be immediately corrected in the field), a Stop-Work Order will be issued by the Project Manager until appropriate measures can be taken to correct the problem. A written report of the Health and Safety audit will be prepared by the PSO and submitted to both the HSM and the Project Manager. This report will identify any deficiencies found and will outline the corrective actions that were recommended/implemented to address any minor deficiencies observed. The audit report will also recommend appropriate corrective actions for any major deficiency noted.

The Project Manager will assist with corrective action and maintain an on-going log of the audit activities in the monthly progress report. The Project Manager will submit follow-up reports to the client's PM (as required), describing completed corrective actions that addressed major deficiencies. A minimum of one Health and Safety audit will be conducted by the PSO during the investigations.

7.4. Morning Safety Meetings

The PSO or designee shall conduct morning safety and health briefings on an as-needed basis. Problems relative to respiratory protection, inclement weather, heat stress, or the interpretation of newly available environmental monitoring data are examples of topics that might be covered during these briefings. An outline report of meetings giving the date, time, attendees, subjects discussed, and instructor shall be. Visitors will be properly oriented to existing site conditions, planned activities, levels of personal protection, and other procedures outlined in this HASP.

8.0 HAZARD COMMUNICATION

Malcolm Pirnie has a written hazard communication program which was established to meet the requirements of 29 CFR 1910.1200, and field activities shall be implemented in accordance with that program, as described below.

Material Safety Data Sheets (MSDSs) for hazardous chemicals introduced to the site by Malcolm Pirnie and their subcontractors will be present at the site, for review by all on-site personnel and maintained in the Project notebook. Labels on containers used by Malcolm Pirnie are as originally received (not to be defaced) and are to contain the following information: (1) the identity of the hazardous chemical(s); (2) the appropriate hazard warnings; and (3) the name and address of the chemical manufacturer. If an employee transfers chemicals from a labeled container to a portable container, a label that contains those three items must be affixed to it. If the portable container is used by one employee during one work shift, the product name only shall be clearly marked on the container. The employee will be responsible to properly empty, clean or dispose of the portable container immediately after use.

The PSO shall make a reasonable effort to obtain the appropriate hazard communication information for hazardous chemicals introduced by other employers: This information will include:

- Explanation of that firm's labeling system;
- The name and location of each hazardous chemical, and location of MSDSs; and,
- Precautionary measures other employers need to take to protect their employees from harmful exposure to hazardous chemicals under normal operating conditions and in foreseeable emergencies.

As part of the site-specific health and safety orientation conducted by the PSO, a review of Malcolm Pirnie's Hazard Communication Program will be included to inform employees of hazardous chemicals to which they may be exposed during field activities. Subcontractors will also attend the hazard communication training session. If the chemical hazard changes or a new chemical hazard is introduced into the area after work begins, additional training will be provided by the PSO.

Site-specific hazard communication training for hazardous chemicals introduced to the site by Malcolm Pirnie will include:

- Properties and hazard (chemical, physical, toxicological) of each hazardous chemical;
- Health hazards, including signs and symptoms of exposure and any medical condition known to be aggravated by exposure;
- Measures employees can take to protect themselves, including: appropriate work practices or methods for proper use and handling, procedures for

emergency response, and the proper use and maintenance of PPE, as required.

- Work procedures for employees to follow to protect themselves when cleaning hazardous chemical spills and leaks.
- Use of the container labeling system and the MSDSs including: where MSDSs are located, how to read and interpret the information on both labels and MSDSs, and how employees may obtain additional hazard communication information.
- Site-specific hazard communications training will also cover hazardous chemicals introduced by other employers and shall emphasize:
- Information about the hazardous chemicals to which Malcolm Pirnie's employees may be exposed;
- An explanation of the labeling system other employers are using;
- Information about the precautionary measures Malcolm Pirnie employees need to take to protect themselves during normal operating conditions and in emergencies; and,
- Location of MSDSs for hazardous chemicals brought to the site by other employers.

The PSO shall document the training, including the agenda and list of attendees. This subsection of the HASP, and the hazard communication training conducted as described above, shall be the mechanism for informing other employers planning to be on-site of hazardous chemicals introduced to the site by Malcolm Pirnie.

9.0 MEDICAL SURVEILLANCE AND EXPOSURE MONITORING

9.1. Medical Surveillance

All Malcolm Pirnie personnel and subcontractors performing fieldwork that could potentially expose them to hazardous materials are required to take part in a medical surveillance program that is consistent with the requirements of 29 CFR Part 1910.120 (f). This includes any employees that may be exposed to hazardous materials or wear a respirator for 30 days or more per year.

Medical examinations, conducted at no cost to the employee, will occur prior to the work assignment and then annually. When an employee is reassigned to work areas where medical surveillance is not a requirement or when employment is terminated, a final medical examination will be conducted if the previous evaluation has not been within the last six months.

A medical examination should be conducted quickly after an emergency incident or when an employee is suffering from symptoms associated with overexposure. Additional medical evaluation can be scheduled at the discretion of the PSO, the Director, Environmental Health & Safety or our designated medical consultant.

Subcontractors will maintain medical records for their own employees, but will also provide the Malcolm Pirnie with written documentation certifying that each employee on site has met the requirements of the OSHA Medical Surveillance Program, is cleared for duty, and indicates any work restrictions that may impact the performance of job tasks.

Supplemental Examinations - Supplemental examinations may be performed whenever there is an actual or suspected excessive exposure to chemical contaminants or upon experience of exposure symptoms, or following injuries or temperature stress.

10.0 PERSONAL PROTECTIVE EQUIPMENT

10.1. General Protection Levels

Personnel must wear protective equipment when work activities involve known or suspected radiological or chemical atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with dermally active substances may occur. Respirators can protect the lungs, the gastrointestinal tract and the eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with skin-destructive and skin absorbable chemicals. Good personal hygiene limits or prevents the ingestion of materials.

The personal protective equipment used during specific activities is based on air monitoring results or at the discretion of the Project Safety Officer. If the Project Safety Officer determines that field measurements or observations indicate that a potential exposure is greater than the protection afforded by the personal protective equipment, work will stop and personnel will be removed until the level of exposure has been decreased or the level of protection has been increased.

Equipment designed to protect the body against contact with known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded:

Level A: Should be selected when the highest level of respiratory, skin and eye protection is needed. It includes:

- Pressure-demand SCBA
- Fully Encapsulating Chemical-resistant Suit
- Inner and outer Chemical Resistant Gloves
- Chemical Resistant boots with steel toe
- Hard Hat
- Two-way radio communications

Level B: Should be selected when the highest level of respiratory protection is needed, but a level of skin protection lower than Level A is required. It includes:

- Pressure-demand SCBA
- Chemical-resistant clothing (overalls and long-sleeve jacket; coveralls; hooded one- or two-piece chemical splash suit; disposable chemical-resistant coveralls)
- Inner and outer Chemical Resistant Gloves
- Chemical Resistant boots with steel toe
- Hard Hat
- Two-way radio communications

Level C: Should be selected when the types of airborne contaminants are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. Level C requires the use of:

- A full-face air-purifying respirator equipped with an organic vapor, dust, fumes and mists combination cartridge
- Chemical-resistant Clothing
- Chemical-resistant Gloves
- Chemical Resistant boots with steel toe
- Hard Hat

Level D/Modified Level D: Level D should be selected only when there are no respiratory or skin hazards suspected or known to exist at the site. Modified Level D PPE is selected when no respiratory hazards are suspected or known to exist, yet the potential for dermal hazards including contact with contaminated soils, splashes or immersion exists. If the potential for splashes or immersion exists, coated-type chemical resistant coveralls (such as Saranex) and hard hats with face shields could be selected. If the only dermal hazards which existed were related to soil sampling, a non-coated semipermeable-type coverall (such as Tyvek) could be selected, thereby avoiding the heat stress hazards associated with an impermeable coverall.

The level of protection selected is based primarily on:

- Types and measured concentrations of the contaminants in the ambient atmosphere and their associated toxicity; and,
- Potential or measured exposure to substances in air; splashes of liquids; or, other indirect contact with material due to the task being performed.

In situations where the types of contaminants, concentrations, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards may be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components outlined in the following subsection are based on the widely used USEPA Levels of Protection.

In general:

- All protective headgear shall meet the requirements of the American National Standards Institute (ANSI) Z89.1, Class A or ANSI Z89.2, Class B.
- Personnel will be provided with eye and face protective equipment when machines or operations present potential eye or face injury from physical, chemical or radiological agents. Eye and face protective equipment shall meet the requirements in ANSI Z87.1, Practice for Occupational and Educational Eye and Face Protection.
- Persons requiring corrective lenses in eyeglasses, when required by this regulation to wear eye protection, will be protected by one of the following:
- Eyeglasses whose protective lenses provide optical correction; or
- Goggles that can be worn over corrective lenses without disturbing the adjustment of the spectacles; or goggles that incorporate corrective lenses mounted behind the protective lenses.
- Use of contact lenses will be avoided. Contact lens use will not be permitted under a full-face respirator. Spectacle kits for insertion into full-face respirators will be provided for Malcolm Pirnie personnel as required.
- If excessive noise levels are encountered, particularly around heavy equipment operation, noise protection shall be provided as appropriate.
- Persons handling rough, sharp-edged, abrasive materials or whose work subjects the hand to lacerations, punctures, burns, or bruises will use general-purpose outer hand protection in addition to the chemical resistant inner and outer gloves, as required.
- Employees will wear clothing suitable for the weather and work conditions. The minimum will be long sleeved shirt, long trousers, and protective work shoes or boots. Canvas tennis or deck shoes are not acceptable.
- Protective footwear (i.e., steel-toed or steel sole boots) will be worn by all persons who are engaged in the work.
- Respiratory protection approved by NIOSH shall be provided for all employees subject to harmful concentrations of dusts, gases, fumes, mists, toxic materials, or atmospheres deficient in oxygen.
- No person will be permitted in atmospheres containing less than 19.5 percent oxygen unless provided with a source of air meeting USP or Compressed Gas Association Specification G7.1, grade D.
- Air purifying respirators will be permitted only where the toxic content of the air is known to be of type and concentration which the mask will effectively remove, has good warning properties, and where there is no deficiency of oxygen.

- PPE will be inspected regularly and maintained in serviceable and sanitary condition and before being reissued to another person or returned to storage, will be cleaned, disinfected, inspected, and repaired.

10.2. Inspection of PPE

Before use of protective clothing, the PSO shall determine that the clothing material is correct for the specified task at hand. The clothing is to be visually inspected for imperfect seams, non-uniform coatings, tears and malfunctioning closures. It is to be held up to the light to check for pinholes. It is to be flexed to observe for cracks or other signs of shelf deterioration. If the product has been used previously, it should be inspected inside and out for signs of chemical deterioration, such as discoloration, swelling and stiffness. During work, the clothing should be periodically inspected by the PSO for evidence of chemical deterioration, closure failure, tears, punctures and seam discontinuities.

Before using gloves, check for pinhole leaks. Prior to use, sir-purifying respirators should be checked for positive and negative fit. Before and after each use, they should be inspected to be sure they have been adequately cleaned. Respirator components should be checked for pliability, deterioration or distortion. Cartridges should be examined to ensure that they are the proper type for the intended use, the expiration date has not passed, and that they have not been opened or used previously. Face shields and lenses should be checked for cracks, crazing and fogginess. Equipment that is found to be defective must be replaced immediately.

11.0 EXPOSURE MONITORING

11.1. General

The purpose of the air-monitoring plan is to evaluate the exposure potential to site personnel, subcontractors, and visitors during perimeter monitoring and related site screening activities. The personal and area-monitoring will be performed during each of the initial phases to determine the exposure potential, confirm the type of and evaluate the need for personal protective equipment. Personnel are not expected to place themselves in a hazardous position when in the exclusion zone during active drilling activities. Repeat monitoring will be performed when there is a change in personnel, scope of work, symptoms experienced by field staff, or readings indicating that the action level was reached or exceeded.

Emergency response actions and PPE selection will be based on monitoring results. The following instruments are available and typically used for Hazardous Waste site projects:

- MiniRAE photoionization detectors (PID);
- Oxygen/combustible gas indicators (CGI);

- Personal dataRam Dust Monitors
- Drager Pumps and Tubes
- Jerome Mercury and Hydrogen Sulfide Detectors
- Gamma radiation scintillation (sodium iodide) detectors
- Thermoluminescent dosimeters (TLDs).

Prior to the start of work, an initial monitoring survey will be conducted to establish background conditions. During site activities, the monitoring instruments will be operated on a continuous basis in the work area. If contaminant levels in the breathing zone exceed those specified in the HASP, the prescribed PPE will be used or the area will be evacuated in accordance with the Emergency Response Procedures.

Contaminant concentrations detected, instrument type and calibration data will be recorded. All instrumentation will be calibrated before use; periodic calibration checks will be made by the PSO or designee and documented over the duration of the work activities.

Instrumentation will be maintained in accordance with the manufacturer's specifications. Monitoring instruments will be protected from surface contamination during use to minimize the need for decontamination.

Personnel assigned to radioactive waste sites for five or more days or more will be issued a TLD. These will be collected quarterly and the dosimetry results will be disclosed; results will be included in the employee’s medical surveillance record.

11.1.1. Minirae Photoionization Detector

MiniRAE PIDs are used to monitor the breathing zone of field personnel to assess the presence of volatile organic vapors.

11.1.2. Oxygen Combustible Gas Indicator (CGI)

CGIs are used to monitor for the presence of explosive atmospheres and oxygen concentrations in areas such as pits, depressions, excavations, on-site buildings, or confined spaces where there may be low oxygen levels and/or flammable gases might collect. Each instrument will be set to alarm when the atmosphere being tested has reached a concentration equal to 10% of the LEL of methane and/or oxygen less than 19% or higher than 23.5%.

11.1.3. Personal dataRAM

Personal dataRAMs are used to obtain real-time particulate dust measurements. Action levels are determined by assessing the expected contaminant concentrations in the soil.

11.1.4. Gamma Radiation Scintillation Detector

On radiation sites, gamma radiation scintillation detectors will be used to continuously monitor the radiation exposure rate in the work areas. The Project Health Physicist will guide field personnel in the interpretation of the monitoring data and provide guidance so that personnel doses will be kept as low as reasonably achievable (ALARA).

11.1.5. Drager Pumps and Tubes

Drager pumps and tubes are used to qualify PID results to determine if low PEL compounds including Benzene and Vinyl Chloride may be present in the work area air. The presence or absence of these compounds may determine the PPE Level required for a particular phase of the work.

11.1.6. Jerome Mercury and Hydrogen Sulfide Detectors

Jerome Mercury and Hydrogen Sulfide Detectors are very sensitive real-time detectors useful for detecting general concentrations and well as point sources of mercury contaminant or hydrogen sulfide releases.

11.2. Personal Monitoring

Personal air monitoring will be conducted during various phases of the project to determine the exposure potential to project staff. This monitoring will occur in the breathing zone and work area during sampling activities to assess the employee exposure potential to contaminants. The analytical results will be posted in the site trailer and/or communicated to field staff. The concentrations and real time readings will determine the need to increase the distance of the exclusion zone and the need to upgrade the level of personal protective equipment. The determination to perform subsequent personal monitoring will be made by the PSO after discussions with the Project Manager.

12.0 ACTION LEVELS FOR WORK AREA MONITORING

Action Levels are developed based upon the contaminants present of the site, the likelihood of the contaminants becoming airborne or the likelihood of physical contact. Airborne contaminant action levels are based on the PEL or ACGIH TLV of the compound(s) with the highest calculated atmospheric concentration and the sensitivity of the instrument to those compounds. For single compounds, Malcolm Pirnie uses ½ the PEL or TLV, which ever is the most protective, modified by the instrument sensitivity.

12.1. Exposure Monitoring/Air Sampling Program

Instrument	Action Levels	Level of Respiratory Protection
PID	Continuous sustained readings of <5 ppm above background in the breathing zone and no visible dust	Level D
Particulate Meter	Readings of <5 mg/m3 total particulates	Level D
PID	Sustained (> 5 min.) readings > 5 ppm but < 50 ppm above background in the breathing zone and/or sustained dust clouds	Level C
Particulate Meter	Sustained readings of >5 mg/m3 <15 mg/m3 total particulates	Level C
Explosive vapors/CGI	< 19.5% oxygen, >23.5% oxygen, or > 10% LEL	Leave Area
Explosive vapors/CGI	>19.5% oxygen, < 23.5% oxygen, or < 10% LEL	Level D
Draeger tubes	Use benzene or vinyl chloride tubes when sustained VOC readings on the PID/FID are above 1.0 ppm above background in the breathing zone. If results are <1.0 ppm: use level D.	Level D
Draeger tubes	Use benzene or vinyl chloride tubes when sustained VOC readings on the PID/FID are above 1.0 ppm above background in the breathing zone. If results are >1.0 ppm: leave area of exposure and upgrade to Level B as necessary.	Leave area or Level B

13.0 SITE CONTROL MEASURES

OSHA requires that Malcolm Pirnie initiate engineering and work practice controls, to the extent feasible, to minimize the potential for employee exposure to chemical, biological, physical, or mechanical hazards. Site control measures help maintain order at the site and minimize health and safety hazards to on-site personnel, visitors, and the public.

13.1. Engineering Controls

In accordance with best management practices, engineering control measures will be utilized on site to provide a safe environment. Such controls include, but are not limited to, the use of fencing, clearly defined work areas, personal protective equipment, monitoring equipment, proper decontamination procedures, and personnel training.

13.2. Site Access

Malcolm Pirnie personnel will abide by any security restrictions and guidelines imposed by facility owner/operators. Site access will be limited to trained, medically cleared, essential personnel only. Appropriate warning signs will be posted at the entrance to the site, at the site trailer (if appropriate), and in areas where special personal protective equipment or precautions must be afforded. Personnel will be courteous to the public and direct all questions to the appropriate owner/operator representative on site.

The PSO shall be responsible for controlling access to the site. Only authorized, qualified personnel are allowed on-site during the performance of the field activities. Personnel desiring access to the site will be required to sign in at the trailer and receive a site safety briefing, as appropriate.

13.3. Establishment of Work Zones

Site control zones include exclusion zones; contaminant reductions zone, and support zones and will be maintained by the PSO. No equipment will leave the site without being decontaminated. A detailed map of site work areas, including exclusion zones, reduction zones, and support zones will be provided for each site managing hazardous waste.

The PSO shall establish an area to provide portable eyewash, first aid kit, towels, plastic garbage bags, fire extinguisher, and decontamination supplies. Access to the work zones will be controlled so that personnel entering the areas are wearing the proper personal protective equipment and proper training and medical clearance.

Temporary work zones shall be established at each location of soil intrusive and/or sampling location. The PSO shall be responsible for establishing a contamination reduction zone directly adjacent to these work zones. The contamination reduction zone shall have available a portable eye wash, first aid kit, towels, plastic garbage bags, fire extinguisher, and decontamination supplies.

13.4. Exclusion Zone

During site activities, the PSO will establish an exclusion zone. The exclusion zone will be set up around the large diameter auger drilling activities. Some type of barricades or fencing shall be established to identify the area as the exclusion zone. Smoking, eating, drinking, and chewing tobacco will not be permitted in the exclusion zone. Personnel entering the exclusion zone shall be limited and only personnel with the proper training and medical clearance may enter. Personnel entering the exclusion zone must wear required personal protective equipment (e.g., Tyvek, rubber steel toed boots, eye protection, hearing protection and gloves).

13.5. Contaminant Reduction Zones

The contamination reduction zone will be established by the PSO as a buffer zone between the work zones and the support zone. When possible, the contaminant reduction zone should be located upwind of an exclusion zone. Smoking, eating, drinking, and chewing tobacco will not be permitted in the contaminant reduction zone. An area for the proper disposal and/or cleaning of personal protective equipment shall be established in the contaminate reduction zone.

13.6. Support Zone

The support zone is considered the clean area and consists of any area outside the work zone and contaminant reduction zones. The command post, appropriate sanitary facilities; safety, medical and support equipment will be located within the support zone. Potentially contaminated personnel or materials are not allowed in the support zone. Drinking of water/fluids is permitted in this area. A designated smoking area will be established near the site/field trailer and housekeeping will be enforced at the site throughout the project.

The support zone is considered the uncontaminated area in the vicinity of the work zone and will be identified by the PSO before field activities begin. It will contain the command post, which will provide for team communications and emergency response. A mobile telephone will be located in this area. Appropriate sanitary facilities, safety, medical and support equipment will be identified. No potentially contaminated personnel or materials are allowed in the support zone.

14.0 DECONTAMINATION PROCEDURES

Decontamination procedures have been developed in order to minimize employee, subcontractor, or visitor contact with hazardous substances. Decontamination procedures for personnel and equipment will be communicated with Malcolm Pirnie employees prior to commencement of work activities.

14.1. Personnel Decontamination Procedures

The Project Manager will be responsible for supervising the proper use of personal protective equipment and decontamination of personnel prior to them leaving contaminated areas. When decontamination procedures are not sufficient or are not being followed, the Project Manager will correct any deficiencies.

Personnel decontamination will be established by the Project Manager in an area that will minimize the exposure to uncontaminated employees and equipment. Personnel will decontaminate and/or dispose of soiled protective clothing in the contamination reduction zone established next to the temporary work zones. Unauthorized personnel will not remove protective clothing or equipment from any work zones.

Decontamination involves scrubbing with a soap and water solution followed by rinses with potable water. Dirt, oil, grease, and other foreign materials that are visible will be removed from surfaces. Rinse water used in personnel decontamination will be disposed with wastewater from equipment decontamination and drummed for laboratory analyses and proper disposal thereafter.

Non-disposable garments will be air-dried prior to storage. Tyvek, gloves, and other disposable personal protective equipment will be disposed of with applicable hazardous waste and replaced as necessary. When employee clothing inadvertently comes in contact with a hazardous substance.

A wash basin will be made available to site personnel to ensure proper personal hygiene procedures are implemented throughout the project phases. If cold weather conditions prevent the use of water, other effective cleansing means will be provided. When required, regular showers and change rooms will be provided outside of the contaminated area in accordance with 29 CFR 1910.120(k)(8). Personnel are required to wash their hands/faces prior to eating, drinking or smoking after conducting sampling or oversight activities at a site.

14.2. Personnel Decontamination Equipment

The following supplies can be made available onsite for personnel decontamination when appropriate:

- Plastic drop cloths;
- Plastic wash tubs;
- Long-handled brushes;
- Alconox®, water, alcohol-free or antimicrobial wipes, and towels to wash hands, face, and respirators;
- Mineral spirits or orange based cleaning agent for tool and equipment decontamination (use chemical resistant gloves and splash goggles, do not use mineral spirits around ignition sources); and
- Hand spray units.

14.3. Equipment Decontamination

Equipment decontamination will consist of removing all visible soil with a shovel, broom, or rags followed by washing with a cleaning agent and rinsing with potable water. Decontamination water will be collected for disposal as required by site conditions.

In some cases, it may be necessary to wash equipment with a high pressure hot water (steam clean) and detergent. Alconox should be utilized to remove all residuals. Equipment must be scrubbed until all visible dirt, grime, grease, oil, etc. have been removed. Equipment must be decontaminated prior to its departing the site or excavation area. After steam cleaning and detergent rinse, equipment must be rinsed with potable (tap) water.

15.0 COLLECTION, STORAGE AND DISPOSAL PROCEDURES

Cutting, purge wastes, and field decontamination wastes are to be collected, drummed, and disposed of in accordance with the Federal, State and Local regulations. Handling drums and carboys associated with investigation-derived waste can be dangerous. Personnel should fill carboys only half way to avoid back strain and spilling water when lifting or tipping the carboy. When pouring waste from a carboy into a 55-gallon drum, personnel should try to avoid spilling any water and use proper lifting techniques. When handling 55-gallon drums, extra caution should be exercised due to the weight of the drums. If the drum lid is removed to sample the drum, personnel should avoid breathing any odors that may escape.

16.0 HAZARDOUS WASTE EMERGENCY RESPONSE

For all worksites where hazardous substances may be released, Malcolm Pirnie will have an Emergency Response Plan as part of the site-specific health and safety plan. The site-specific health and safety plan will be completed prior to commencement of work activities and will be kept onsite and made available for all employees to review.

Under the site-specific health and safety plan, training requirement will be outlined to ensure that all personnel will be trained based on their duties and functions and will receive necessary annual refresher training. Training records will be kept by the Corporate Health & Safety and training will be conducted by trainers that have completed appropriate training courses and/or have adequate academic and instructional experience.

Emergency Response Plan

In accordance with 29 CFR 120(q)(2), site-specific emergency response plans must contain the following elements:

- Pre-emergency planning and coordination with outside parties;
- Personnel roles, lines of authority, training and communications;
- Emergency recognition and prevention;
- Safe distances and places of refuge;
- Site security and control;
- Evacuation routes and procedures;
- Decontamination;
- Emergency medical treatment procedures;
- Emergency alerting and response procedures;
- Critiques of response and cleanup;
- Personal protective equipment and emergency equipment; and
- Use of local or state emergency plans to avoid duplications.

16.1. Key Personnel

16.1.1. First Responder Awareness Level

All Malcolm Pirnie employees onsite in work areas where the potential exists for hazardous substance releases will, at a minimum, be trained at the first responder awareness level. At the first responder awareness level, individuals are able to initiate the emergency response sequence (i.e. notify proper authorities) upon discovering a release. At this level, Malcolm Pirnie personnel will either have training or sufficient experience in order to demonstrate competency in the following areas:

- Hazardous substance characteristics and risks and outcomes associated with their release;
- Hazardous substance recognition in the event of an emergency;
- Hazardous substance identification (whenever possible);
- Role of first responder awareness personnel within the site-specific emergency response plan, site security, and US Department of Transportation's Emergency Response Guidebook;
- Recognition of need for additional resources and, in recognizing these needs, properly notifying required contacts.

16.1.2. First Responder Operations Level

When deemed necessary by the Project Manager and with the concurrence of the Director, Environmental Health and Safety, the Project Manager will arrange to staff the project with personnel trained at the first responder operations level. At the first responder operations level, these personnel will be able to initially respond to a hazardous substance release and minimize the impact of the release on nearby persons, property, or the environment. First responder training will allow personnel to respond to a hazardous substance release in a defensive manner and to contain the release (if possible) from a safe distance, keep if from spreading, and prevent exposures. The training must be at least 8 hours and provide employees with competency in the following areas:

- Basic hazard and risk assessment techniques;
- Proper selection and use of personal protective equipment available to first responders;
- Basic hazardous material terms;
- Basic control, containment, and/or confinement operations within the capabilities of the available personal protective equipment;
- Decontamination procedures; and
- Relevant standard operating and termination procedures.

16.1.3. Hazardous Materials Technician

When deemed necessary by the Project Manager and with the concurrence of the Director, Environmental Health and Safety, the Project Manager will arrange to staff the project with personnel trained as a hazardous materials technician. As a hazard materials technician, individuals will be able to approach the point of release and attempt to stop or contain it. At least 24 hours of training equal to the first responder operations level is required and will confer understanding of the following:

- Emergency response plan implementation as outlined in the site-specific health and safety plan;
- Identification, classification, and verification of known and unknown onsite substances and an understanding of the hazards or potential hazards associated with those substances;
- Hazardous material technician's role in the emergency response plan;
- Selection of required personal protective equipment;
- Performance of advance control, containment, and/or confinement operations within the resources available onsite;
- Decontamination procedures;
- Termination procedures; and
- Interpret chemical and toxicological terminology and exposure characteristics.

16.1.4. Hazardous Materials Specialist

When deemed necessary by the Project Manager and with the concurrence of the Director, Environmental Health and Safety , the Project Manager will arrange to staff the project with personnel trained as a hazardous materials specialist. A hazardous materials specialist has duties similar to that of the hazardous materials technician; however, the specialist has a more specific knowledge of the hazards associated with the release. At least 24 hours of training equal to the hazardous materials technician level is required to have additional understanding of the following:

- Emergency response plan implementation as outlined in the site-specific health and safety plan;
- Identification, classification, and verification of known and unknown onsite substances by using advanced survey instruments and equipment;
- Selection and use of required personal protective equipment available for hazardous materials specialists;
- Performance of specialized control, containment, and/or confinement operations within the resources available onsite;
- In-depth knowledge of hazard and risk techniques;
- Decontamination procedures;
- Development and implementation of site-specific health and safety plan;
- Interpret chemical, radiological, and toxicological terminology and exposure characteristics; and
- State-specific emergency response plan.

16.1.5. On Scene Incident Commander

When deemed necessary by the Project Manager and with the concurrence of the Director, Environmental Health and Safety, the Project Manager will arrange to staff the project with personnel trained as an On Scene Incident Commander. Incident Commanders assume control of the scene and will receive at least 24 hours of training equal to the first responder operations level and will know how to:

- Implement the local and corporate emergency response plan;
- Interpret the hazards and risks associated with employees utilizing personal protective equipment;
- Implement any applicable state emergency response plan and initiate the federal regional response team action; and
- Value the importance of decontamination procedures.

16.2. Emergency Response Organization

The PSO is the senior emergency response official who will respond to all releases of hazardous substances. In the event that Malcolm Pirnie's Director of Environmental Health & Safety is onsite, he/she will be considered the senior emergency response official.

The senior emergency response official will identify all hazardous substances, evaluate site conditions, and use engineering controls to minimize exposure to onsite personnel. Based on the site evaluation, the senior emergency response official implements appropriate emergency operations and enforced the use of adequate personal protective equipment as outlined in the site-specific emergency response plan. The senior emergency response official will ensure that employees exposed to inhalation hazards during emergency response procedures will use positive pressure self-contained breathing apparatus (SCBA) unless air monitoring has indicated that decreased level of respiratory protection is allowed. The number of personnel allowed access to the emergency site will be restricted as per the judgment of the senior emergency response official. Backup personnel will be assigned by the senior emergency response official to stand by and offer immediate assistance or rescue as needed.

A safety official will be designated by the senior emergency response official. The safety official will be knowledgeable of emergency operations underway and will be tasked with identifying and evaluating hazards that arise during such operations. If the safety official determines that emergency site conditions may be IDLH, the safety official has authority to alter, suspend, or terminate relevant activities.

When emergency operations have ended, the senior emergency response official will implement and oversee decontamination procedures outline in the emergency response plan.

The Malcolm Pirnie Director, Environmental Health & Safety is notified in the event of any release of hazardous substances.

The Director, Environmental Health and Safety is to be notified when the hazardous substances introduced to the worksite or under control of Malcolm Pirnie employees have the potential to result in a large release (greater than 55 gallons). The Director, Environmental Health and Safety will see to the following:

- The site-specific health and safety plan properly addresses all hazards and control measures needed;
- All onsite Malcolm Pirnie staff have received training to satisfy the requirements of their duties as outlined in the site-specific health and safety plan; and
- As necessary, contracting a readily available HAZMAT response team approved by Corporate Health and Safety.

16.3. Emergency Response Procedures

For hazardous substances introduced to the worksite or under control of Malcolm Pirnie employees, releases would be considered incidental and would be controlled in the immediate area of the release. Releases shall be handled by Malcolm Pirnie staff (who are trained accordingly) in accordance to their level of training and roles and duties assigned in the site-specific health and safety plan. Malcolm Pirnie staff will always utilize appropriate precautions based on the chemical characteristics for spill control methods and selection and use of minimum personal protective equipment. If onsite Malcolm Pirnie personnel are not able to contain the release, they must follow the procedures outlined for large releases.

In the event of a large release (greater than 55 gallons) of a hazardous substance:

- Respond in accordance to level of training and roles and duties assigned in the site-specific health and safety plan;
- Notify the HAZMAT/Spill response contractor in accordance with the site-specific health and safety plan;
- Notify the Malcolm Pirnie Director of Environmental Health & Safety at 1-800-478-6870 (24-hour emergency number).

16.4. Post Emergency Response Operations

Following a hazardous substance release, the removal of contaminated material (e.g., personal protective equipment, environmental media) will be conducted in accordance with 29 CFR 120(q)(11).

Waste determinations for materials contaminated by a release will be arranged by the Project Manager utilizing the regulations, laboratory analysis, MSDS, or manufacturer information. The PSO along with the Project Manager will conduct a hazard analysis to determine the risks and personal protective equipment requirements associated with handling and transporting the waste.

17.0 RECORDKEEPING

17.1. Waste Management Records

All required records and documents associated with hazardous waste management will be maintained by the Deputy Project Manager. These records include but are not limited to:

- Analytical results and chains of custody.
- Waste determinations.
- Training records of personnel.
- Inspection logs and inventories
- Manifests and shipping documentation.
- Exception reports and correspondence with federal state and local agencies.

The analytical results and waste determinations will be kept on file with the Project files for the firm's standard records retention period.

17.2. Training Records

Individual training certificates will be maintained in the local office Health and Safety files. The Director, Environmental Health and Safety, will maintain a copy of all corporate exposure control training records. A summary record will be maintained by Corporate Health & Safety in the PeopleSoft database, and will be updated according to the schedule established in the Health and Safety Training section of this manual.

The training records maintained in the local office file will include the following information:

- The dates of the training sessions.
- The contents or a summary of the training sessions.
- The names and qualifications of persons conducting the training.
- The names and job titles of persons attending the training sessions.

Training records shall be maintained for three years from the date on which the training occurred. Upon request, employees will have access to any of his/her training records maintained by the local office, the Director, Environmental Health and Safety, and Human Resources.

17.3. Medical Records

Malcolm Pirnie's Corporate Health & Safety group maintains employee medical records according to 29 CFR 1910.1020. Health Resources, Inc., Woburn, MA is the Corporate Medical Consultant and maintains these records at their facility. For the purposes of this Hazardous Waste Management Plan, employee medical records include:

- The name and social security number of the employee.
- A copy of results of examinations, medical testing, and follow-up procedures.
- Malcolm Pirnie's copy of the healthcare professional's written opinion.
- A copy of the information provided to the healthcare professional.

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

The purpose of this section is to assist employees in the proper selection and use of personal protective equipment (PPE). Malcolm Pirnie staff shall use PPE when engaged in activities where there is a potential for exposure to chemical, biological, physical or mechanical hazards, or as otherwise required by applicable laws and regulations.

The occupational use of PPE is governed by a series of standards promulgated by the Occupational Safety and Health Administration (OSHA) and found in Title 29 CFR 1910, Subpart I, *Personal Protective Equipment*. These include 29 CFR 1910. 133, *Eye and Face Protection*; 29 CFR 1910.135, *Occupational Head Protection*; and, 29 CFR 1910.136, *Occupational Foot Protection*. PPE required by the OSHA *Respiratory Protection Standard*, 29 CFR 1910.134, and the *Noise Standard* including the *Hearing Conservation Amendment*, 29 CFR 1910.95, are addressed separately in this Manual.

The OSHA standards dealing with personal protective equipment consist of three types of requirements. Section 1910.132 is a set of general requirements covering all types of equipment and all situations where it is needed. Section 1910.132 requirements do not cover section 1910.134, *Respiratory Protection*, or section 1910.137, *Electrical Protective Devices*, which are subjects of separate rule making. The other sections of Subpart I each give requirements for one particular type of equipment; and certain paragraphs in standards not primarily concerned with PPE call for protective equipment to be used under working conditions regulated by that section. In deciding on protective equipment for a project, project managers may find that provisions of all three apply.

OSHA does not recommend PPE if administrative or engineering controls will eliminate a hazard. Such controls are always preferred over reliance on personal protection to shield an employee from chemicals, processes or machinery known to be dangerous.

2.0 POLICY

A written hazard evaluation will be conducted for all Malcolm Pirnie worksites, **on all field projects**, other than work in office environments, to:

- Determine potential hazards to the health and safety of Malcolm Pirnie.
- Evaluate the need for and the feasibility of engineering and/or administrative controls of the hazards.
- Specify effective types of personal protective equipment to reduce potential exposures.

Individual articles of a PPE ensemble will be chosen by a qualified employee, Project Safety Officer (PSO) or Corporate Health & Safety, to provide the best available protection against known or reasonably anticipated chemical and physical hazards.

Individual articles of a PPE ensemble will be sized to fit the individual wearing it.

Compromised PPE will not be worn by Malcolm Pirnie employees or employees of Malcolm Pirnie subcontractors.

Contaminated PPE materials will be left at the work site if this can be done in a **responsible** manner.

3.0 RESPONSIBILITIES

OSHA requires that Malcolm Pirnie initiate engineering and work practice controls, to the extent feasible, to minimize the potential for employee exposure to chemical, biological, physical, or mechanical hazards. If recognized health and safety hazards cannot be practically removed from the work environment, and if employee exposures cannot be significantly reduced by administrative means, Malcolm Pirnie must provide employees with appropriate PPE and ensure that it is used properly.

3.1. Non-Hazardous Waste Projects

Project Managers: Project Managers are responsible for providing the project resources necessary to determine the appropriate level of PPE for employees working on their projects. To this end, Project Managers and/or PSOs will conduct a preliminary hazard assessment of the worksite and tasks to be performed and specify the appropriate PPE ensemble for each task and location. The Hazard Assessment Checklist, found in Appendix A, should be used to conduct the preliminary hazard assessment. Based upon the information generated in the assessment, and good safety practices, the Project Manager or the PSO can:

- Evaluate, design or purchase feasible engineering controls to isolate the hazard.
- Develop procedures and work practices to control the hazard.
- Evaluate and specify PPE required for the safe completion of the project.

3.2. Hazardous Waste Projects

For hazardous waste projects, a hazard analysis is conducted when developing a Site Safety Plan (SSP) for field activities. The SSP writer and reviewers evaluate the potential safety and health hazards posed by the project tasks. Then, in the SSP, they specify levels of protection, the specific PPE in each level, and action level ranges that govern the selection of each level.

Any questions regarding hazard evaluations should be addressed to the SBU Health & Safety Leader or to the Manager, Health & Safety, COR.

Qualified Employee: As a practical matter, the Project Manager is likely to delegate the task and hazard evaluation to a junior member of the project team who will often serve as the PSO. Evaluating hazards and selecting appropriate engineering, work practice and PPE control methods for a project is an important responsibility. To promote the effective completion of this task, the Project Manager will delegate this task to an individual who meets certain education and training qualifications. Employees are considered qualified to select PPE if they meet either of these criteria:

- The employee has received formal training in industrial hygiene or safety practices.
- The employee has received training in the selection, use, maintenance and limitations of PPE (e.g., 40-Hour Hazardous Waste Operations, Construction Site Safety training, or PPE Training), is familiar with the site, the tasks to be completed and the known or reasonably anticipated site and task hazards.

Project Safety Officer: The Project Safety Officer (PSO) on hazardous waste projects has the responsibility and authority to see that the provisions of the approved SSP are implemented during site activities. The person selected to be PSO must meet the minimum qualifications above.

At the site, the PSO evaluates air-monitoring data, work tasks and site conditions and then specifies a pre-approved level of protection PPE ensemble to be used by Malcolm Pirnie employees. If site conditions change, the PSO may only upgrade or downgrade the level of protection in accordance with the action levels and PPE ensembles specified in the approved SSP. Modifications to the PPE ensembles, the task evaluations or the action levels as a result of unforeseen circumstances must be approved by the SBU Health & Safety Leader (HSL) and/or the Manager, Health & Safety, COR.

Equipment Coordinators: The office Equipment Coordinator (E.C.) is responsible for procuring and dispensing expendable PPE for that office.

Employees: Employees are responsible for using the PPE in accordance with both the training they receive, and instructions provided. Employees should alert the PSO or team leader if proper PPE has not been assigned, if they have not been trained in the use and limitations of assigned PPE, and if the PPE is damaged, compromised, or does not appear to be working.

4.0 HAZARD ASSESSMENT

Malcolm Pirnie prepares written hazard assessments in order to identify the appropriate PPE ensemble(s) for project work activities. The PPE ensemble(s) for hazardous waste projects are specified in the SSP. A particular ensemble is chosen based upon:

- Proposed work tasks.
- Potential routes of entry and points of contact.
- Airborne contaminant action levels specified in the SSP.

For projects that do not require a SSP, the Preliminary Hazard Assessment form (Appendix A) is used to develop PPE requirements. The written Hazard Assessment form provides the certifier's name, signature, date(s), and identification of assessment documents. Contact the HSL or the Manager, Health & Safety, COR for further assistance.

When new processes are implemented or when existing processes change, the PSO should be notified by the project staff so that the existing Hazard Assessment may be reviewed and updated as necessary.

5.0 PPE SELECTION

On projects defined by OSHA's *Hazardous Waste Operations and Emergency Response* standard (29 CFR 1910.120), and on other projects as determined by the hazard assessment, PPE ensembles (Levels of Protection) are selected based upon:

- The toxic materials, physical agents, or waste contaminants known to be present.
- Contaminant concentrations in the waste media.
- The toxicology and the probable routes of entry into the body exhibited by the contaminants.
- Known or expected airborne contaminant concentrations.
- Potential for exposure to physical agents (e.g., electrical, mechanical, hydraulic, pneumatic, chemical, thermal, nuclear, or non-ionizing radiation energy) based upon the type and strength of the energy source and the proximity of the employee to the source.

Individual articles of a PPE ensemble are chosen by a "qualified employee" (previously defined) to provide the best available protection against known or reasonably anticipated chemical and physical hazards. Multiple articles of PPE may be "layered" to provide multi-contaminant and full protection. The various elements of PPE will only protect a worker if the following conditions are met:

- The individual article of PPE must be effective against the hazard (see Appendix B).
- The individual article of PPE must be sized, fitted, worn and secured correctly.

- The functioning surface of the PPE must be intact and not compromised by holes, rips, tears, or split seams.
- The PPE ensemble (see Appendix C) chosen must be effective against all the hazards in the specific situation.

Non-specific action levels have been developed by the U.S. EPA and others as guidelines for determining respiratory and other PPE requirements when exposure air monitoring is conducted by non-specific response field instrumentation. Specific action levels may be used when a site is well characterized, the type and relative concentrations of air contaminants are well known, and appropriate field instrumentation is used to provide real-time exposure data. Malcolm Pirnie has adopted both sets of action levels. These can be found in Appendix C and in the current Malcolm Pirnie Short Form Site Safety Plan form. Airborne Contaminant Action Levels for Selection of PPE Ensembles is provided in Appendix D.

6.0 PPE USE

Individual articles of a PPE ensemble will be sized to fit the individual wearing it. To provide effective protection during removal and decontamination, PPE will be donned in the reverse order presented in the appropriate decontamination table. Duct tape will be used to seal overlaps between gloves /boots and the protective clothing, and to reinforce weak seams or tighten the waist of the garment. PPE will be cleaned and maintained in accordance with manufacturer specifications.

6.1. Fitting PPE

Proper fit of PPE is critical to providing adequate protection. Proper fit is also associated with comfort and comfort is essential if the employees are to wear the PPE provided. Malcolm Pirnie provides employees with a choice of PPE from several different vendors in a selection of sizes. In training, Malcolm Pirnie discusses and practices proper fitting, use and wear of the PPE.

OSHA believes fit is a critical factor in the overall effectiveness of PPE. PPE that fits poorly will not afford the necessary protection. PPE that is too small will bind and tear; PPE that is too large is harder to manage and can become tangled in equipment presenting additional hazards. Care should be taken to ensure the right size is selected. The user should be fit with the protective device and given instructions on care and use of the PPE. It is very important that employees be made aware of all warning labels for, and limitations of, their PPE.

Adjustment of the PPE should be made on an individual basis, with the goal of achieving a comfortable fit that will maintain the protective device in the proper position. Particular care should be taken in fitting devices for eye protection used against dust and chemical splashes, to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that no helmet will fall off during work operations. When manufacturer's instructions are available, they should be followed carefully.

6.2. Damaged PPE

Compromised PPE will not be worn by Malcolm Pirnie employees. When a PPE wearer or their buddy notices that an article of PPE has been compromised, the two will quickly move to the decontamination/support zone to replace or repair the defective article(s).

6.3. Employee-Owned PPE

Malcolm Pirnie provides all required PPE at no or little cost to its employees. When employees plan to use personally owned PPE, the employee must present it to the PSO for inspection prior to use at the work site. If the PSO finds that the employee-owned PPE is adequate and has been properly maintained, the employee may use their personal PPE.

7.0 IN-USE PPE MONITORING

When wearing PPE at sites, Malcolm Pirnie personnel shall report any perceived problems or difficulties to the PSO. Likely concerns are:

- Perception of odors while wearing APR/SAR.
- Skin, eye, or nasal irritation.
- Unusual residues on PPE.
- Suspected degradation of PPE ensemble.
- Excessive discomfort or fatigue.
- Sudden increases in breathing resistance.
- Personal responses such as rapid pulse, nausea, and chest pain.

Should personnel experience any of these problems while wearing PPE, the PSO will temporarily shut down both Malcolm Pirnie and subcontractors operations on the site and all personnel will move to the support zone until the cause of the problem is identified and corrected.

8.0 PPE INSPECTION

PPE shall be inspected by employees before donning and periodically while in use. Protective clothing should be visually inspected before its use for imperfect seams, uneven coatings, tears, and malfunctioning closures. Gloves should be checked for pinholes by entrapping air in the glove, then rolling the cuff toward the fingers, or by inflating the glove and holding it under water. In either case, no air should escape. If a defect is observed in protective clothing or in gloves, the defective item should not be worn onsite. Clean defective apparel shall be disposed of in the trash. Contaminated defective apparel shall be left on-site in appropriate containers if possible.

During field activities, protective clothing should be periodically inspected by the employee and his/her assigned buddy for rips and punctures. Small rips or punctures observed in

garments may be taped over, or the garment may be exchanged for a new one. Large rips or punctures require exchange.

9.0 PPE DECONTAMINATION

Any site where hazardous waste operations occur must have a written plan that outlines decontamination procedures (see 29 CFR 1910.120 [k]). Employees must be trained on these procedures and the decontamination line must be operational when anyone enters areas on-site where there is suspected contamination.

9.1. The Decontamination Plan

The written decontamination plan addresses:

- The number and placement of decontamination stations.
- Decontamination equipment and methods.
- Methods for disposing of clothing and equipment that may not be completely decontaminated.
- Methods of cleaning decon equipment and disposing of decon wastes.

The decontamination plan shall be based on the assumption that all equipment and personnel leaving the Exclusion Zone ("hot zone") will be grossly contaminated. A personnel decontamination system will be established to wash and rinse (at least once) all reusable PPE worn in contaminated areas. This should be done in combination with a sequential doffing of protective equipment, starting at the first decontamination station with the most heavily contaminated item and progressing to the last decontamination station with the least contaminated article.

The decontamination plan developed should address the following factors:

- ***Type of Contaminant***. The extent of personnel decontamination is a function of the amount of the contaminant, its toxicity and its interaction with the PPE articles.
-

- ***Amount of Contamination***. Gross contamination increases the probability of personal contact or the degradation and permeation. Swipe tests may help determine the type and quantity of surface contaminants, or clear articles for disposal as non-hazardous trash.

- ***Type and Level of PPE***. Clothing variations and different levels of protection may require adding or deleting stations to the decontamination line.

- ***Work Function***. Those who are performing tasks that will not bring them into contact with contaminants may not need to have their garments washed and rinsed while others in the Exclusion Zone, with potential direct contact with the hazardous material, will require a more thorough decontamination.

- ***Location of the Contamination***. Contamination on the upper areas of protective clothing poses a greater risk to workers because volatile compounds may generate a hazardous breathing concentration for both the worker and the decontamination personnel. There is also an increased probability of skin contact when doffing the upper part of the clothing.

9.2. Decontamination Procedures and Equipment

Decontamination activities should be confined to a designed area within the Contamination Reduction Zone, known as the Contamination Reduction Corridor. The Corridor controls access into and out of the Exclusion Zone and confines decontamination activities to a limited area. The size of the Corridor varies depending on the number of stations in the decontamination procedure, overall dimensions of the work control zones, and the amount of space available at the site. On smaller sites or sites with limited contamination potential, the size of the decontamination area and the number of decontamination stations will be severely reduced.

Within the Corridor, distinct areas should be set aside for decontamination of personnel, portable field equipment, discarded clothing, etc. Step-by-step procedures for decontamination of personnel wearing PPE Levels B and C are found in Appendix E at the end of this section.

10.0 PPE DISPOSAL

There are few reference guidelines for disposal of contaminated or used PPE garments. Sites requiring Decontamination Corridors will also be equipped to drum, bag, or otherwise dispose of large volumes of PPE wastes generated by site operations. On smaller sites such as well drilling and sampling, or soils sampling projects, field teams are required to bring an adequate supply of heavy gauge opaque plastic garbage bags to hold disposable PPE garments after use.

Contaminated PPE materials will be left at the work site if this can be done in a **responsible** manner. This activity **must** be negotiated with the client / owner / operator / subcontractor in advance of the fieldwork. If this cannot be done, decontaminate contaminated PPE, conduct a swipe test on a representative sample, and bring it back, in clean plastic bags, to the office. PPE that is used but "clean" or was contaminated but tests "clean" may be disposed of in the office dumpster. PPE, which cannot be decontaminated or is contaminated by materials containing mercury, lead, solvents, petroleum, PCBs or dioxin, will be disposed of as hazardous waste.

11.0 TRAINING

Malcolm Pirnie personnel provided with PPE shall be trained in its use, care, capabilities, and limitations prior to using it in a hazardous work environment. Personnel engaged in hazardous waste operations site activities shall receive the initial 40-hour training, of which PPE instruction is an integral part. Subsequent refresher training will include an annual review in the use, limitations, inspection, and care of PPE. A combined refresher/PPE certificate will be issued documenting this training.

11.1. Initial Training

Initial training is provided to all employees that are required to wear PPE. Employees receive initial training in the proper use and care of PPE prior to wearing the PPE in the work place. This training is most effective when the employee understands the hazards that are present, how the PPE provides protection, and the limitations of the PPE.

At a minimum, the training portion of the PPE program should delineate the user's responsibilities utilizing both classroom and hands-on training when necessary to explain the following:

- When PPE is necessary to be worn.
- What PPE is necessary and the selection criteria used for this determination.
- The operation of the selected PPE, including capabilities and limitations.
- The nature of the hazards and the consequences of not using the PPE.
- The human factors influencing PPE performance.
- Instruction in inspecting, donning, doffing, checking, fitting, and using PPE.
- The user's responsibility for decontamination, cleaning, maintenance and repair of PPE.
- Limitations of the PPE.
- Useful life and disposal of the PPE.
- How to recognize emergencies.
- Emergency procedures and self-rescue in the event of PPE failure.
- The buddy system.
-

- Emergency action planning, and the user's responsibilities and duties in an emergency.

Employees are required to demonstrate their understanding in each of the subject areas listed above. Special emphasis should be placed on proper wear, fit, and limitations of the PPE. If the employee cannot demonstrate a full understanding of the material provided in the training, that employee shall be retrained and must exhibit complete understanding of the material presented before they are allowed to wear the PPE in the work place.

11.2. Additional Training

Refresher training is provided when an employee cannot demonstrate a good understanding of the five required OSHA training topics (see above). Employees that are observed using PPE improperly are retrained.

Additional training is provided whenever processes change and new hazards require the use of additional or different PPE.

Staff provided with ancillary PPE (e.g., safety belts, floatation gear) should be trained in its use and care by the PSO before actual use onsite.

Staff requesting PPE who are not in the hazardous waste Health and Safety Training Program and have not received PPE training should be trained in the use and care of the PPE by their PSO before actual use onsite. The PSO will provide the Administrator, Health and Safety, WHI, with an attendance list and a brief summary of the training material covered to document the training and to issue certificates.

Since PPE use often causes discomfort and inconvenience, there is a natural resistance toward wearing it conscientiously. The major thrust of training must be to make the user aware of the need for PPE and to instill the motivation to properly wear and maintain the necessary PPE.

12.0 RECORDKEEPING

PPE training should be documented in the site health and safety logbook. The Manager, Health and Safety, COR, will maintain a copy of all corporate PPE training records. A summary record will be maintained by Health and Safety, COR, in the PeopleSoft database, and will be updated according to the schedule established in the Health and Safety Training section of this manual.

The training records maintained in the local office file will include the following information:

- The dates of the training sessions.
- The contents or a summary of the training sessions.
- The names and qualifications of persons conducting the training.
- The names and job titles of persons attending the training sessions.

Training records shall be maintained for three years from the date on which the training occurred. Upon request, employees will have access to any of his/her training records maintained by the local office, the Manager, Health and Safety, COR.

APPENDIX A

PRELIMINARY HAZARD ASSESSMENT CHECKLIST

MALCOLM PIRNIE

PERSONAL PROTECTIVE EQUIPMENT

PART A
TASK(S)
WORK AREA(S)

PART B	
HEAD PROTECTION	
Hazards/Operations	*PPE/Options*
☐ **Construction**	☐ **Hard Hat**
☐ **Cold Weather**	**ANSI Z89.1-1986**
☐ **Confined Space**	**Class A and B**
☐ **Electrical**	☐ **Chin Strap**
☐ **Frequent Bending or Leaning**	☐ **Liner**
☐ **Heavy Equipment**	☐ **Hood**
☐ **Hot Weather**	☐ **Protective Hair Covering**
☐ **Low Ceilings/Piping**	☐ **Bump Cap**
☐ **Moving Machinery**	
☐ **Overhead Activity**	
PROTECTIVE BODY CLOTHING	
Hazards/Operations	*PPE/Options*
☐ **Chemical Transfer**	☐ **Fully Encapsulating Suit**
☐ **Cold Weather**	☐ **Non-Encapsulating Suit**
☐ **Confined Space**	☐ **Aprons, Leggings, and Sleeve Protectors**
☐ **Dirty Area**	☐ **Anti-Radiation Suit**
☐ **Fire Potential**	☐ **Flotation Gear**
☐ **Hot Weather**	☐ **Cooling Garment**
☐ **Laboratory**	☐ **Tyvek**
☐ **Sampling**	☐ **Warm Weather Clothing (Carhartt's, etc.)**
☐ **Wet Area**	☐ **Rain Gear**
EYE PROTECTION	
Hazards/Operations	*PPE/Options*
☐ **Acids/Caustics**	☐ **Safety Glasses with Side Shields**
☐ **Chemical Splashes**	☐ **Goggles**
☐ **Chemical Transfer**	☐ **Face Shields**
☐ **Confined Space**	☐ **Optical Inserts for Full Face Respirators**
☐ **Construction**	
☐ **Flying Particles**	
☐ **Gases and Vapors**	
☐ **Light (UV, Laser)**	

MALCOLM PIRNIE

PERSONAL PROTECTIVE EQUIPMENT

☐ Liquid Chemicals	
☐ Liquid Sampling	
☐ Molten Metal	
☐ Scraping	
☐ Waste Water/Sludge	
☐ Wire Wheel/Chipping	

HAND PROTECTION

Hazards/Operations	*PPE/Options*
☐ Acids/Caustics	☐ Gloves to Match Hazard(s)
☐ Chemical Transfer	☐ Inner linings
☐ Confined Space	☐ Mittens
☐ Cold Weather	☐ A combination of gloves, liners and mittens may be best
☐ Construction	
☐ Cutting Snips	
☐ Hammering	
☐ Hazardous Waste	
☐ Hot Surfaces	
☐ Laboratory	
☐ Liquid Chemicals	
☐ Pinch Points	
☐ Rough or Sharp Objects	
☐ Sample Handling	
☐ Sampling	
☐ Shoveling	
☐ Waste Water/Sludge	

FOOT PROTECTION

Hazards/Operations	*PPE/Options*
☐ Biological Decay	☐ Work Shoes
☐ Broken Ground	☐ Safety Shoes
☐ Confined Space	☐ Overboots
☐ Cold Weather	☐ Waders
☐ Construction	☐ Hip Boots
☐ Demolition	☐ A combination of foot protectors may be best
☐ Dirty Area	
☐ Drum Movement	
☐ Electrical Hazards	
☐ Falling or Rolling Objects	
☐ Heavy Equipment	
☐ Inclement Weather	
☐ Laboratory	
☐ Moving Machinery	
☐ Shallow Water (to 2 Feet)	
☐ Shallow Water (to 4 Feet)	
☐ Waste Water/Sludge	
☐ Wet Soil	
☐ Uneven Ground	

FALL PROTECTION

Hazards/Operations	*PPE/Options*
☐ Confined Space	☐ Full Body Harness w/Shock-absorbing Lanyard

MALCOLM PIRNIE

PERSONAL PROTECTIVE EQUIPMENT

☐ **Floor Openings (Above 6')**	☐ **Retractable Life Line**
☐ **Ladders (Above 28')**	☐ **Safety Line and Rope Grab**
☐ **Platforms (Above 6')**	
☐ **Roofs**	
☐ **Scaffolds**	
RESPIRATORY PROTECTION	
Potential Hazards/Operations	*PPE/Options*
☐ **Acids/Caustics**	☐ **Half Face Air Purifying Respirator**
☐ **Chemical Transfer**	☐ **Full Face Air Purifying Respirator**
☐ **Confined Space**	☐ **Self Contained Breathing Apparatus (SCBA)**
☐ **Dusts and Mists**	
☐ **Gases and Vapors**	
☐ **Hazardous Waste**	
☐ **Laboratory**	
☐ **Liquid Chemicals**	
☐ **Sample Handling**	
☐ **Sampling**	
☐ **Waste Water/Sludge**	

<u>Respiratory Protection Addendum--Partial List of Available Cartridges</u>:

Multi-Gas/Vapor Super Cartridge P100 Filter Cartridge
Organic Vapors Cartridge Multi-Gas/Vapor Super Cartridge/P100 Filter
Cartridge
Organic Vapors/Acid Gases Cartridge Acid Gases Cartridge/P100 Filter Cartridge
Acid Gases Cartridge Organic Vapors Cartridge/Acid Gases
Cartridge/P100 Filter Cartridge Ammonia/Methylamine Cartridge
Formaldehyde Cartridge Ammonia/Methylamine Cartridge/P100 Filter
Cartridge
Organic Vapors Cartridge/P100 Filter Cartridge N95 Filter/Prefilter

<u>Hearing Protection Addendum--Available Hearing Protection</u>

Ear Plugs, Many Types and Styles
Ear Muffs
Combination of Ear Muffs and Plugs

Evaluator: ______________________________ **Date:** ________________

Department Head: __________________________ **Date:** ________________

APPENDIX B

PPE SPECIFICATIONS, CAPABILITIES AND LIMITATIONS

- Introduction
- Protective Clothing
- Types of Protective Clothing
- Head Protection
- Eye and Face Protection
- Hearing Protection
- Hand Protection
- Foot Protection
- Ancillary PPE
- Reference

PPE SPECIFICATIONS, CAPABILITIES AND LIMITATIONS

1) INTRODUCTION

This appendix provides information on the technical specifications, capabilities and limitations of various types of PPE typically used by Malcolm Pirnie employees. This information is by no means exhaustive and may become rapidly dated by new research findings and product development. If you have any questions regarding the applicability of a particular piece of PPE, contact your SBU Health and Safety Leader or the Manager, Health and Safety, COR.

2) PROTECTIVE CLOTHING

Protective clothing is a type of PPE that provides protection against dermal contact with dirt, hazardous chemicals or waste. Protective clothing is made of various fabrics and fabric treatments, which impart the desired physical and chemical resistive properties. Protective clothing may be limited-use or repetitive use and is usually worn over street clothes, underwear, or bathing suits.

Protective clothing has two critical components: the fabric and the tailoring. The fabric imparts the physical and chemical properties of the garment. Fabric manufacturers conduct tests using American Society of Testing Materials (ASTM), American National Standards Institute (ANSI), and National Fire Protection Association (NFPA) protocols to determine and rate the protective characteristics of their products.

Protective fabrics are sold to safety clothing manufacturers who produce the final garment. The manufacturer's design or manufacturing (tailoring) processes may make superior protective clothing; or garments entirely unsuitable for their intended use. Common failure points are the seams, stitching and the zippers. Chemicals, which may not be able to permeate through the fabric, may easily pass through split seams, stitch holes or zipper teeth. Seams should be sewn, heat-sealed or taped.

a) Selection Criteria

Protective clothing shall be selected to protect employees from occupational hazards while considering the hazards presented by the garments themselves. When selecting protective clothing;

- Consider the hazardous chemicals present, the task(s) to be performed, and the ambient site conditions.
- Match the physical and chemical resistance characteristics of the garment against the requirements and limitations of the site and task-specific conditions.

- Choose the garment with the widest range of protection for a site that has a variety of chemical hazards.

Multiple layers of protection may be needed when more than one contaminant is present or when the hazards are unknown. Disposable boots, gloves, and splash suits are used to provide an extra layer of protection.

Evaluate the physical performance characteristics of each garment under consideration. These performance characteristics may increase the hazards associated with using the garment. The cost of certain types of protective clothing and the affect of the clothing on employee productivity are secondary but valid concerns.

b) Performance Characteristics

Heat Transfer - A garment with a low rate of heat transfer increases heat stress of the person wearing it.

Durability - is the degree to which the protective clothing resists tears, punctures, abrasions, and repeated decontamination.

Flexibility - The garment should be flexible to allow mobility.

Temperature effects - The garment should be able to maintain its protective integrity and flexibility in the temperature ranges expected at the work site.

Decontamination - If reusable protective clothing cannot be decontaminated easily, use a disposable garment with the same resistive properties.

Compatibility - The selected garment should not make it difficult or impossible to use other required protective equipment (e.g., a hard hat).

Lifetime - Lifetime is determined by the length of time a reusable garment can resist aging, especially under severe conditions.

Protective clothing comes in various sizes. The larger sizes (large, XL or XXL) are preferable during cold weather because they allow the garment to be worn over layered winter clothing. Pay particular attention to project team members who have special sizing requirements.

While protective clothing is useful to protect personal clothing from becoming soiled, there may be hazards involved in using protective garments. Therefore, using unnecessary PPE is discouraged.

The project or task evaluation in Appendix A, EPA's *Guidelines for the Selection of Chemical Protective Clothing* (Ref. 1), the *Quick Selection Guide to Chemical Protective Clothing* (Ref. 2), are useful in selecting appropriate protective clothing.

3) TYPES OF PROTECTIVE CLOTHING

a) Repetitive-Use Rainwear / Splash Protection

Rainwear garments are used alone or in combination with chemical protective clothing to prevent exposure to inclement weather and incidental mud or chemical splashes. When choosing these garments consider:

- Whether the garment will be subject to limited use or continuous exposure.
- What will be the specific physical or chemical hazards?
- What are the flexibility and thermal requirements?

b) Available Materials:

Vinyl - extremely lightweight PVC material that offers a reasonable initial barrier to liquid penetration. Good flexibility through changing temperatures. Best for short-term use with water-based liquids, mild acids, solvents, oils and salts.

PVC-Coated Fabrics - a broad class of synthetic thermoplastic polymers that protects against many liquids and chemicals. The degree of protection varies depending upon the specific formulation and the thickness of the coating. Resists salts, alkalies, oils, ketones, aldehydes, alcohols, some acids and organic esters.

Rubber-Coated Fabrics - A very flexible heavy fabric for heavy-duty use in extreme cold or heat. Abrasion and tear resistant and offers general protection against solvents and chemicals.

Neoprene-Coated Fabrics - A very flexible heavy fabric for heavy-duty use in extreme cold or heat. Abrasion and tear resistant and offers general protection against acids, hydrocarbons and oils.

Nitrile-Coated Fabrics - Thin-gauge material resistant to cuts and punctures. Resistant to grease, acids and solvents.

Polyurethane-Coated Fabrics - Light weight and sheds liquids easily. Breath ability depends upon thickness of coating and material additives. Good abrasion resistance. General protection against many liquids.

c) Laboratory Wear

Lab coats or splash aprons are required when using chemicals in a laboratory setting. Lab coats will be of cotton or cotton/polyester blend, have long sleeves and extend to the knee. Standard lab coats are not especially fire resistive nor do they provide protection against chemical splashes. Care should be exercised near open flames or hot surfaces. Splash aprons and over-sleeves made of the appropriate material (see Rainwear/Splash Protection) should be used in laboratory situations where chemical, sample or waste splashing is likely.

d) Limited-Use General Protection Clothing

Economical choice for protection against limited hazards such as lead and asbestos dusts, radionuclides, light chemical splashes and biohazards. When choosing these garments consider:

- Whether the garment will be stand up to the rigors of the work environment.
- The degree of protection offered by the garment against the contaminants (and concentrations) present.
- What are the flexibility and thermal requirements?

e) Available Materials

Tyvek - registered trademark of the E.I. DuPont Company. Tyvek is a spun-bonded olefin fiber, which delivers high tear resistance and a high level of protection against particulate materials. Available in a variety of styles and colors.

Kleenguard - registered trademark of the Kimberly-Clark Corporation. Kleenguard is a non-woven polypropylene fabric, usually layered, which effectively repels most non-hazardous liquids, oils and greases and but allows air to pass through reduce the potential for heat stress. Available in a variety of styles and colors.

f) Limited-Use Chemical Protective Clothing

Chemical Protective Clothing (CPC) is used prevent exposure to chemical contact or splashes. For protection from significant chemical or vapor hazards, choose garments that prevent hazardous liquid breakthrough for at least 240 minutes and prevent hazardous vapor breakthrough for at least 1440 minutes as tested by the ASTM F739 protocol. When choosing these garments consider:

4) HEAD PROTECTION

Head protection shall be worn when working in areas where there is danger of head injury from impacts, falling and flying objects, electrical shock and burns, and contact with hazardous chemicals.

Hard hats shall be worn on all construction sites, in the immediate vicinity of drilling operations, in industrial facilities where there are overhead activities, during confined space entry tasks, and in posted hardhat areas. Hardhat suspensions must always be in place, properly adjusted and free from defects. The hard hat selected shall be compatible with any other type of PPE in use including suits, respirators, face shields, and hearing protection.

a) Available Equipment

Hard Hats - hard hats that comply with ANSI Z89.1-1986, Class A and B, and are SEI certified, provide appropriate head protection from overhead impact and electrical hazards. Bump caps are not acceptable. Employees shall not deface, drill holes, or other wise tamper with hard hats in any way that might compromise their effectiveness.

Chin Straps - employees shall use chin straps when tasks involve strenuous bending, downward movements or in any circumstance, for instance, confined space entry, that may result in the hard hat falling off the employee's head.

– Liners - Hardhat liners can be worn inside the hard hat to provide thermal protection during cold weather.

Hoods - hoods can be worn with hard hats, and are usually attached to a whole-body CPC. Hoods protect the head and neck from hazardous chemicals. Hoods can be used to protect the hair when wearing respirators.

Visitor's Hardhats - project offices and trailers should be equipped with an adequate number of spare hard hats for the use of visitors to the project site.

b) Inspection and Maintenance

Hardhats and suspensions systems will be inspected before each use. Cracking, signs of excessive wear, or frayed webbing is cause for replacement. Contact your Equipment Coordinator for parts or hardhat replacement.

2) EYE AND FACE PROTECTION

Appropriate eye and face protection shall be worn by employee when exposed to hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

Employees shall use eye protection that provides side protection when there is a hazard from flying objects.

Employees who wear prescription lenses while engaged in operations involving eye hazards shall wear eye protection that incorporates the prescription in its design, or shall wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

Contact lens shall not be worn in the presence of particulate, chemical, or gaseous eye hazards.

Employees working near sources of injurious light radiation including welding arc, cutting flame, class III and IV lasers, etc., shall use equipment with filter lenses that have a shade number that will protect the eyes from injury.

a) Available Equipment

Safety Glasses with Side Shields - safety glasses with full side shields (prescription to 20/40 vision if required) complying with ANSI Z87.1-1989 shall be worn during drilling operations, and when working near impact tools or equipment. The glasses protect the eyes from large particles

Goggles - goggles complying with ANSI Z87.1-1989 are available in two types: chemical-splash (indirectly vented) and non-vented. Both are available with polycarbonate lenses to protect the eyes from impact injury, chemical splashes, large particles, and projectiles. Non-vented goggles provide additional protection against vapors and gases. Goggles may be worn over prescription eyeglasses.

Face shields - face shields complying with ANSI Z87.1-1989 and at least 8" long protect the face and neck from chemical splashes but do not protect against projectiles. Face shields provide only limited eye protection. Goggles or safety glasses should be worn in conjunction with face shields. Face shields that attach directly to the hard hat are sealed to prevent overhead splashes from running down the inside of the face shield.

Full-face Respirators - because the lens of the full-face respirator is constructed of polycarbonate material meeting the impact resistance standards specified in 30 CFR 11, additional eye and face protection is not required when wearing a full-face respirator.

Optical Inserts - spectacle kits are provided by Malcolm Pirnie to users of full-face respiratory protection who wear corrective eye wear. Each eligible employee may take a spectacle kit to his or her personal eyewear provider to have prescription lens ground and fitted to the kit. The inserts should correct visual acuity to at least 20/40. Reasonable costs, excluding eye exams, are reimbursable as an group Health & Safety expense (Chart of Accounts 7931). The cost of associated eye examinations can be covered by VSP with any balance submitted for reimbursement from your Flexible Spending Account (Medical).

b) Visitor's Safety Glasses

Project offices and trailers should be equipped with an adequate number of spare safety glasses and goggles for the use of visitors to the project site.

3) HEARING PROTECTION

Hearing protection shall be worn by employees who are exposed to noise levels in excess of those defined in OSHA standard 29 CFR 1910.95. See the Section on Hearing Conservation for additional information.

Two basic types of hearing protectors are available: ear plugs and earmuffs. The use of earplugs shall be considered with caution because earplugs can introduce chemical contaminants into the ear. The selection of hearing protectors shall be based on the attenuation requirements of 29 CFR 1910.95, and on the comfort of the wearer. Employees may require hearing protection when working near drilling and heavy equipment operations, high impact tools, or when working in the vicinity of generators, air compressors or other noisy machinery. Earmuffs are not a stock item since they need to be sized to the individual.

4) HAND PROTECTION

Employees shall use appropriate hand protection when exposed to hazards such as those from skin absorption of harmful substances; severe cuts and lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes.

A qualified employee shall select gloves designed to provide protection against specific chemicals and physical demands of the site. Use flexibility, resistance to tearing and puncturing, and resistance to specific chemicals as criteria for selection.

If roughened-surface, chemical-resistant gloves are not available wear heavy leather gloves or disposable studded cotton gloves over chemical-resistant gloves to provide better gripping during manual labor.

Combinations or layers of chemical-resistant gloves are used to protect against multiple chemical contaminants. For example, a mixture of acids, caustics, and aromatic hydrocarbons may require the use of outer neoprene gloves for protection against acids and caustics, and inner PVA gloves for protection against the aromatics.

Disposable latex or vinyl (surgical) gloves are a general-purpose disposable inner glove and are routinely discarded after each use. Permeation-resistant outer gloves such as Viton and butyl rubber are selected based on the chemicals involved. Neoprene is a general-purpose outer glove. Cotton liners are used inside chemical-resistant gloves to provide warmth during cold weather, or to absorb sweat during summer.

The qualified employee shall consider the glove's thickness and cuff length. Thick gloves with long cuffs (gauntlet type) provide more protection than thin, short gloves. However, the material should not be so thick that it interferes with the dexterity required by the task.

a) Available Materials

Natural Rubber (Polyisoprene). Resists degradation by alcohols and caustics. Not recommended for organics.

Butyl Rubber (Synthetic Rubber). Resists degradation by many contaminants including ketones and esters. Especially resistant to permeation by gases and water vapors. Not recommended for halogenated hydrocarbons and petroleum compounds.

Polyvinyl Alcohol (PVA). Resists degradation and permeation by aromatic and chlorinated hydrocarbons and petroleum compounds. Not recommended for water-based solutions, acids, bases, ethers and esters.

Neoprene (Chloroprene). Resists degradation by caustics acids, alcohols, and oils. Not recommended for halogenated and aromatic hydrocarbons, PCBs and ketones.

Nitrile (Acrylonitrile Polymers / Butadiene). Resists degradation by petroleum compounds, gasoline, alcohols, acids, caustics, and peroxides. Not recommended for aromatic or halogenated hydrocarbons, amines, ketones, and esters. Can be used for some chlorinated compounds.

Viton. Resists degradation and permeation by aromatic and chlorinated hydrocarbons and petroleum compounds, oxidizers, acids, and water-based solutions. Not recommended for aldehydes, esters, ketones, amines, and acetone.

Latex Surgical Vinyl (disposable). Poor chemical resistance. Not recommended as an outer glove. This type of glove rips and tears easily. Remember to remove large rings or rings with protrusions or sharp points to prevent tearing. Use only when dexterity and flexibility are needed in non-hazardous chemical situations.

Silver Shield. Resists degradation and permeation by aromatic and chlorinated hydrocarbons and petroleum compounds, oxidizers, acids, and most water-based solutions. Not recommended for amides.

5) FOOT PROTECTION

Footwear worn at field sites shall comply with the ANSI Z41-1991 and shall be chemically resistant. Proper footwear protects the foot from crushing, puncture, electrical, and chemical hazards.

a) Available Materials

Leather safety boots with steel toe and shank - resists punctures and crushing. Employees are responsible for purchasing their own boots and this expense may be reimbursed up to $120.00 per year with their manager's approval. These boots are generally not chemical or water-resistant without the use of disposable latex/butyl/"Tyvek" boot covers or neoprene overboots.

Overboots - made of PVC, latex, butyl, natural rubber, polyethylene, neoprene or vinyl provide protection from a wide range of chemicals. Some overboots have an integrated steel toe and puncture resistant insert.

Waders - waders are one-piece waterproof garments with boots and coveralls that protect the lower body (up to the hip/chest) from water immersion. Employees sampling water from ponds, streams or sewers at locations that are no more than waist deep are to wear waders.

Hip boots - are useful for water sampling or sewer inspections when the water level is below the thighs. Hip boots are less expensive and provide more mobility than chest-high waders.

6) ANCILLARY PPE

Ancillary PPE is used for protection against specific health and safety hazards.

a) Available Equipment

Belts, Harnesses, Lanyards and Lifelines - body harnesses, lanyards, and lifelines are used to prevent falls from elevated areas or into water, and to make possible the emergency retrieval of employees who have entered confined spaces. Fall protection belts are no longer allowable. Employees working on or moving across unguarded platforms or catwalks at elevations **greater than 6 feet** are required to tie off to some type of effective fall protection.

Safety belts used at sites shall comply with 29 CFR 1926.104 and also shall be constructed of spark-free hardware and chemical- resistant materials. Lifelines and fall protection devices must use double-action snap hooks. Safety restraints are selected on the basis of applicability to the task(s) for which they will be used.

Cooling Vests - cooling vests are used to remove excess heat generated by worker activity, protective clothing, or extremely hot environments. The most commonly used units resemble vests with cold pack pockets, and are used when personnel are wearing level B or C protection in warm weather, usually above 80^{o}F. To use the vests, ice-making equipment and cold pack storage must be available on-site. The availability of this equipment must be addressed in planning for the work.

Other cooling devices use forced air or circulation of a refrigerant through caps and vests. Maintenance problems and the increased weight (up to 25 pounds) borne by workers shall be evaluated when selecting these units.

Floatation Gear - floatation gear such as life jackets, work vests and cold water survival suites that meet United States Coast Guard (USGS) standards (46 CFR Part 160) shall be worn when working in or on surface waters e.g., ponds, lagoons, and streams, at chest high depths (four feet) or greater. Floatation gear is commonly worn over protective clothing. Floatation vests add bulk to the wearer and may restrict mobility. Floatation vests may be difficult to decontaminate.

Reflectorized Vests - reflectorized vests are to be worn be all employees when working near vehicular traffic and in situations where visibility is essential.

Tool Pouches and Belts - equipment pouches and belts may be worn by site personnel who use portable equipment and tools during field activities. Pouches and belts are worn around the waist, outside of the protective clothing.

Infection Control Kits - an infection control kit (ICK KIT) shall be available in each office, field office, field trailer, and field vehicle for use in the event of an injury resulting in contact with blood or other bodily fluids.

Protective Leggings - leggings are worn to protect against snakebites or other hazards to the lower extremities.

7) REFERENCES

- *EPA. Guidelines for the Selection of Chemical Protective Clothing. -1987.*
- *Forsberg, K. and S.Z. Mansdorf. Quick Selection Guide to Chemical Protective Clothing. Van Nostrum Reinhold, New York, 1989.*

APPENDIX C

PPE ENSEMBLES FOR HAZARDOUS WASTE OPERATIONS

Levels of Protection for Levels A - D

1) ENSEMBLES FOR HAZARDOUS WASTE OPERATIONS

Various types of personal protective clothing, respirators, and ancillary protective equipment are combined into ensembles that provide a sufficient level of protection from site-specific hazards. Using excessive levels of PPE is discouraged.

Four distinct levels -- A, B, C, and D -- have been defined by EPA, each providing protection against varying degrees of respiratory, dermal, and safety hazards. A specific level of protection shall be selected based on:

- The type, concentration, and toxicity of airborne contaminants.
- The potential for personal exposures, liquid splashes, or direct contact with hazardous materials in relation to site tasks /activities.

The main factor in selecting a level of protection is the magnitude of the respiratory and dermal hazards present or potentially present on- site. Levels A and B specify the same respiratory protection (self- contained or air-line breathing apparatus), but Level A includes specific dermal protection (fully encapsulating suit). Levels B and C generally specify the same dermal protection (chemical-resistant coveralls or partially encapsulating suit) but Level B includes a higher degree of respiratory protection. Level D, essentially an ordinary work uniform ensemble, is used only when there is minimal potential for exposure to hazardous materials or waste on-site.

Each standard level of protection may be modified in the Site Safety Plan (SSP) to account for varying degrees of respiratory and dermal hazard. For instance, a Level C ensemble may be modified for a task involving surface soil sampling for a semi-volatile compound in wet conditions by making the use of the respirator contingent upon air monitoring results but mandating full body protective clothing for dermal exposure control.

The SSP specifies the level of protection required for various site tasks and work zones. Upgrades or downgrades of protective levels are based on the action levels specified in the air-monitoring procedures of the SSP. An increase or decrease in the potential for exposure to hazardous materials necessitating a level of protection not specified in the SSP requires a written amendment to the SSP approved by the Project Safety Officer (PSO), the SBU Health and Safety Leader, and/or the Manager, Health and Safety, COR.

The four levels of protection that may be used by Malcolm Pirnie personnel are described below. Selection criteria are presented for general guidance only: protection shall be tailored to the site-specific contaminants and conditions.

a) Level A Protection

Level A shall be selected when the highest level of respiratory, skin, and eye protection is required due to the presence in the air of high concentrations of hazardous materials, or the presence of contaminants highly toxic to the skin. Level A is also used when the hazards are unknown, inadequately defined, or when Level B protection is not adequate. Level A protection is extremely cumbersome and may be life- threatening due to heat stress. Level A is generally appropriate in emergency response and rescue circumstances not normally performed by Malcolm Pirnie personnel. For example, workers would use Level A protection when entering a confined area to repair a leaking chlorine gas valve.

Selection Criteria - Use Level A when:

- Hazardous materials have been identified on-site that require the highest level of respiratory, skin, and eye protection based on measured (or potentially) high concentrations of hazardous vapors, gases, or particulate atmospheres that are greater than levels determined to be "immediately dangerous to life or health" (IDLH).
- Site operations or tasks present a high potential for splashing of, contact with, or airborne exposure to substances highly toxic by skin absorption.
- Site operations or tasks to be conducted in confined or poorly ventilated areas where there is potential for encountering highly toxic substances.

Personal Protective Equipment at Level A consists of:

- Pressure-demand, full-face, self-contained breathing apparatus (SCBA) or a pressure-demand, supplied-air respirator / SCBA combination i.e., a dual-purpose breathing apparatus (DPBA).
- Fully encapsulating suit with intrinsic gloves, booties, and polycarbonate lens.
- Inner chemical-resistant gloves (latex or vinyl surgical type).
- Overboots of appropriate chemical - resistant materials with steel toe and shank. (The boots are worn over the intrinsic booties of the rubber suit, and the boots themselves may be covered by disposable booties.)

Additional Equipment that may be required for a Level A entry:

- Cooling vest/jacket
- Disposable chemical-resistant booties (latex/butyl)
- Coveralls
- Cotton long underwear
- Hard hat
- Hearing Protection
- Two-way radio communications (rated intrinsically safe)

b) Level B Protection

Level B shall be selected when the highest level of respiratory protection is required but a degree of dermal protection lower than that afforded by Level A is acceptable. The specific type of dermal protection may vary from site to site. A good quality, chemical-resistant, one-piece garment with taped wrists, ankles, and hood often provides adequate dermal protection for splash or contact hazards on-site.

Level B is generally used in situations where respiratory hazards are difficult to evaluate. Level B protection is cumbersome and may cause heat stress. Level B protection shall be the minimum used during initial response or reconnaissance except when the respiratory hazard has been evaluated and it is determined that a lower level of respiratory protection is acceptable.

Selection Criteria: Use Level B when:

- The type and concentration of airborne contaminants have been identified as those requiring a high level of respiratory protection, but a lower level of skin protection, for example, when specific airborne substances, present in IDLH concentrations, do not present a severe skin contact/absorption hazard. Also when atmospheres do not meet the criteria that would permit use of air-purifying respirators.
- Atmospheres contain less than 19.5 percent oxygen.
- Site activities generate high concentrations of substances highly toxic by skin absorption but skin contact with toxic substances is not likely.
- When the air contaminants of concern do not have adequate warning properties of breakthrough or there are no approved filter cartridges for Level C respiratory protection.
- When significant time will be spent in areas with contaminant concentrations at or above occupational exposure limits.

Personal Protective Equipment at Level B consists of:

- Pressure-demand, full-face SCBA or DPBA.
- Chemical-resistant clothing, including disposable "Tyvek" coveralls, with or without various coatings. Also, butyl rubber aprons, or neoprene, acid-resistant, full body coveralls.
- Inner chemical-resistant gloves (latex or vinyl surgical type.)
- Outer chemical-resistant gloves (butyl, neoprene, Viton, or other appropriate material.)
- Neoprene rubber boots with steel toe and shank.
- Emergency escape bottle with 5 - 15-minute air supply.

Additional Equipment that may be required for a Level B entry:

- Cotton coveralls worn beneath CPC.
- Cotton long underwear.
- Disposable chemical-resistant booties (latex/butyl).
- Hard hat

- Hearing protection
- Two-way radio communications
- Cooling vest/jacket.

c) Level C Protection

Level C protection is composed of dermal protection and an air- purifying respirator (APR). Level C shall be used only when the types and concentrations of airborne substances are known, when the criteria for using APRs are met, and when skin exposure is unlikely.

Use of this level is limited by the restrictions placed on the use of APRs in 29 CFR 1910.134 and ANSI Z88.2-1992. Air contaminants shall be measured and compared to action levels specified in the SSP. Level C may be sufficiently cumbersome to cause heat stress.

Selection Criteria: Use Level C when:

- The type and concentration of airborne contaminants are known, an approved respirator cartridge/canister is available that will remove the contaminants, and the following criteria for use of APRs are met:
- Oxygen content is equal to or greater than 19.5 percent.
- Concentrations do not exceed the NIOSH-approved use levels for the respirator and cartridge/canister.
- Contaminants have obvious warning properties (e.g., contaminant can be detected by odor, taste, or irritation at concentrations below its exposure limit).
- Atmospheres are not IDLH.
- Airborne contaminants are known and will be monitored throughout site activities.

Site activities will not generate high airborne concentrations or liquid splashes or other means of contact with substances highly toxic to the skin.

Personal Protective Equipment at Level C consists of:

- Full-face APR or full-face powered APR with cart ridge/canister appropriate for the airborne contaminant present.
- Chemical-resistant clothing (same alternatives as for Level B, determined by site).
- Inner chemical-resistant gloves (latex or vinyl surgical type).
- Outer chemical-resistant gloves (butyl, neoprene, Viton, or other appropriate material).
- Work boot with neoprene rubber sole, and steel toe and shank.

Additional Equipment that may be required for a Level C entry:

- Coveralls.
- Disposable chemical-resistant latex or butyl booties.
- Cotton long underwear.
- Hardhat.
- Hearing protection.
- Two-way radio communications.

d) Level D Protection

A work uniform providing minimal protection constitutes Level D protection. Level D shall not be used in a hazardous atmosphere or environment. Level D will be used only when there is no indication of a hazardous atmosphere, and the work tasks preclude splashes, immersion, or other bodily contact with hazardous substances.

In situations where the possibility of a hazardous atmosphere exists, Level D is permissible when prescribed by the SSP as long as monitoring indicates the continued absence of a hazardous atmosphere. When hazardous atmospheres are detected, workers in Level D shall upgrade their protection in accordance with instructions in the SSP.

Selection Criteria: Use Level D on:

- Sites where the SSP writer and reviewer have made a reasonable determination that exposure to hazardous materials is unlikely.
- Sites where there is limited potential for exposure to hazardous materials, but procedures for monitoring onsite air and upgrading the protection level or evacuating the site have been established, and are being followed.

Personal Protective Equipment at Level D consists of:

- Coveralls (cotton or "Tyvek").
- Work boots with steel toe and shank.
- Safety glasses with side shields.

Additional Equipment that may be required for a Level D entry:

- Inner and outer gloves.
- Hardhat.
- Hearing protection.
- Emergency escape respirator (readily available onsite.)
- Air-purifying respirator (readily available onsite.)
- Aprons, boot covers.

APPENDIX D

AIRBORNE CONTAMINANT ACTION LEVELS FOR SELECTION OF PPE ENSEMBLES

Appendix D Airborne Contaminant Action Levels for Selection of PPE Ensembles

Action Levels

	Uncharacterized Airborne Vapors or Gases	Characterized Gases, Vapors, Particulates**
Level D	Background*	Up to 50% of PEL, REL or TLV
Level C	Up to 5 ppm above background	Up to 25 times PEL, REL or TLV
Level B	5 ppm to 500 ppm above background	UP to 500 times PEL, REL or TLV
Level A	500 ppm to 1000 ppm above background	Up to 1000 times PEL, REL or TLV
	* Off-site "clean" air measurement.	** Use mixture calculations (% allowed = ΣC_n PEL_n) if more than one contaminant is present

Oxygen Deficiency

Concentration	Action Taken
< 19.5% O_2	Leave area. Reenter only with supplied-air respirators.
19.5% to 23.5% O_2	Work may continue. Investigate changes from 21%.
> 23.5% O_2	Work must stop. Ventilate area before returning.

Flammability

Concentration	Action Taken
< 10% of LEL	Work may continue. Consider toxicity potential.
> 10% LEL	Work must stop. Ventilate area before returning.

Radiation

Intensity	Action Taken
< 0.5 mR/hr	Work may continue.
< 1 mR/hr	Work may continue. Continue to Monitor. Notify Corporate Health and Safety and Corporate Health Physicist.
5 mR/hr	Radiation work zone. Work must stop.

APPENDIX E

MINIMUM AND MAXIMUM DECONTAMINATION STATIONS AND EQUIPMENT FOR PPE ENSEMBLE LEVELS B AND C

E-1 ***MAXIMUM*** DECONTAMINATION PROCEDURES FOR ***LEVEL B***

Equipment Worn

This decontamination procedure outlined is the **maximum** number of decontamination stations necessary for Malcolm Pirnie workers wearing the following protective clothing and equipment:

- one-piece, hooded chemical-resistant splash suit
- SCBA
- hard hat
- chemical-resistant boots with steel toe and shank
- boot covers
- inner and outer gloves
- taped joints between gloves, boots, and suit

DECONTAMINATION PROCEDURES

Station 1: Segregated Equipment Dump

Deposit equipment used on the site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each piece of equipment may be contaminated to a different degree; therefore, segregation at the drop reduces the potential for contamination. Equipment needed:

- containers of various sizes
- plastic liners
- plastic drop cloths

Station 2: Suit, Boot Covers, and Glove Wash

Thoroughly wash and scrub fully encapsulating suit, outer boot covers, and gloves with a decontamination solution or detergent-waste solution. Equipment needed:

- container (20 to 30 gallon)
- decontamination solution
- detergent-water solution
- two or three long-handled, soft-bristled scrub brushes

Station 3: Suit, Boot Covers, and Glove Rinse

Rinse off the decontamination solution from Station 2 using copious amounts of water. Repeat as many times as necessary. Equipment needed:

- container (30 to 50 gallon)
- high-pressure spray unit and splash guard
- water
- two or three long-handled, soft-bristled scrub brushes

Station 4: Tape Removal
Remove tape around boots and gloves and deposit it in a container with a plastic liner. Equipment needed:

- container (20 to 30 gallon)
- plastic liners

Station 5: Boot Cover Removal
Remove boot covers and deposit them in a container with a plastic liner. Equipment needed:

- container (30 to 40 gallon)
- plastic liners
- bench or stool

Station 6: Outer Glove
Remove outer gloves and deposit them in a container with a plastic liner. Equipment needed:

- container (20 to 30 gallon)
- plastic liners

Station 7: Suit, SCBA, Boot, and Glove Wash
If design does not include *Station 2*, wash suit at this station. Thoroughly wash suit, SCBA, boots, and gloves with a long-handled, soft-bristled scrub brush and copious amounts of decontamination solution or detergent-water solution. Wrap SCBA regulator (if belt-mounted type) with plastic to keep out water. Wash backpack assembly with sponges or cloth. Equipment needed:

- container (30 to 50 gallon)
- decontamination solution
- detergent-water solution
- two or three long-handled bristled scrub brushes
- small buckets
- sponges or cloths

Station 8: Suit, SCBA, Boot, and Glove Rinse
If design does not include *Station 3*, rinse suit at this station. Rinse off the decontamination solution or detergent-water solution using copious amounts of water. Repeat as many times as necessary. Equipment needed:

- container (30 to 50 gallon)
- high-pressure spray unit and splash guard
- water
- small buckets
- two or three long-handled, soft-bristled scrub brushes
- sponges or cloths

Station 9: Tank Change

If a worker leaves the exclusion zone to change their air tank, this is the last step in the decontamination procedure. They exchange the tank, don new outer gloves and boots, and have the joints taped. They then return to duty. Equipment needed:

- air tanks
- tape
- boot covers
- gloves

Station 10: Chemical-resistant Boot Removal

Remove chemical-resistant boots and deposit them in a container with a plastic liner. Equipment needed:

- container (30 to 50 gallon)
- plastic liners
- bench or stool
- bootjack

Station 11: SCBA Backpack Removal

While still wearing face piece, remove backpack and place it on a table. Disconnect hose from regulator valve and proceed to next station. Equipment needed:

- table

Station 12: Splash Suit Removal

With assistance, remove splash suit. Deposit it in a container with a plastic liner. Equipment needed:

- container (30 to 50 gallon)
- plastic liners
- bench or stool

Station 13: Inner Glove Wash

Wash with decontamination solution or detergent-water solution that will not harm skin. Repeat as many times as necessary. Equipment needed:

- basin or bucket
- decontamination solution
- detergent-water solution
- small table

Station 14: Inner Glove Rinse
Rinse with water. Repeat as many times as necessary. Equipment needed:
- water
- basin or bucket
- small table

Station 15: Face Piece Removal
Remove face piece. Deposit it in a container with a plastic liner. Avoid touching face with fingers. Equipment needed:
- container (30 to 50 gallon)
- plastic liners

Station 16: Inner Glove Removal
Remove inner gloves and deposit them in a container with a plastic liner. Equipment needed:
- container (20 to 30 gallon)
- plastic liners

Station 17: Inner Clothing Removal
Remove inner clothing. Place it in a container with a plastic liner. Do not wear inner clothing off the site, since small amounts of contaminants may have been transferred in removing fully encapsulating suit. Equipment needed:
- container (30 to 50 gallon)
- plastic liners

Station 18: Field Wash
Shower if highly toxic, skin-corrosive, or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available. Equipment needed:
- water
- soap
- small table
- basin or bucket
- field showers
- towels

Station 19: Redress
Put on clean clothes. A dressing trailer is needed in inclement weather. Equipment needed:
- table
- chairs
- lockers
- clothes

E-2 ***MINIMUM*** DECONTAMINATION PROCEDURES FOR ***LEVEL B***

Equipment Worn

This decontamination procedure outlined is the **minimum** number of decontamination stations necessary for Malcolm Pirnie workers wearing the following protective clothing and equipment:

- one-piece, hooded chemical-resistant splash suit
- SCBA
- hard hat
- chemical-resistant boots with steel toe and shank
- boot covers
- inner and outer gloves
- taped joints between gloves, boots, and suit

DECONTAMINATION PROCEDURES

Station 1: Segregated Equipment Dump

Deposit equipment used on the site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability for cross-contamination. During hot weather operations, cool-down station may be set up within this area. Equipment needed:

- containers of various sizes
- plastic liners
- plastic drop cloths

Station 2: Suit, Boot Covers, and Glove Wash and Rinse

Thoroughly wash and scrub chemical-resistant splash suit, outer boots, and gloves with a decontamination solution or detergent-waste solution. Rinse off using copious amounts of water. Equipment needed:

- containers (20 to 30 gallon)
- decontamination solution
- detergent-water solution
- rinse water
- high-pressure spray unit and splash guard
- two or three long-handled, soft-bristled scrub brushes

Station 3: Outer Boot and Glove Removal

Remove outer boots and gloves and deposit them in a container with a plastic liner. Equipment needed:

- container (30 to 40 gallon)
- plastic liners
- bench or stool
- water
- two or three long-handled, soft-bristled scrub brushes

Station 4: Tank Change

If a worker leaves the exclusion zone to change their air tank, this is the last step in the decontamination procedure. They exchange the tank, don new outer gloves and boots, and have the joints taped. They then return to duty. Equipment needed:

- air tanks
- tape
- boot covers
- gloves

Station 5: Outer Garment Removal

Chemical-resistant splash suit, if worn outside the SCBA, is removed and deposited in separate containers with plastic liners. If the suit is worn underneath the SCBA, see station 5A. Equipment needed:

- containers (20 to 30 gallon)
- plastic liners

Station 5A: Suit Removal When Worn Underneath the SCBA

If the chemical-resistant splash suit is worn beneath the SCBA, remove SCBA backpack, but not the face piece, and hand to a buddy or lay down on plastic sheeting and remove suit. Equipment needed:

- plastic sheeting

Station 6: SCBA Removal and Decontamination

Wrap SCBA regulator (if belt-mounted type) with plastic to keep out water. Wash backpack assembly with sponges or cloth. Remove face piece while avoiding facial contact by fingers. SCBA is deposited on a clean plastic sheet. Equipment needed:

- water
- small buckets
- sponges or cloths
- plastic sheeting
- two or three long-handled, soft-bristled scrub brushes

Station 7: Inner Glove Removal

Remove inner gloves and deposit them in a container with a plastic liner. Equipment needed:

- container (20 to 30 gallon)
- plastic liners

Station 8: Field Wash

Shower if highly toxic, skin-corrosive, or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available. Equipment needed:

- water
- soap
- small table
- basin or bucket
- field showers
- towels

E-3 *MAXIMUM* DECONTAMINATION PROCEDURES FOR *LEVEL C*

Equipment Worn

This decontamination procedure outlined is the **maximum** number of decontamination stations necessary for Malcolm Pirnie workers wearing the following protective clothing and equipment:

- one-piece coverall
- full-face respirator
- hard hat
- safety boots with steel toe and shank
- boot covers
- inner and outer gloves
- taped joints between gloves, boots, and suit

DECONTAMINATION PROCEDURES

Station 1: Segregated Equipment Dump

Deposit equipment used on the site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each piece of equipment may be contaminated to a different degree; therefore, segregation at the drop reduces the potential for contamination. Equipment needed:

- containers of various sizes
- plastic liners
- plastic drop cloths

Station 2: Boot Covers, and Glove Wash

Thoroughly wash and scrub outer boot covers, and gloves with a decontamination solution or detergent-waste solution. Equipment needed:

- container (20 to 30 gallon)
- decontamination solution
- detergent-water solution
- two or three long-handled, soft-bristled scrub brushes

Station 3: Boot Covers, and Glove Rinse

Rinse off the decontamination solution from Station 2 using copious amounts of water. Repeat as many times as necessary. Equipment needed:

- container (30 to 50 gallon)
- high-pressure spray unit and splash guard
- water
- two or three long-handled, soft-bristled scrub brushes

Station 4: Tape Removal
Remove tape around boots and gloves and deposit it in a container with a plastic liner. Equipment needed:

- container (20 to 30 gallon)
- plastic liners

Station 5: Boot Cover Removal
Remove boot covers and deposit them in a container with a plastic liner. Equipment needed:

- container (30 to 40 gallon)
- plastic liners
- bench or stool

Station 6: Outer Glove Removal Remove outer gloves and deposit them in a container with a plastic liner. Equipment needed:

- container (20 to 30 gallon)
- plastic liners

Station 7: Canister or Mask Change
If a worker leaves the exclusion zone to change their canister (or mask), this is the last step in the decontamination procedure. The worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and the worker returns to duty. Equipment needed:

- respirator canisters appropriate to the field hazard
- extra respirators
- tape
- boot covers
- gloves

Station 8: Outer Garment Removal
One-piece coverall is removed and deposited in containers with plastic liners. Equipment needed:

- containers (20 to 30 gallon)
- plastic liners

Station 9: Inner Glove Wash
Wash with decontamination solution or detergent-water solution that will not harm skin. Repeat as many times as necessary. Equipment needed:

- basin or bucket
- decontamination solution
- detergent-water solution
- small table

Station 10: Inner Glove Rinse
Rinse with water. Repeat as many times as necessary. Equipment needed:
- water
- basin or bucket
- small table

Station 11: Face Piece Removal and Decontamination
Remove face piece while avoiding facial contact by fingers. Face-piece is deposited on a clean plastic sheet. Canisters are removed and deposited in containers with plastic liners. Respirators are scrubbed with soap and water and rinsed with copious amounts of clean water. Equipment needed:
- water
- soap
- small buckets
- small brushes
- sponges or cloths
- plastic sheeting

Station 12: Inner Glove Removal
Remove inner gloves and deposit them in a container with a plastic liner. Equipment needed:
- container (20 to 30 gallon)
- plastic liners

Station 13: Inner Clothing Removal
Remove inner clothing. Place it in a container with a plastic liner. Do not wear inner clothing off the site, since small amounts of contaminants may have been transferred in removing outer suit. Equipment needed:
- container (30 to 50 gallon)
- plastic liners

Station 14: Field Wash
Shower if highly toxic, skin-corrosive, or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available. Equipment needed:
- water
- soap
- small table
- basin or bucket
- field showers
- towel

Station 15: Redress
Put on clean clothes. A dressing trailer is needed in inclement weather. Equipment needed:
- table
- chairs
- lockers
- clothes

E-4 *MINIMUM* DECONTAMINATION PROCEDURES FOR *LEVEL C*

Equipment Worn

This decontamination procedure outlined is the **minimum** number of decontamination stations necessary for Malcolm Pirnie workers wearing the following protective clothing and equipment:

- one-piece coverall
- full-face respirator
- hard hat
- safety boots with steel toe and shank
- boot covers
- inner and outer gloves
- taped joints between gloves, boots, and suit

Station 1: Segregated Equipment Dump

Deposit equipment used on the site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability for cross-contamination. During hot weather operations, cool-down station may be set up within this area. Equipment needed:

- containers of various sizes
- plastic liners
- plastic drop cloths

Station 2: Boot Covers, and Glove Wash and Rinse

Thoroughly wash and scrub outer boots, and gloves with a decontamination solution or detergent-waste solution. Rinse off using copious amounts of water. Equipment needed:

- containers (20 to 30 gallon)
- decontamination solution
- detergent-water solution
- rinse water
- high-pressure spray unit and splash guard
- two or three long-handled, soft-bristled scrub brushes

Station 3: Outer Boot and Glove Removal

Remove outer boots and gloves and deposit them in a container with a plastic liner. Equipment needed:

- container (30 to 40 gallon)
- plastic liners
- bench or stool
- water
- two or three long-handled, soft-bristled scrub brushes

Station 4: Canister or Mask Change
If a worker leaves the exclusion zone to change their canister (or mask), this is the last step in the decontamination procedure. The worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and the worker returns to duty. Equipment needed:

- respirator canisters appropriate to the field hazard
- extra respirators
- tape
- boot covers
- gloves

Station 5: Outer Garment Removal
One-piece coverall is removed and deposited in containers with plastic liners. Equipment needed:

- containers (20 to 30 gallon)
- plastic liners

Station 6: Face Piece Removal and Decontamination
Remove face piece while avoiding facial contact by fingers. Face-piece is deposited on a clean plastic sheet. Canisters are removed and deposited in containers with plastic liners. Respirators are scrubbed with soap and water and rinsed with copious amounts of clean water. Equipment needed:

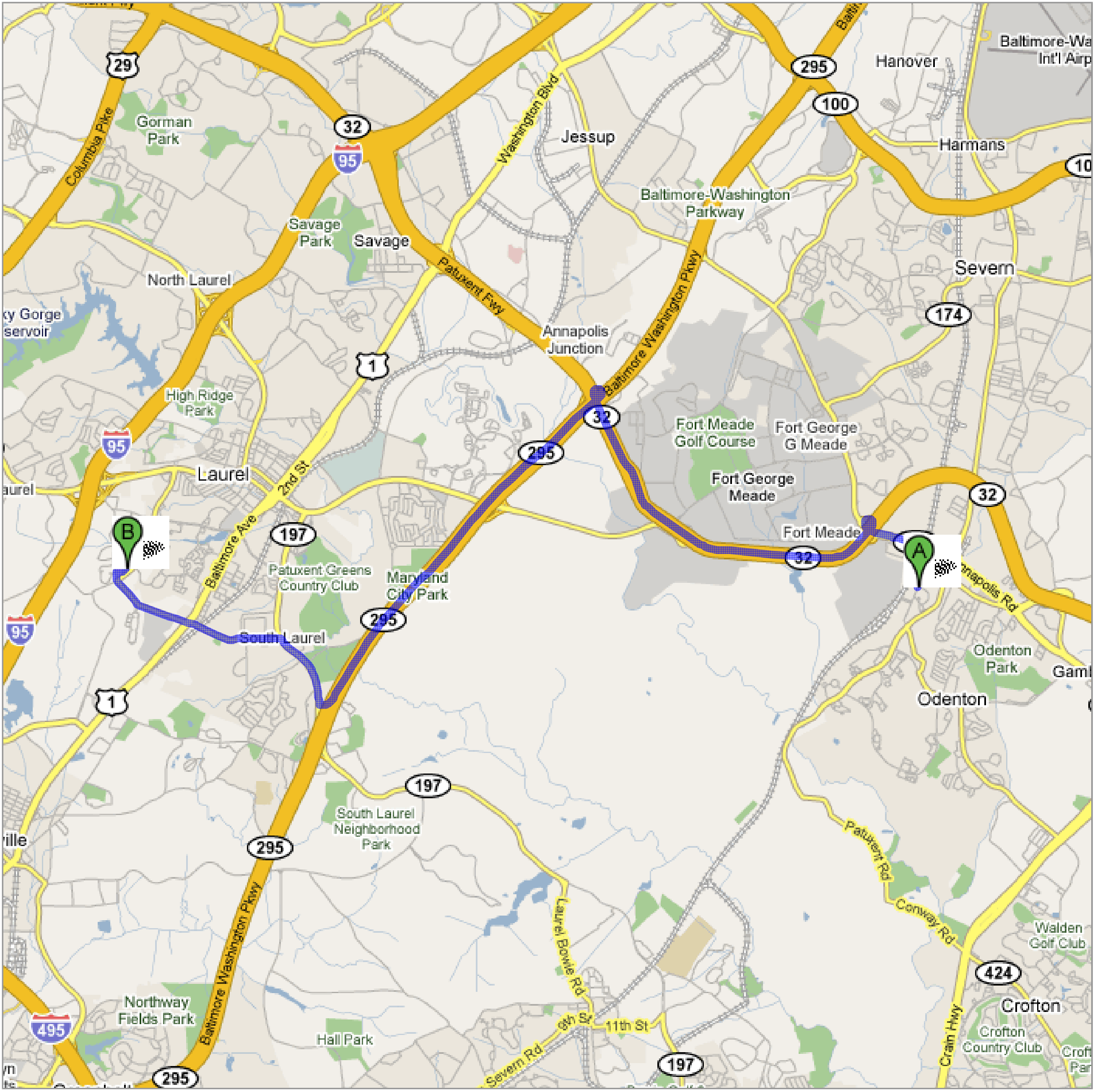
- water
- soap
- small buckets
- small brushes
- sponges or cloths
- plastic sheeting

Station 7: Inner Glove Removal
Remove inner gloves and deposit them in a container with a plastic liner. Equipment needed:

- container (20 to 30 gallon)
- plastic liners

Station 8: Field Wash
Shower if highly toxic, skin-corrosive, or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available. Equipment needed:

- water
- soap
- small table
- basin or bucket
- field showers
- towels



29
32
95
Gorman Park
Columbia Pike
Washington Blvd
Jessup
295
100
Hanover
Baltimore-Wa
Int'l Airp
Harmans
Baltimore-Washington Parkway
Savage Park
Savage
North Laurel
Patuxent Fwy
Severn
174
Annapolis Junction
Baltimore Washington Pkwy
1
High Ridge Park
Fort Meade Golf Course
Fort George G Meade
Fort George Meade
Laurel
2nd St
Baltimore Ave
197
Fort Meade
B
A
Annapolis Rd
Patuxent Greens Country Club
Maryland City Park
South Laurel
Odenton Park
Odenton
Patuxent Rd
South Laurel Neighborhood Park
Laurel Bowie Rd
Conway Rd
Walden Golf Club
424
Crofton
Crofton Country Club
Crain Hwy
Northway Fields Park
495
Hall Park
9th St
11th St
Severn Rd

Flowering Knoll Trailer Park/N Patuxent Rd

1.	Head **northeast** on **Flowering Knoll Trailer Park/N Patuxent Rd** toward **Dovetail Ln** About 1 min	go 0.3 mi total 0.3 mi
2.	Turn **right** at **Odenton Rd** About 1 min	go 0.3 mi total 0.6 mi
3.	Turn **left** at **Telegraph Rd** About 1 min	go 0.2 mi total 0.8 mi
4.	Turn **left** at **Annapolis Rd/MD-175** About 2 mins	go 1.1 mi total 1.9 mi
5.	Merge onto **MD-32 W** via the ramp to **Columbia** About 6 mins	go 4.7 mi total 6.6 mi
6.	Take the **Balt/Wash Pkwy** exit	go 0.4 mi total 6.9 mi
7.	Merge onto **MD-295 S** About 5 mins	go 4.7 mi total 11.6 mi
8.	Take the exit toward **Laurel**	go 0.3 mi total 11.9 mi
9.	Merge onto **Laurel Rd/Laurel Bowie Rd/MD-197** About 2 mins	go 0.9 mi total 12.8 mi
10.	Turn **left** at **Contee Rd** About 2 mins	go 1.1 mi total 13.9 mi
11.	Slight **left** to stay on **Contee Rd** About 4 mins	go 1.2 mi total 15.1 mi
12.	Turn **right** at **Laurel Regional Hospital**	go 0.1 mi total 15.2 mi

Laurel Regional Hospital, Laurel, MD 20707

MATERIAL SAFETY DATA SHEET

SECTION I - COMPANY AND PRODUCT INFORMATION

Product SKU Number:........... 332
Manufacturer's Name:.......... Chem Lab Products, Inc.
Emergency Telephone No.:...... (909) 390-9912
.... (800)424-9300(CHEMTREC)
Street Address:............... 5160 E. Airport Drive
City/State/Zip code:.......... Ontario, CA 91761
Chemical Name and Synonyms:... Hydrochloric Acid
Trade Name and Synonyms:...... Kem Tek MURIATIC ACID
Chemical Family:.............. Acids
Formula:..............HCl _____CAS # 07647-01-0

NFPA Rating: Health:3 Flammability:0 Reactivity:0 Special: ACID

DOT Proper Shipping Name:..... Hydrochloric acid, solution
DOT ID Number:................ UN1789
DOT Hazard Class:............. 8, CORROSIVE
Package Group:................ II

SECTION II - HAZARDOUS INGREDIENTS

HYDROCHLORIC ACID..................................29.0%

SECTION III - PHYSICAL DATA

FREEZING POINT................ N/A ___DECOMPOSITION TEMPERATURE... N/A
BOILING POINT .... 178° F ___BULK DENSITY (loose)........ N/A
SPECIFIC GRAVITY (H_2O=1).... 1.16 ___ pH (in 1% solution)......... N/A
VAPOR PRESSURE (cm Hg.).. 25 mm 11g.
PERCENT VOLATILE BY VOLUME ... N/A ____MOLECULAR WEIGHT..........36.461
EVAPORATION RATE (____=1)..... N/A ____APPEARANCE...... Greenish-yellow
VAPOR DENSITY (Air = 1)...... 11.0 ____ODOR............. A pungent odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT.......................... None
FLAMMABLE LIMITS..................... N/A
EXTINGUISHING MEDIA.................. Non-Flammable
SPECIAL FIRE FIGHTING PROCEDURES:
... Wear positive pressure self-contained breathing apparatus.
UNUSUAL FIRE AND EXPLOSION HAZARDS:
... Hydrochloric acid is non-flammable. Acid action on most metals may
... release Hydrogen, a highly flammable and explosive gas.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE:.............. 5ppm as Hydrogen Chloride
EFFECTS OF OVEREXPOSURE:
... **EYE**- severe irritation with corneal injury which may result in
... blindness. **SKIN** - severe irritation. **INGESTION** - may cause
... gastrointestinal irritation or ulceration and severe burns of the
... mouth and throat. **INHALATION** - severe irritation.
EMERGENCY AND FIRST AID PROCEDURES:
... **EYES:** Wash with water for 15 minutes and get medical attention
... promptly. **INGESTION**: Do not induce vomiting; give large amounts
... of water. Follow with milk of magnesia, beaten eggs, or vegetable
... oil. Call physician immediately. **INHALATION**: remove to fresh air

... if effects occur. **SKIN**: Flush with water for 15 minutes.

SECTION VI - REACTIVITY DATA

STABILITY: This Product is stable
CONDITIONS TO AVOID:
... Contact with metals may cause generation of flammable
... concentrations of hydrogen gas.
INCOMPATIBILITY: (Materials to avoid)
... Avoid basic and corrosive materials. Avoid contact with most
... metals. Avoid oxidizing materials (can oxidize to chlorine).
HAZARDOUS DECOMPOSITION PRODUCTS:.... None
HAZARDOUS POLYMERIZATION:............ WILL NOT OCCUR
CONDITIONS TO AVOID .... None Known

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE OF MATERIAL RELEASED OR SPILLED:
... Small quantities may be flushed with copious quantities of water;
... in case of larger amounts, contain liquid. Use limestone, lime or
... soda ash to cautiously neutralize. Since considerable amounts of
... heat and steam may be generated during neutralization.
WASTE DISPOSAL METHOD:
... Comply with all local, state, and federal regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: (Specify type)
... Where required to maintain exposure levels before exposure limits
... use a NIOSH approved respirator for hydrogen chloride gas, or
... hydrogen chloride mists as applicable.
VENTILATION:
LOCAL EXHAUST: If possible... **MECHANICAL:** If possible to provide
PROTECTIVE GLOVES: Rubber Gloves
EYE PROTECTION: Use chemical goggles
OTHER PROTECTIVE EQUIPMENT:
... Chemical splash goggles and face shield as a minimum. Acid
... resistant apron.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:
... Prevent all contact with eyes and skin. Avoid breathing
... irritating vapors.
OTHER PRECAUTIONS: None Known

This data is offered in good faith as typical values and not as a product specification. No warranty, either expressed or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate.

ExxonMobil
Chemical

MATERIAL SAFETY DATA SHEET

ExxonMobil Chemical Company

A Division of Exxon Mobil Corporation

Isobutylene

PAGE: 1
DATE PREPARED: APR 1, 2000
MSDS NO.: 32659000

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Isobutylene
CHEMICAL NAME:
2-methyl propene — CAS 115-11-7
CHEMICAL FAMILY:
Alkenes
PRODUCT DESCRIPTION:
Colorless liquid or gas.

CONTACT ADDRESS:
ExxonMobil Chemical Company
P.O. Box 3272, Houston, Texas 77253-3272

** EMERGENCY TELEPHONE NUMBERS: (24 Hours) **
** CHEMTREC (800) 424-9300 **
** ExxonMobil Chemical Company (800) 726-2015 **

NON EMERGENCY TELEPHONE NUMBERS : (8am-5pm M-F)
FOR GENERAL PRODUCT INFORMATION CALL : (281) 870-6000
FOR HEALTH AND MEDICAL INFORMATION CALL : (281) 870-6884

SECTION 2 COMPOSITION/INFORMATION ON INGREDIENTS

This product is hazardous as defined in 29 CFR1910.1200.
OSHA HAZARD
Flammable gas
CNS effects

SECTION 3 HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS
EYE CONTACT:
Exposure to rapidly expanding gas or vaporizing liquids may cause frostbite (cold burns) or tissue damage.
SKIN CONTACT:
Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold" burn).
No hazard in normal industrial use.
INHALATION:
Vapor concentrations above recommended exposure levels are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Asphyxiant if allowed to accumulate in confined spaces to concentrations that reduce oxygen below safe breathing levels.
INGESTION:
No hazard in normal industrial use.

Continues on page 2

MATERIAL SAFETY DATA SHEET

ExxonMobil Chemical Company

A Division of Exxon Mobil Corporation

SECTION 4 FIRST AID MEASURES

EYE CONTACT:
First aid is normally not required.
SKIN CONTACT:
In case of cold burns caused by rapidly expanding gas or vaporizing liquid, get prompt medical attention.
INHALATION:
Using proper respiratory protection, immediately remove the affected victim from exposure. Administer artificial respiration if breathing is stopped. Keep at rest. Call for prompt medical attention.
INGESTION:
First aid is not applicable.

SECTION 5 FIRE-FIGHTING MEASURES

FLASH POINT:	-112 Deg F. METHOD: TCC ASTM D56
FLAMMABLE LIMITS:	LEL: 1.8 UEL: 9.6
AUTOIGNITION TEMPERATURE:	869 Deg F.

GENERAL HAZARD
Extremely Flammable, material will readily ignite at ambient temperatures.
Flammable Gas, can readily form flammable mixtures at or above the flashpoint.
Static Discharge, material can accumulate static charges which can cause an incendiary electrical discharge .
Auto-refrigeration, drains can become plugged and valves may become inoperable because of the formation of ice due to expanding vapors or vaporizing liquids.
FIRE FIGHTING
Use water spray to cool fire exposed surfaces and to protect personnel.
Shut off "fuel" to fire. If a leak or spill has not ignited, use water spray to disperse the vapors.
Do not extinguish flames at leak because possibility of uncontrolled explosive reignition exists. Cut off fuel and/or allow fire to burn out.
Extinguish small residual fires with dry chemical powder or water spray.
Try to cover liquid spills with foam.
Remove compressed gas cylinders from fire area if possible.
DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS
No unusual

SECTION 6 ACCIDENTAL RELEASE MEASURES

LAND SPILL
Eliminate sources of ignition. Prevent additional discharge of material, if possible to do so without hazard. For small spills implement cleanup procedures; for large spills implement cleanup procedures and, if in public area, keep public away and advise authorities. Also, if this

Continues on page 3

product is subject to CERCLA reporting (see Section 15 REGULATORY INFORMATION) notify the National Response Center.
Allow to evaporate.
Consult an expert on disposal of recovered material and ensure conformity to local disposal regulations.

WATER SPILL

Eliminate sources of ignition. Warn occupants and shipping in surrounding and downwind areas of fire and explosion hazard and request all to stay clear.
Allow to evaporate from surface.
Consult an expert on disposal of recovered material and ensure conformity to local disposal regulations.

SECTION 7 STORAGE AND HANDLING

ELECTROSTATIC ACCUMULATION HAZARD:

Yes, use proper bonding and/or grounding procedure.
Additional information regarding safe handling of products with static accumulation potential can be ordered by contacting the American Petroleum Institute (API) for API Recommended Practice 2003, entitled "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents" (American Petroleum Institute, 1220 L Street Northwest, Washington, DC 20005), or the National Fire Protection Association (NFPA) for NFPA 77 entitled "Static Electricity" (National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101).

STORAGE TEMPERATURE, °F:
50 to 70

LOADING/UNLOADING TEMPERATURE, °F:
70 to 70 Ambient

STORAGE/TRANSPORT PRESSURE, mmHg:
1 ATM Lower, 60 ATM upper

LOADING/UNLOADING VISCOSITY, cSt:
0.4 to 0.3

STORAGE AND HANDLING:

Keep container closed. Handle and open containers with care. Store in a cool, well ventilated place away from incompatible materials.
Do NOT handle or store near an open flame, heat or other sources of ignition. Protect material from direct sunlight.
Material will accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or grounding procedures.
Do NOT pressurize, cut, heat, or weld containers. Empty product containers may contain product residue. Do NOT reuse empty containers without commercial cleaning or reconditioning.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE CONTROLS

The use of mechanical ventilation is recommended whenever this product is used in a confined space to maintain ambient concentrations below recommended threshold exposure limits.
Use explosion-proof ventilation equipment.

Continues on page 4

PERSONAL PROTECTION

For open systems where contact is likely, wear gas-proof goggles.
Where contact may occur, wear gas-proof goggles.
Where it is likely that frostbite hazards may occur from vaporizing liquid and expanding vapor, prevent contact with eyes and skin. Wear safety glasses with side shields, long sleeves and insulating gloves.
Where concentrations in air may exceed the limits given in this Section and engineering, work practice or other means of exposure reduction are not adequate, NIOSH approved respirators may be necessary to prevent overexposure by inhalation.

WORKPLACE EXPOSURE GUIDELINES

ExxonMobil RECOMMENDS THE FOLLOWING OCCUPATIONAL EXPOSURE LIMITS:
a TWA of 800 ppm for Iso Butylene.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

SPECIFIC GRAVITY, at °F:
0.60 at 60

DENSITY at °F: 5.0 lbs/gal at 68

SOLUBILITY IN WATER, wt. % at °F:
0.01 at 77

SP. GRAV. OF VAPOR, at 1 atm (Air=1):
2.01

EVAPORATION RATE, n-Bu Acetate=1:
Not Available

VAPOR PRESSURE, mmHg at °F:
1365.137 at 50
1140.114 at 39

VISCOSITY OF LIQUID, cSt at °F:
0.4 at 12
0.3 at 86

FREEZING/MELTING POINT, °F:
-221

BOILING POINT, °F:
18

SECTION 10 STABILITY AND REACTIVITY

STABILITY:
Stable

CONDITIONS TO AVOID INSTABILITY:
Air contamination - causes peroxide formation

HAZARDOUS POLYMERIZATION:
Will not occur

CONDITIONS TO AVOID HAZARDOUS POLYMERIZATION:
Not Applicable

MATERIALS AND CONDITIONS TO AVOID INCOMPATIBILITY:
Inorganic acids, organic acids, oxidizing agents, molten sulfur, halogenated compounds, monomers, polymerizable esters, cyanohydrins

HAZARDOUS DECOMPOSITION PRODUCTS:
None

SECTION 11 TOXICOLOGICAL INFORMATION

Please refer to Section 3 for available information on potential health effects.

Continues on page 5

MATERIAL SAFETY DATA SHEET

ExxonMobil Chemical Company

A Division of Exxon Mobil Corporation

Isobutylene

SECTION 12 ECOLOGICAL INFORMATION

No specific ecological data are available for this product. Please refer to Section 6 for information regarding accidental releases and Section 15 for regulatory reporting information.

SECTION 13 DISPOSAL CONSIDERATIONS

Please refer to Sections 5, 6, and 15 for disposal and regulatory information.

SECTION 14 TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (DOT):
DOT SHIPPING DESCRIPTION: ISOBUTYLENE, 2.1, UN 1055

SECTION 15 REGULATORY INFORMATION

TSCA:
This product is listed on the TSCA Inventory at CAS Registry Number 115-11-7

CERCLA:
If this product is accidentally spilled, it is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). We recommend you contact local authorities to determine if there may be other local reporting requirements.

SARA TITLE III:
Under the provisions of Title III, Sections 311/312 of the Superfund Amendments and Reauthorization Act, this product is classified into the following hazard categories: Fire, Sudden Release of Pressure.
This information may be subject to the provisions of the Community Right-to-Know Reporting Requirements (40 CFR 370) if threshold quantity criteria are met.
This product does not contain Section 313 Reportable Ingredients.

SECTION 16 OTHER INFORMATION

NOTES:

1. This material may also be handled at ambient temperatures at pressures of up to 689 kPa (100 psi).

Continues on page 6

MATERIAL SAFETY DATA SHEET

ExxonMobil Chemical Company

A Division of Exxon Mobil Corporation

Isobutylene

REVISION SUMMARY:
Since September 24, 1999 the corporate names have been changed to reflect the merger of Exxon and Mobil.

REFERENCE NUMBER:
HDHA-L-00003

SUPERSEDES ISSUE DATE:
September 24, 1999

FLINN SCIENTIFIC INC.

"Your Safer Source for Science Supplies"

Material Safety Data Sheet (MSDS)

MSDS #: 249.00
Revision Date: November 25, 2002

Section 1 — Chemical Product and Company Identification

Liquinox, Laboratory Cleaner

Flinn Scientific, Inc. P.O. Box 219 Batavia, IL 60510 (800) 452-1261

CHEMTREC Emergency Phone Number: (800) 424-9300

Section 2 — Composition, Information on Ingredients

Proprietary mixture manufactured by Alconox, Inc.

CAS#: None Established

Section 3 — Hazards Identification

Yellow liquid. Practically odorless.
Irritating to eyes. May be irritating to mucous membranes.

FLINN AT-A-GLANCE
Health-0
Flammability-0
Reactivity-0
Exposure-1
Storage-0

0 is low hazard, 3 is high hazard

Section 4 — First Aid Measures

Call a physician, seek medical attention for further treatment, observation and support after first aid.
Inhalation: Remove to fresh air at once. If breathing has stopped give artificial respiration immediately.
Eye: Immediately flush with fresh water for 15 minutes.
External: Wash continuously with fresh water for 15 minutes.
Internal: Rinse out mouth, give 1 to 2 cups of water or milk, induce vomiting. Call a physician or poison control at once.

Section 5 — Fire Fighting Measures

Non flammable, non combustible liquid.
When heated to decomposition, emits toxic fumes of CO, CO_2, SO_2.
Fire Fighting Instructions: Use triclass, dry chemical fire extinguisher. Firefighters should wear PPE and SCBA with full facepiece operated in positive pressure mode.

NFPA CODE
None Established

Section 6 — Accidental Release Measures

Material foams profusely. Cleaner is biodegradable. Restrict unprotected personnel from area and ventilate area. Contain spill with sand or absorbent material; deposit in sealed bag or container. See Sections 8 and 13 for further information.

Section 7 — Handling and Storage

Flinn Suggested Chemical Storage Pattern: Inorganic Miscellaneous, or near washing area.

Section 8 — Exposure Controls , Personal Protection

Avoid contact with eyes, skin and clothing. Wear chemical splash goggles, chemical-resistant gloves and chemical-resistant apron.

Section 9 — Physical and Chemical Properties

Yellow liquid. Practically odorless.
Liqui-Nox is a trade name. An anionic detergent.
Solubility: Completely soluble in water.

Specific Gravity: 1.065
Boiling Point: 210 C

Section 10 — Stability and Reactivity

Avoid contact with strong oxidizing agents.
Shelf life: Good.

Section 11 — Toxicological Information

Acute effects: Irritant
Chronic effects: N.A.
Target organs: N.A.

ORL-RAT LD50: N.A.
IHL-RAT LC50: N.A.
SKN-RBT LD50: N.A.

N.A. = Not available, not all health aspects of this substance have been fully investigated.

Section 12 — Ecological Information

Data not yet available.

Section 13 — Disposal Considerations

Please consult with state and local regulations.
Flinn Suggested Disposal Method #26b is one option.

Section 14 — Transport Information

Shipping Name: Not regulated
Hazard Class: N/A
UN Number: N/A

N/A = Not applicable

Section 15 — Regulatory Information

Not listed.

Section 16 — Other Information

Consult your copy of the Flinn Scientific Catalog/Reference Manual for additional information about laboratory chemicals. This Material Safety Data Sheet (MSDS) is for guidance and is based upon information and tests believed to be reliable. Flinn Scientific Inc. makes no guarantee of the accuracy or completeness of the data and shall not be liable for any damages relating thereto. The data is offered solely for your consideration, investigation, and verification. Flinn Scientific Inc. assumes no legal responsibility for use or reliance upon this data.

HEALTH RESOURCES

For the health of your organization

Control Panel

Health Resources
600 West Cummings Park, Suite 3400, Woburn, MA 01801 Tel: 800-350-4511 Fax: 781-938-4678

PS ✓

MALCOLM PIRNIE

Certificate for Respirator Use

Employee Name:	**Brian Jordan**
ID #:	633473 2863
Company:	Malcolm Pirnie, Inc.
Location:	Indianapolis, IN
Date of Exam:	7/25/2008
Exam Location:	Concentra Medical Center, Madison, WI

I have examined the above named individual and I certify that this employee

- [x] is physically capable
- [ ] is not physically capable

of using a negative pressure, air supplied respirator and/or purifying respirator subject to the following restrictions:

- [ ] Respirator use should be limited to air supplied or or powered air purifying respirators.
- [ ] No respirator use if wheezing and shortness of breath are evident.

Note: Prescription eyeglasses, contact lenses or beards cannot be worn with all types of respirators. Any interference with a face-to-face pieces seal is not acceptable. Contact lenses cannot be worn with any supplied air respirator. General safety recommendations indicate that contact lenses should not be worn in area where there may be a likelihood of chemical splashes.

Jerry Berke M.D. Date: 8/4/2008

HEALTH RESOURCES

For the health of your organization

Control Panel

Health Resources
600 West Cummings Park, Suite 3400, Woburn, MA 01801 Tel: 800-350-4511 Fax: 781-938-4678

MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Brian Jordan**
ID #	633473
Company:	Malcolm Pirnie, Inc.
Location:	Indianapolis, IN
Date of Exam:	7/25/2008
Exam Location:	Concentra Medical Center, Madison, WI
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☑ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

☑ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.

☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.

☐ I have limited the employee's assigned work. Recommended limitations are:

☐ In evaluating the employee, it was determined that the employee is probably fit for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.

☐ As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were

performed in an OSHA-CDC approved laboratory. ☐ Other:
I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment. For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.
Jerry Berke M.D. Date: 8/4/2008

HEALTH RESOURCES

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MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Rosemarie L. Fehrman**
ID #	609675
Company:	Malcolm Pirnie, Inc.
Location:	Baltimore, MD
Date of Exam:	11/21/2008 9:00:00 AM
Exam Location:	Concentra Medical Center Baltimore, MD CMCOHC, Baltimore, MD
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☑ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

☑ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.

☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.

☐ I have limited the employee's assigned work. Recommended limitations are:

☐ In evaluating the employee, it was determined that the employee is probably fit

for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.

- ☐ As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were performed in an OSHA-CDC approved laboratory.
- ☐ Other:

I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment.

For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.

Jerry Berke M.D. Date: 1/19/2009

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MALCOLM PIRNIE

Certificate for Respirator Use

Employee Name:	**Rosemarie L. Fehrman**
ID #:	609675
Company:	Malcolm Pirnie, Inc.
Location:	Baltimore, MD
Date of Exam:	11/21/2008 9:00:00 AM
Exam Location:	Concentra Medical Center Baltimore, MD CMCOHC, Baltimore, MD

I have examined the above named individual and I certify that this employee

- [x] is physically capable
- [ ] is not physically capable

of using a negative pressure, air supplied respirator and/or purifying respirator subject to the following restrictions:

- [ ] Respirator use should be limited to air supplied or or powered air purifying respirators.
- [ ] No respirator use if wheezing and shortness of breath are evident.

Note: Prescription eyeglasses, contact lenses or beards cannot be worn with all types of respirators. Any interference with a face-to-face pieces seal is not acceptable. Contact lenses cannot be worn with any supplied air respirator. General safety recommendations indicate that contact lenses should not be worn in area where there may be a likelihood of chemical splashes.

Jerry Berke M.D. Date: 1/19/2009

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MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Lisa Marie Heffner**
ID #	609773
Company:	Malcolm Pirnie, Inc.
Location:	King of Prussia, PA
Date of Exam:	11/3/2008
Exam Location:	National - Review Only, Woburn, MA
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☐ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

- ☐ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.
- ☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.
- ☐ I have limited the employee's assigned work. Recommended limitations are:

- ☐ In evaluating the employee, it was determined that the employee is probably fit for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.

☐ As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were performed in an OSHA-CDC approved laboratory. ☑ Other: Medical Extension Granted-Expires 7/13/2009
I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment. For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.
Jerry Berke M.D. Date: 11/13/2008

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MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Gregory M. Firely**
ID #	609681
Company:	Malcolm Pirnie, Inc.
Location:	King of Prussia, PA
Date of Exam:	11/3/2008
Exam Location:	National - Review Only, Woburn, MA
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☐ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

- ☐ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.
- ☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.
- ☐ I have limited the employee's assigned work. Recommended limitations are:

☐ In evaluating the employee, it was determined that the employee is probably fit for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.

☐	As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were performed in an OSHA-CDC approved laboratory.
☑	Other: Medical Extension Granted-Expires 11/21/2009

I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment.

For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.

Jerry Berke M.D. Date: 11/12/2008

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MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Christine P. McCarthy**
ID #	623021
Company:	Malcolm Pirnie, Inc.
Location:	King of Prussia, PA
Date of Exam:	5/29/2008 8:00:00 AM
Exam Location:	Concentra Medical Center-Plymouth Meeting, Plymouth Meeting, PA
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☑ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

☑ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.

☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.

☐ I have limited the employee's assigned work. Recommended limitations are:

☐ In evaluating the employee, it was determined that the employee is probably fit for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.

- ☐ As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were performed in an OSHA-CDC approved laboratory.
- ☐ Other:

I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment.

For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.

Jerry Berke M.D. Date: 6/9/2008

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MALCOLM PIRNIE

Certificate for Respirator Use

Employee Name:	**Christine P. McCarthy**
ID #:	623021
Company:	Malcolm Pirnie, Inc.
Location:	King of Prussia, PA
Date of Exam:	5/29/2008 8:00:00 AM
Exam Location:	Concentra Medical Center-Plymouth Meeting, Plymouth Meeting, PA

I have examined the above named individual and I certify that this employee

- [x] is physically capable
- [ ] is not physically capable

of using a negative pressure, air supplied respirator and/or purifying respirator subject to the following restrictions:

- [ ] Respirator use should be limited to air supplied or or powered air purifying respirators.
- [ ] No respirator use if wheezing and shortness of breath are evident.

Note: Prescription eyeglasses, contact lenses or beards cannot be worn with all types of respirators. Any interference with a face-to-face pieces seal is not acceptable. Contact lenses cannot be worn with any supplied air respirator. General safety recommendations indicate that contact lenses should not be worn in area where there may be a likelihood of chemical splashes.

Jerry Berke M.D. Date: 6/9/2008

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MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Thomas J. Quinn**
ID #	610059
Company:	Malcolm Pirnie, Inc.
Location:	Wilmington, DE
Date of Exam:	4/8/2008
Exam Location:	National - Review Only, Woburn, MA
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☐ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

- ☐ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.
- ☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.
- ☐ I have limited the employee's assigned work. Recommended limitations are:

- ☐ In evaluating the employee, it was determined that the employee is probably fit for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.
- ☐ As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were

performed in an OSHA-CDC approved laboratory. ☑ Other: Medical Surveillance Extension Granted - Expires 6/8/09
I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment. For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.
Jerry Berke M.D. Date: 9/11/2008

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Health Resources
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PS ✓

MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Jeriud D. Shoemaker**
ID #	[redacted] 1471
Company:	Malcolm Pirnie, Inc.
Location:	Wilmington, DE
Date of Exam:	4/9/2008 8:00:00 AM
Exam Location:	Christiana Care Occupational Health Services, Wilmington, DE
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☑ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

☑ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.

☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.

☐ I have limited the employee's assigned work. Recommended limitations are:

☐ In evaluating the employee, it was determined that the employee is probably fit for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.

☐ As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were performed in an OSHA-CDC approved laboratory.

☐ Other:

I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment.

For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.

Jerry Berke M.D. Date: 4/11/2008

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600 West Cummings Park, Suite 3400, Woburn, MA 01801 Tel: 800-350-4511 Fax: 781-938-4678

MALCOLM PIRNIE

Certificate for Respirator Use

Employee Name:	**Jeriud D. Shoemaker**
ID #:	[redacted]
Company:	Malcolm Pirnie, Inc.
Location:	Wilmington, DE
Date of Exam:	4/9/2008 8:00:00 AM
Exam Location:	Christiana Care Occupational Health Services, Wilmington, DE

I have examined the above named individual and I certify that this employee

- [x] is physically capable
- [ ] is not physically capable

of using a negative pressure, air supplied respirator and/or purifying respirator subject to the following restrictions:

- [ ] Respirator use should be limited to air supplied or or powered air purifying respirators.
- [ ] No respirator use if wheezing and shortness of breath are evident.

Note: Prescription eyeglasses, contact lenses or beards cannot be worn with all types of respirators. Any interference with a face-to-face pieces seal is not acceptable. Contact lenses cannot be worn with any supplied air respirator. General safety recommendations indicate that contact lenses should not be worn in area where there may be a likelihood of chemical splashes.

Jerry Berke M.D. Date: 4/11/2008

HEALTH RESOURCES

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Health Resources
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MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Denise A. Tegtmeyer**
ID #	610189
Company:	Malcolm Pirnie, Inc.
Location:	Baltimore, MD
Date of Exam:	11/3/2008
Exam Location:	National - Review Only, Woburn, MA
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☐ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

- ☐ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.
- ☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.
- ☐ I have limited the employee's assigned work. Recommended limitations are:

- ☐ In evaluating the employee, it was determined that the employee is probably fit for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.

- [ ] As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were performed in an OSHA-CDC approved laboratory.
- [x] Other: Request for Extension Granted Expires 11/30/09. Respirator clearance not issued at this time.

I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment.

For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.

Jerry Berke M.D. Date: 12/15/2008

HEALTH RESOURCES

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Control Panel

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MALCOLM PIRNIE

Certificate for Respirator Use

Employee Name:	**Christopher R. Ortolano**
ID #:	652615
Company:	Malcolm Pirnie, Inc.
Location:	King of Prussia, PA
Date of Exam:	12/24/2008
Exam Location:	Concentra Medical Center-Plymouth Meeting, Plymouth Meeting, PA

I have examined the above named individual and I certify that this employee

- [x] is physically capable
- [ ] is not physically capable

of using a negative pressure, air supplied respirator and/or purifying respirator subject to the following restrictions:

- [ ] Respirator use should be limited to air supplied or or powered air purifying respirators.
- [ ] No respirator use if wheezing and shortness of breath are evident.

Note: Prescription eyeglasses, contact lenses or beards cannot be worn with all types of respirators. Any interference with a face-to-face pieces seal is not acceptable. Contact lenses cannot be worn with any supplied air respirator. General safety recommendations indicate that contact lenses should not be worn in area where there may be a likelihood of chemical splashes.

Jerry Berke M.D. Date: 12/29/2008

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MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Christopher R. Ortolano**
ID #	652615
Company:	Malcolm Pirnie, Inc.
Location:	King of Prussia, PA
Date of Exam:	12/24/2008
Exam Location:	Concentra Medical Center-Plymouth Meeting, Plymouth Meeting, PA
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☑ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

☑ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.

☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.

☐ I have limited the employee's assigned work. Recommended limitations are:

☐ In evaluating the employee, it was determined that the employee is probably fit

for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined. ☐ As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were performed in an OSHA-CDC approved laboratory. ☐ Other:
I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment. For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.
Jerry Berke M.D. Date: 12/29/2008

HEALTH RESOURCES For the health of your organization

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600 West Cummings Park, Suite 3400, Woburn, MA 01801 Tel: 800-350-4511 Fax: 781-938-4678

MALCOLM PIRNIE

Printable Version

Surveillance Examination Medical Release for Job Placement

Employee Name:	**Nicole U. Walworth**
ID #	610229
Company:	Malcolm Pirnie, Inc.
Location:	Baltimore, MD
Date of Exam:	11/21/2008 10:00:00 AM
Exam Location:	Concentra Medical Center Baltimore, MD CMCOHC, Baltimore, MD
Medical Surveillance Exam:	☐ Asbestos ☑ Hazmat ☐ Deleading ☐ ☐ Initial ☑ Periodic ☐ Exit ☐

I have reviewed the examination of the above individual per OSHA regulations and in my opinion:

☑ I have not detected any medical condition which would place the employee at increased risk of health impairment from work.

☐ I have detected a medical condition which would place the employee at increased risk of health impairment from work.

☐ I have limited the employee's assigned work. Recommended limitations are:

☐ In evaluating the employee, it was determined that the employee is probably fit

for work, but laboratory abnormalities were noted which require follow-up before fitness can be determined.

- [ ] As part of the evaluation, Blood Lead and Zinc Protoporphyin testing were performed in an OSHA-CDC approved laboratory.
- [ ] Other:

I have informed the employee of the results of the medical examination and any medical condition which require further examination or treatment.

For asbestos examinations: The above employee has been informed of the health risks associated with smoking and asbestos exposure.

Jerry Berke M.D. Date: 12/19/2008

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600 West Cummings Park, Suite 3400, Woburn, MA 01801 Tel: 800-350-4511 Fax: 781-938-4678

MALCOLM PIRNIE

Certificate for Respirator Use

Employee Name:	**Nicole U. Walworth**
ID #:	610229
Company:	Malcolm Pirnie, Inc.
Location:	Baltimore, MD
Date of Exam:	11/21/2008 10:00:00 AM
Exam Location:	Concentra Medical Center Baltimore, MD CMCOHC, Baltimore, MD

I have examined the above named individual and I certify that this employee

- [x] is physically capable
- [ ] is not physically capable

of using a negative pressure, air supplied respirator and/or purifying respirator subject to the following restrictions:

- [ ] Respirator use should be limited to air supplied or or powered air purifying respirators.
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Jerry Berke M.D. Date: 12/19/2008

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

Appendix D - Quality Assurance Project Plan

MALCOLM PIRNIE

2118151 / BAL

FINAL
UNIFORM FEDERAL POLICY
QUALITY ASSURANCE PROJECT PLAN for

INTERIM MEASURES WORK PLAN FOR
MONITORING WELLS 125d and 126d
FORT GEORGE G. MEADE, MARYLAND

MARCH 2009

Prepared for:

UNITED STATES ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT
P.O. Box 1715
Baltimore, Maryland 21203

Prepared by:

MALCOLM PIRNIE, INC.
300 East Lombard Street, Suite 610
Baltimore, Maryland 21202

FINAL
UNIFORM FEDERAL POLICY
QUALITY ASSURANCE PROJECT PLAN for

INTERIM MEASURES WORK PLAN FOR
MONITORING WELLS 125d and 126d
FORT GEORGE G. MEADE, MARYLAND

DoD Delivery Order Contract Number: W912DQ-08-R-0012

Reviewed and Approved by:

Heather Polinsky
____
Heather Polinsky, Vice President
Program Officer
Malcolm Pirnie, Inc.

____
Dan Sheehan
Project Manager
Malcolm Pirnie, Inc.

Malcolm Pirnie, Inc., prepared this Uniform Federal Policy Quality Assurance Project Plan (QAPP) at the direction of the United States Army Corps of Engineers (USACE). This document should be used only with the approval of the USACE. This QAPP is based, in part, on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

MARCH 2009

TABLE OF CONTENTS

FIGURES

ATTACHMENTS
(provided electronically on enclosed CD)

ACRONYMS/ABBREVIATIONS

CA	Corrective Action
CCl_4	Carbon Tetrachloride
CIH	Certified Industrial Hygienist
CO	Contracting Officer
COC	Chain of Custody
CQC	Contract Quality Control
DoD	Department of Defense
DQI	Data Quality Indicator
EDD	Electronic Data Deliverable
FGGM	Fort George G. Meade
FSP	Field Sampling Plan
FTL	Field Team Leader
GC	Gas Chromatography
HASP	Health and Safety Plan
ID	Identification
LCS	Laboratory Control Sample
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
MDL	Method Detection Limit
MPC	Measurement Performance Criteria
MS	Mass Spectrometer/Spectrometry or Matrix Spike
MSD	Matrix Spike Duplicate
MW	Monitoring Well
NA	Not Applicable
No.	Number
PCE	Tetrachloroethylene
PM	Project Manager
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit
QSM	Quality Systems Manual
RI	Remedial Investigation
RL	Reporting Limit
RPD	Relative Percent Difference
SMO	Sample Management Officer
SOP	Standard Operating Procedure
TBD	To Be Determined
TCE	Trichloroethene
TCL	Target Compound List
UFP	Uniform Federal Policy
U.S.	United States
USACE	United States Army Corps of Engineers
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine

USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
^{o}C	Degrees Celsius
$\mu g/L$	Microgram(s) per Liter

INTRODUCTION

This Quality Assurance Project Plan (QAPP) is intended to integrate the technical and quality control aspects of the Fort George G. Meade (FGGM) Interim Measures Work Plan for Monitoring Wells 125d and 126d. It is supplemented by detailed information in the Work Plan. The QAPP details the planning processes for collecting data and describes the implementation of the quality assurance (QA) and quality control (QC) activities developed for this program. The purpose of this QAPP is to generate project data that are technically valid and legally defensible. The QAPP consists of four main components:

- Project management
- Measurement and data acquisition
- Assessment and oversight
- Data validation and usability

The above components will incorporate QA/QC requirements cited within the following documents:

- United States (U.S.) Environmental Protection Agency (USEPA) Requirements for Quality Assurance Project Plans, USEPA QA/R-5, March 2001.
- USEPA Guidance for the Data Quality Objectives Process, QA/G-4, February 2006.
- Uniform Federal Policy (UFP) for Quality Assurance Project Plans, Final Version March 2005

See Section 1 of the Interim Measure Work Plan for site background information.

QAPP Worksheet #1 -- Title and Approval Page (UFP-QAPP Manual Section 2.1)

Site Name/Project Name: Interim Measures Work Plan for Monitoring Wells 125d and 126d, FGGM, Maryland

Site Location: FGGM, Anne Arundel County, Maryland

Document Title: QAPP Interim Measures Work Plan for Monitoring Wells 125d and 126d, Fort George G. Meade, Maryland

Revision Number: 1

Lead Organization: USEPA Region 3

Preparer's Names and Organizational Affiliation: Rosemarie Fehrman, Malcolm Pirnie, Inc.

Preparers' Address, Telephone Number, and E-mail Address:
300 E. Lombard Street, Suite 1510, Baltimore, Maryland, 21202, (410) 332-4808, rfehrman@pirnie.com

Preparation Date (Day/Month/Year): February 5, 2009; Revised March 27, 2009

Contractor Organization's Project Manager/Date: Signatures

Printed Name/Organization: Daniel Sheehan / Malcolm Pirnie, Inc.

Contractor Organization's Project QA Officer/Date: Signature

Printed Name/Organization: Richard Brownell / Malcolm Pirnie

Lead Organization's Project Manager/Date: Signature

Printed Name/Organization: Paul Fluck / FGGM

Document Control Numbering System: 2118-151

QAPP Worksheet #2 -- QAPP Identifying Information (UFP-QAPP Section 2.2.4)

Site Name/Project Name: Interim Measures Work Plan for Monitoring Wells 125d and 126d
Site Location: Anne Arundel County, Maryland
Contractor Name: MALCOLM PIRNIE
Contractor Number: W912DR-08-R-0012

Contract Title: Interim Measures Work Plan for Monitoring Wells 125d and 126d Within the USEPA Region III
Work Assignment Number: Task Order 0001

1. Identify regulatory program: Comprehensive Environmental Response, Compensation and Liability Act

2. Identify approval entity: USEPA Region 3

3. The QAPP is (select one): ☐Generic ☒Project Specific

4. List dates of scoping sessions that were held:
   February 2, 2009 (Scoping Meeting)

5. List dates and titles of QAPP documents written for previous site work, if applicable:
   None

6. List organizational partners (stakeholders) and connection with lead organization:
   The project orgnizational partners include representatives from USEPA Region 3, U.S. Army Corps (USACE) of Engineers Baltimore District, U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Maryland Department of the Environment (MDE), FGGM, and Malcolm Pirnie.

7. List data users:
   USEPA Region 3, USACE, FGGM, MDE, Malcolm Pirnie

If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusions below:

QAPP Worksheet #2 – QAPP Identifying Information (continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Worksheet # or Related Documents
Project Management and Objectives		
2.1 Title and Approval Page	- Title and Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	2
Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	9 10 Section 1.0 of the Work Plan See Work Plan Map 1-1
Project Quality Objectives and Measurement Performance Criteria Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific Project Quality Objectives - Measurement Performance Criteria Table	11 12
2.7 Secondary Data Evaluation	- Sources of Secondary Data and Information - Secondary Data Criteria and Limitations Table	13
2.8 Project Overview and Schedule 2.8.1 Project Overview 2.8.2 Project Schedule	- Summary of Project Tasks - Reference Limits and Evaluation Table - Project Schedule/Timeline Table	14 15 16

QAPP Worksheet #2 – QAPP Identifying Information (continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Worksheet # or Related Documents
Measurement/Data Acquisition		
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	- Sampling Design and Rationale - Sample Location Map - Sampling Locations and Methods / Standard Operating Procedure (SOP) Requirements Table - Analytical Methods/SOP Requirements Table - Field QC Sample Summary Table - Sampling SOPs - Project Sampling SOP References Table - Field Equipment Calibration, Maintenance, Testing, and Inspection Table	17 18 19 20 21 22
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical SOPs - Analytical SOP References Table - Analytical Instrument Calibration Table - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	23 24 25
Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody (COC) Form and Seal	26 27
3.4 QC Samples 3.4.1 Sampling QC Samples 3.4.2 Analytical QC Samples	- QC Samples Table - Screening/Confirmatory Analysis Decision Tree	28
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records Table - Analytical Services Table - Data Management SOPs	29 30

QAPP Worksheet #2 – QAPP Identifying Information (continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Worksheet # or Related Documents
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments Table - Audit Checklists - Assessment Findings and Corrective Action (CA) Responses Table	31 32
4.2 QA Management Reports	- QA Management Reports Table	33
4.3 Final Project Report		
Data Review		
5.1 Overview		
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process Table - Validation (Steps IIa and IIb) Process Table - Validation (Steps IIa and IIb) Summary Table - Usability Assessment	34 35 36 37
5.3 Streamlining Data Review 5.3.1 Data Review Steps To Be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Types of Data Appropriate for Streamlining		36

QAPP Worksheet #3 -- Distribution List (UFP-QAPP Manual Section 2.3.1)

The following persons will receive a hardcopy of the approved QAPP, subsequent QAPP revisions, addenda, and amendments:

QAPP Recipients / Number of Copies	Title	Organization	Telephone Number	E-mail Address	Document Control Number
Bob Stroud / 3	Project Manager (PM)	USEPA Region 3	410-305-2748	Stround.robert@epa.gov	
L. Craig Maurer / 2	PM	USACE Baltimore	410-962-3506	Lester.C.Maurer@usace.army.mil	
Laurie Haines / 1	PM	USAEC	410-436-1626	Laurie.haines@us.army.mil	
Larry Tannenbaum / 1	Scientist	USACHPPM		larry.tannenbaum@us.army.mil	
Kurt Scarbro / 2	Federal Facilities Division	MDE	410-537-3475	kscarbro@mde.state.md.us	
Kerry Topovsky / 1	Restoration Advisory Board Member	Anne Arundel County			
Mick Butler / 1	Chief Env. Division	FGGM	301-677-9188	mick.butler@us.army.mil	
Paul Fluck / 1	Installation Restoration Manager	FGGM	301-677-9365	Paul.v.fluck@conus.army.mil	
Daniel Sheehan / 1	PM	Malcolm Pirnie	302-884-6919	dsheehan@pirnie.com	

QAPP Worksheet #4 -- Project Personnel Sign-Off Sheet (UFP-QAPP Manual Section 2.3.2)
Have copies of this form signed by key project personnel from each organization to indicate that they have read the applicable QAPP sections and will perform the tasks as described. Ask each organization to forward signed sheets to the central project file.

Project Personnel Sign-Off Sheet

Organization: USEPA Region 3

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Bob Stroud	PM	410-305-2748		

QAPP Worksheet #4 -- Project Personnel Sign-Off Sheet (UFP-QAPP Manual Section 2.3.2)
Have copies of this form signed by key project personnel from each organization to indicate that they have read the applicable QAPP sections and will perform the tasks as described. Ask each organization to forward signed sheets to the central project file.

Project Personnel Sign-Off Sheet

Organization: USACE-Baltimore District

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
L. Craig Maurer	PM	410-962-3506		
Clyde Lichtenwalner	Design Team Lead	410-779-0014		

QAPP Worksheet #4 -- Project Personnel Sign-Off Sheet (continued)

Have copies of this form signed by key project personnel from each organization to indicate that they have read the applicable sections of the QAPP and will perform the tasks as described. Ask each organization to forward signed sheets to the central project file.

☐ Worksheet Not Applicable (State Reason)

Project Personnel Sign-Off Sheet

Organization: Malcolm Pirnie

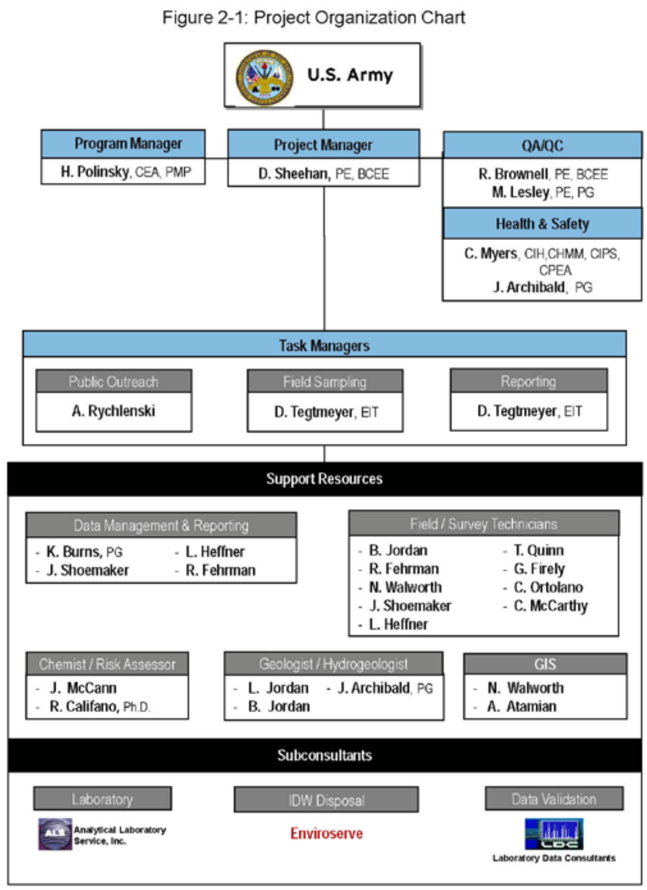
Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Heather Polinsky	Program Manager	410-230-9961		
Daniel Sheehan	PM	302-884-6919		
Jim McCann	Project Chemist	201-398-4310		

QAPP Worksheet #5 --Project Organizational Chart (UFP-QAPP Manual Section 2.4.1)

Project Organizational Chart

The description of project organization and the roles of the team members are summarized below:

FIGURE 1 – PROJECT ORGANIZATION CHART



GIS=Geographic Information Systems
IDW=Investigation Derived Waste

Project/Task Organization Overview

The project management team will consist of representatives from USEPA Region 3, USAEC, USACHPPM, MDE, Anne Arundel County, FGGM, and Malcolm Pirnie. The USACE will provide technical and contract oversight to the project. MDE will provide the USEPA with State approval during the project.

FGGM Off-Site Private Well Investigation Team Members

This section contains a description of the project organizational structure. Bob Stroud is the USEPA PM with responsibility for the FGGM Interim Measures for Monitoring Wells 125d and 126d. Malcolm Pirnie will conduct program and project management, contractor quality control, and site safety and health. Malcolm Pirnie will be responsible for project management, corrective measures implementation and operations and will provide project management to other subcontractors, including laboratory and water disposal services. Additional project team members from other companies will be subcontracted to Malcolm Pirnie. A brief description of the roles and responsibilities of project personnel is described in the following sections.

Changes to the contract quality control (CQC) staff organization require acceptance from the USACE Contracting Officer (CO) and must be submitted in writing seven days prior to the proposed change. Requests will include the names, qualifications, duties, and responsibilities of each proposed replacement. All such changes to CQC staff and notification/acceptance of the CO will be routed through the PM.

Team Members

A full description of Malcolm Pirnie management and support personnel is described in Appendix G1 of the Work Plan.

Subcontractor Team Members

Subcontractors may be utilized for performance of specific work activities associated with the field implementation. The following is a list of possible services to be subcontracted for the Site:

Laboratories –Subcontract laboratories will be required to perform the chemical testing. Analytical Laboratory Services, Inc. will perform the majority of the testing and provide the data in the specified format. Data validation will be conducted by Laboratory Data Consultants, a third-party data validator.

Other Contractor(s) (to be determined) – Other subcontractors will be employed for functions such as waste water disposal. The activities of these subcontractors are described in the Work Plan.

QAPP Worksheet #6 -- Communication Pathways (UFP-QAPP Manual Section 2.4.2)

Communication Pathways

Communication Drivers	**Responsible Entity**	**Name**	**Phone Number**	**Procedure** (timing, pathways, etc.)
Approval of Amendments to the QAPP	Malcolm Pirnie	PM (Dan Sheehan or designee)	302-884-6919	Obtain initial approval from PM. Submit documented amendments within 10 working days for transmittal to USACE and USEPA for approval.
Document Control	Malcolm Pirnie	PM (Dan Sheehan or designee)	302-884-6919	Project document preparation and distribution to USACE and USEPA for review and approval.
Stop Work and Initiation of CA	Malcolm Pirnie	PM (Dan Sheehan or designee)	302-884-6919	The PM communicates within 24 hours of stop work to the project organization by phone with confirming e-mail.
Real time modification, notifcations and approval	Malcolm Pirnie	PM (Dan Sheehan or designee)	302-884-6919	Real time modification to the project will require the approval of the PM and will be documented using the Field Change Request Form in Attachment 5 within five working days.
Reporting of serious issues	Malcolm Pirnie	PM (Dan Sheehan or designee)	302-884-6919	Report any serious issues to the USEPA and USACE and other concerned parties by e-mail or memo.
Meeting Minutes	Malcolm Pirnie	PM (Dan Sheehan or designee)	302-884-6919	Post approved meeting minutes or distribute by e-mail within five working days.
Sampling and shipping information	Malcolm Pirnie	Field Team Leader (FTL) (Denise Tegtmeyer)	410-230-9963	The Malcolm Pirnie FTL will communicate with laboratories regarding sample shipments.
Health and Safety Issues	Malcolm Pirnie	CIH (Chuck Myers)	914-641-2610	Will communicate with the field team and project managers regarding safety requirements and issues
Data Management	Malcolm Pirnie	Malcolm Pirnie Staff (Rosemarie Fehrman or designees)	410-332-4808	Will communicate with those responsible for recording data including lab and the data validator regarding chemistry data.

Communication Pathways

Data Quality Issues	Malcolm Pirnie	PM (Dan Sheehan or designee)	302-884-6919	Will investigate quality issues and document CAs. Serous issues will be reported as soon as possible
CA, audit finding	Malcolm Pirnie	PM (Dan Sheehan or designee)	302-884-6919	Problems or negative audit finding are reported to PM by e-mail within 3 days.

QAPP Worksheet #7 -- Personnel Responsibilities and Qualifications Table (UFP-QAPP Manual Section 2.4.3)

Personnel Responsibilities and Qualification Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Bob Stroud	PM	USEPA Region 3	Lead PM	Resume available on request
L. Craig Maurer	PM	USACE-Baltimore	PM	Resume available on request
Laurie Haines	PM	USAEC	PM	Resume available on request
Larry Tannenbaum	PM	USACHPPM	PM	Resume available on request
Kurt Scarbro	Federal Facilities Division	MDE	PM	Resume available on request
Cary Topovsky	Restoration Advisory Board	Anne Arundel County	Restoration Advisory Board	Resume available on request
Mick Butler	Chief Env. Division	FGGM	PM	Resume available on request
Paul Fluck	Installation Restoration Manager	FGGM	PM	Resume available on request
Heather Polinsky	Program Manager	Malcolm Pirnie	Program Manager	Vice President with extensive experience as Environmental Program Manager; resume included in Appendix G1 of the Work Plan
Richard Brownell	QA/QC Officer	Malcolm Pirnie	QA/QC Officer	Vice President with extensive experience as QA/QC Officer; resume included in Appendix G1 of the Work Plan
Daniel Sheehan	PM	Malcolm Pirnie	Management and Direction of Field Operations	Senior Associate with extensive experience as Environmental Project Manager; resume included in Appendix G1 of the Work Plan
Denise Tegtmeyer	FTL	Malcolm Pirnie	FTL	Experienced Project Engineer; resume included in Appendix G1 of the Work Plan
Jim McCann	Senior Project Chemist	Malcolm Pirnie	Chemist	MA/BS in Chemistry, 40+ years of experience in analytical chemistry, environmental testing,

Personnel Responsibilities and Qualification Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
				and quality assurance; resume included in Appendix G1 of the Work Plan
R. Fehrman, B. Jordan, N. Walworth, J. Shoemaker, L. Heffner, T. Quinn, G. Firely, C. Ortolano, C. McCarthy	Field Team Members	Malcolm Pirnie	Field team	Resumes included in Appendix G1 of the Work Plan

QAPP Worksheet #8 -- Special Personnel Training Requirements Table (UFP-QAPP Manual Section 2.4.4)

Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Field Sampler and On-Site personnel	Safety, first aid training as specified in the HASP	Malcolm Pirnie	Training dates kept in company/project training records	All field team members working on site.	All Malcolm Pirnie and subcontractor personnel working on site	Malcolm Pirnie Project Files
PM, QA/QC Officer Project Engineer	USACE Resident Management System-Quality Control System	USACE	Training dates kept in company/project training records	Project administration and monitoring personnel	All Malcolm Pirnie and subcontractor personnel working on site	Malcolm Pirnie Project Files

QAPP Worksheet #9 -- Project Scoping Session Participants Sheet (UFP-QAPP Manual Section 2.5.1)

Team member responsible for project planning are as follows:

Name	Title	Organization	Telephone Number	Fax Number	E-mail Address
L. Craig Maurer[1]	PM	USACE Baltimore	410-962-3506	-	Lester.C.Maurer@usace.army.mil
Laurie Haines[1]	PM	USAEC	410-436-1626	-	Laurie.haines@us.army.mil
Mick Butler	Chief, Environmental Division	FGGM Environmental Division	301-677-9188	-	Mick.butler@us.army.mil
Paul Fluck	Installation Restoration Manager	FGGM Environmental Division	301-677-9365	-	Paul.v.fluck@conus.army.mil
Heather Polinsky	Program Manager	Malcolm Pirnie	410-230-9961	410-230-0491	hpolinsky@pirnie.com
Denise Tegtmeyer	FTL	Malcolm Pirnie	410-230-9963	410-230-0491	dtegtmeyer@pirnie.com
Daniel Sheehan	PM	Malcolm Pirnie	302-884-6919	302-658-2068	dsheehan@pirnie.com
Rosemarie Fehrman	Project Support	Malcolm Pirnie	410-230-4808	410-230-0491	rfehrman@pirnie.com

[1]Not present for the meeting

To date, the following meetings have been held:
February 2, 2009 Scoping Meeting

Major topics of discussion:

- Necessary items to include in Work Plan are interim measures objectives and a community relations plan
- Health and Safety Plan (HASP) can be a short form.
- QAPP must be written per USEPA requirements.
- Any certified laboratory can be used for analysis.
- A map will be provided with the Work Plan.
- The three volatile organic compound (VOC) contaminants are the only compounds of concern for this project.
- The project schedule was also discussed.

QAPP Worksheet #10 -- Problem Definition (UFP-QAPP Manual Section 2.5.2)

Problem Definition
Based on the USEPA's review of groundwater sampling results from FGGM monitoring well (MW)-125d and MW-126d (Department of the Army, 2008), USEPA determined that consumption of the water sampled could pose an unacceptable risk to human health based on contaminants present in concentrations significantly exceeding maximum contaminant levels (MCLs). Specifically, USEPA found the concentration of carbon tetrachloride (CCl_4) in the water in MW-125d to be five times the MCL of 5 micrograms per liter (µg/L) and 10 times the MCL in MW-126d. The concentration of trichloroethylene (TCE) in the water of MW-126d was found to be three times the MCL of 5 µg/L. The concentration of tetrachloroethylene (PCE) in the water in MW-125d equals the MCL of 5 µg/L; the concentration of PCE in MW-126d is 10 times the MCL. Based on these concentrations, the USEPA estimates that the risk presented by the water, if consumed, significantly exceeds a Hazard Index of 1 for CCl_4 and exceeds a cancer risk of 1 x 10^{-4} due to PCE and CCl_4. In fact, USEPA estimates a Hazard Index as high as 6 and a cancer risk as high as 7 x 10^{-4} based on the concentrations detected in the samples (Department of the Army, 2009). A number of residential wells are located within 1 mile of the sampled wells. Interim Measures are needed to reduce the magnitude of risk presented by the water to nearby residents from consumption, inhalation, and contact with well water or vapor intrusion. Sampling will be conducted twice for the four monitoring wells. Representative groundwater sampling will also be conducted at any private local wells a minimum of twice over a two-month period. This sampling will be used to determine whether any currently used water sources are contaminated and, if so, to provided a basis for what immediate response, if any, should be taken. Please see the Work Plan for additional information.

QAPP Worksheet #11 -- Project Quality Objectives/Systematic Planning Process (UFP-QAPP Manual Section 2.6.1)

Project Quality Objectives / Systematic Planning Process Statements

Who will use the data? USEPA Region 3, USACE Baltimore District, MDE, FGGM, and Malcolm Pirnie
What will the data be used for? The data collected from groundwater will be used to determine whether any currently used water sources are contaminated and, if so, to provided a basis on what immediate response, if any, should be taken. A map of the site, with monitoring well locations, is given in the Work Plan as Map 1-1.
What types of data are needed? (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques) Analytical data needs include analyses of groundwater for VOCs.
How "good" do the data need to be in order to support the environmental decision? The data must be technically defensible and of sufficient quality as to support the project Scope of Work which are described in the Work Plan. See Worksheet 15, Reference and Evaluation Table, which summarizes the analytes with the associated project action levels and project quantitation limits (QLs) for each parameter.
How much data are needed? (number of samples for each analytical group, matrix, and concentration) Samples will include groundwater collected for test parameters listed above. Two sampling events will be conducted at each of the two monitoring wells. Two sampling events will also be conducted at each private well within a one-half-mile radius of the monitoring wells.
Where, when, and how should the data be collected/generated? Groundwater samples will be collected in February 2009 per the project schedule. The samples collected will be submitted to subcontract laboratory Analytical Laboratory Services, Inc. for analyses.
Who will collect and generate the data? Malcolm Pirnie field personnel will collect the samples. The samples will be analyzed for chemical analytical parameters by the assigned subcontract laboratories. Analytical Laboratory Services, Inc. was selected as the primary subcontract laboratory for the sample analyses to be performed.
How will the data be reported? The data will be reported by assigned laboratories to Malcolm Pirnie according to the requirements specified in Worksheet 29.
How will the data be archived? Electronic data will be archived by Malcolm Pirnie. Hard copies of laboratory reports will be delivered to Malcolm Pirnie for data evaluation and reporting. Electronic and hard copies of data packages will be sent to Malcolm Pirnie for the project files. Data will be transferred to the USACE upon completion of the project. Retrieval of data by others will be at the discretion of the USEPA. The length of time that records will be archived will be at the discretion of the USACE and USEPA. USEPA will receive the Electronic Data Deliverable (EDD) at the completion of the report.

Note: See the Work Plan for additional detail.

QAPP Worksheet #12 -- Measurement Performance Criteria Tables (UFP-QAPP Manual Section 2.6.2)

Measurement Performance Criteria (MPC) Table

Matrix	Water
Analytical Group	TCL Volatiles
Concentration Level	Low

Sampling Procedure	**Analytical Method/SOP**	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)**
GC/MS	Volatile Organic Compounds by (GC/MS): Capillary Column Technique	Sensitivity and Accuracy	Less than QLs	Equipment Blank and Trip Blank	S & A
		Precision	Relative Percent Difference (RPD) ≤30% for duplicate values greater than or equal to 5 times the QL	Field Duplicates	S & A
		Accuracy/Bias	Per requirements in DoD QSM	Laboratory Control Sample (LCS)	A
		Sensitivity	Less than ≤30% RL	Method Detection Limits (MDLs)	A
		Sensitivity	Less than ≤50% RL	Method Blank	A

Note:
DoD – Department of Defense
GC/MS – gas chromatography / mass spectrometry
QSM – Quality Systems Manual
RL – Reporting Limit
TCL – Target Compound List

Precision, Accuracy (or Bias), Representativeness, Completeness, and Comparability

To measure and control the quality of analyses, certain QA parameters are defined and utilized in data analysis activities. These parameters are defined below. The assigned subcontract laboratory will generally were applicable following the QA/QC criteria specified in the DoD QSM for Environmental Laboratories, Standard Methods or the applicable USEPA method. The subcontract laboratory chosen for this project must also hold National Environmental Laboratory Accreditation Conference certification for parameters where this certification is available.

Precision

Precision measures the reproducibility of data or measurements under specific conditions. Precision is a quantitative measure of the variability of a group of data compared to their average value. Duplicate precision is stated in terms of RPD or absolute difference between two measurements. Measurement of precision is dependent upon sampling technique and analytical method. Field duplicate and laboratory duplicate samples will be used to measure precision for project samples. Both sampling and analysis will be as consistent as possible. For a pair of measurements, RPD (or absolute difference) will be used, as presented below:

$$RPD(\%) = \frac{|D_1 - D_2|}{\left[\frac{(D_1 + D_2)}{2}\right]} \times 100$$

where: D_1 and D_2 = the two replicate values.

Accuracy/Bias

Accuracy measures the bias in a measurement system. Sources of error include the sampling process, field contamination, preservation, handling, shipping, sample matrix, sample preparation, and analysis technique. Analytical accuracy will be assessed through surrogate spike, matrix spike (MS), LCS, and/or quality check samples, where applicable. In general, accuracy is measured in terms of percent recovery (%R):

$$\%R = \frac{(SSR - SR)}{SA} \times 100$$

where: SSR = spike sample result
SR = sample result
SA = spike added to spiking matrix

Representativeness

Representativeness expresses the degree to which data accurately and precisely reflects a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the proper design and implementation of the sampling program and proper laboratory protocol. The sampling design created for this project was designed to provide data representative of Site conditions. During the development of the sampling designs, consideration was given to the past history of contamination in the study area, existing analytical data, physical setting, and processes. Representativeness will be satisfied by determining that the Field Sampling Plan (FSP) is followed, proper sampling techniques, preservation, and handling are used, proper analytical procedures are followed, and holding times for the samples are not exceeded in the laboratory.

Completeness
Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the laboratories used for this project will provide data that meet the QC acceptance criteria for 90%, or more, of all samples analyzed. Following the completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{COMPLETENESS } (\%) = \frac{\text{number of usable data}}{\text{number of samples collected for each parameter analyzed}} \times 100$$

The data validation process will be used to determine the quality and quantity of usable analytical data generated. The completeness acceptance criterion for samples collected in the field will be 98% of the quantity of samples planned for collection in the FSP. CA may be implemented to re-collect samples where necessary and possible (e.g., modifying a planned sample location, sample jars broken during shipment). Laboratory notification sample receipt and conditions will be used to determine, as soon as possible, whether any problems during sample shipment would necessitate recollection of samples.

Comparability
Comparability expresses the confidence with which one data set can be compared to another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data are expected to provide comparable data. The procedures used will be USEPA methodologies, which are well recognized and commonly used for environmental and geotechnical investigations.

Desired Method Sensitivity
Depending upon the use of the data (see Attachment 2 for data need and data use table) and the type of test parameter, specific QLs will be required. Worksheet 15 lists the required QLs, which specified for the definitive chemical parameters this project. In each case, these are well below the project action levels which are also listed or referenced. The analytical methods used for this project should have sensitivities well below these criteria.

QAPP Worksheet #13 -- Secondary Data Criteria and Limitations Table (UFP-QAPP Manual Section 2.7)

Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
Historical Data	USACHPPM, November 2008, Ground-Water Monitoring Report No. 38-EH-0ARN-09, Monitoring Wells (MW) MW-125d and MW-126d, Fort Meade, Maryland	A groundwater monitoring report that showed high values for TCE, PCE, and CCl_4. The sampling methodology and a map were also given.	To develop groundwater sampling analytical criteria.	The data is considered to be valid data which has been accepted by the USEPA.
Historical Data	EM Federal Corporation, August 2007, Fort George G. Meade Closed Sanitary Landfill, Groundwater Remedial Investigation (RI), Final Document	A groundwater RI for the adjacent Closed Sanitary Landfill that showed elevated values for TCE, PCE, and CCl_4. The sampling methodology, results, and a map were given.	To develop groundwater sampling analytical criteria.	The data is considered to be valid data which has been accepted by the USEPA.

QAPP Worksheet #14 -- Summary of Project Tasks (UFP-QAPP Manual Section 2.8.1)

Summary of Project Tasks

Sampling Tasks:
Groundwater samples will be collected for analytical parameters from the locations decribed in Worksheets 17 and 18 per the instructions in the Work Plan.

Analysis Tasks:
Groundwater samples will be analyzed for VOCs.

Quality Control Tasks:
The analytical and testing laboratories will be required to analyze QC samples listed in the documents and procedures listed in Worksheets 28.

Secondary Data:
Historical data available in the November 2008 Groundwater Monitoring Report will be used to develop groundwater sampling analytical criteria.

Data Management Tasks:
All field data and notes will be maintained in the project files. An EDD for the chemical data will provided by the laboratory in a project specific format derived from the USEPA Region 3 format (See Attachment 4). The laboratry chemistry data will be stored in an Acccess Data Base. The electronic data stored will include the following:

- Base map (electronic map of the site property boundries)
- Data provider (point of contact for EDD and file providing the information)
- Site (general infromation about the site
- Location (Global Positioning System information (xyz and data) regarding the sampling locations)
- Chemistry sample (information about sample collection)
- Chemistry test/result (information on analytical tests and results; no QC data)
- Monitoring wells data (includes lithologic descriptions only from the 15 performance monitoring wells)

Hardcopies of the analytical data including the raw data and related QC will also provided by the laboratory to be kept in project files. Also see Worksheet 29 for discussion of data management.

Documentation and Records:
All hardcopy data (field notebooks, photos, hard copies of COC forms, airbills etc.) will be taken to the Malcolm Pirnie Baltimore Office and kept in the project files.

Assessment/Audit Tasks:
SOPs will be reviewed prior to the performance of tasks.

Data Review Tasks:
Verification of sampling and laboratory data. Laboratory data will be validated by an independent third-party data validator.

QAPP Worksheet #15 -- Reference Limits and Evaluation Tables (UFP-QAPP Manual Section 2.8.1)

Reference Limits and Evaluation Table

Matrix: Water

Analytical Group: TCL Volatiles

Concentration Level: Low

Analyte	CAS Number	Project Action Limit [1] (µg/L)	Project QL (µg/L)	Analytical Method		Achievable Laboratory Limits	
				MDLs (µg/L))	Method QLs (µg/L)	MDLs (µg/L)	QLs (µg/L)
Chloromethane	74-87-3	0.5	1	Note 3	Note 4	0.2	1
Vinyl Chloride	75-01-4	2	1	Note 3	Note 4	0.2	1
Bromomethane	74-83-9	1,500[2]	1	Note 3	Note 4	0.2	1
Chloromethane	74-87-3	5,900[2]	1	Note 3	Note 4	0.3	1
1,1-Dichloroethene	75-35-4	32[2]	1	Note 3	Note 4	0.2	1
Acetone	67-64-1	5.0	10	Note 3	Note 4	4	10
Carbon Disulfide	75-15-0	0.5	1	Note 3	Note 4	0.1	1
Methylene Chloride	75-09-2	5,900[2]	1	Note 3	Note 4	0.1	1
trans-1,2-Dichloroethylene	156-60-5	140,000[2]	1	Note 3	Note 4	0.2	1
1,1-Dichloroethane	75-34-3	5	1	Note 3	Note 4	0.1	1
cis-1,2-Dichloroethylene	156-59-2	5	1	Note 3	Note 4	0.2	1
2-Butanone	78-93-3	5	10	Note 3	Note 4	3	10
Bromochloromethane	74-97-5	170[2]	1	Note 3	Note 4	0.2	1
Chloroform	67-66-3	70	1	Note 3	Note 4	0.2	1
1,1,1-Trichloroethane	71-55-6	200	1	Note 3	Note 4	0.2	1
Carbon Tetrachloride	56-23-5	5	1	Note 3	Note 4	0.2	1
Benzene	71-43-2	5	1	Note 3	Note 4	0.4	1
1,2-Dichloroethane	107-06-2	5	1	Note 3	Note 4	0.2	1
Trichloroethene	79-01-6	5	1	Note 3	Note 4	0.2	1
1,2-Dichloropropane	78-87-5	150[2]	1	Note 3	Note 4	0.2	1
Bromodichloromethane	75-27-4	170[2]	1	Note 3	Note 4	0.2	1
cis-1,3-Dichloropropene	10061-01-5	1,700[2]	1	Note 3	Note 4	0.2	1

QAPP Worksheet #15 (Continued)

Reference Limits and Evaluation Table
Matrix: Water

Analytical Group: TCL Volatiles

Concentration Level: Low

Analyte	CAS Number	Project Action Limit [1] (µg/L)	Project Quantitation Limit (µg/L)	Analytical Method		Achievable Laboratory Limits	
				MDLs (µg/L)	Method QLs (µg/L)	MDLs (µg/L)	QLs (µg/L)
4-Methyl-2-pentanone	108-10-1	0.5	0.5	Note 3	Note 4	1.3	5
Toluene	108-88-3	1,000	0.5	Note 3	Note 4	0.2	1
trans-1,3-Dichloropropene	10061-02-6	1,700[2]	0.5	Note 3	Note 4	0.2	1
1,1,2-Trichloroethane	79-00-5	200	0.5	Note 3	Note 4	0.2	1
Tetrachloroethyne	127-18-4	5	0.5	Note 3	Note 4	0.4	1
2-Hexanone	591-78-6	5	5.0	Note 3	Note 4	0.7	5
Dibromochloromethane	124-48-1	80[2]	0.5	Note 3	Note 4	0.2	1
1,2-Dibromoethane	106-93-4	0.5	0.5	Note 3	Note 4	0.3	1
Chlorobenzene	108-90-7	100	0.5	Note 3	Note 4	0.2	1
Ethylbenzene	100-41-4	700	0.5	Note 3	Note 4	0.3	1
o-Xylene	95-47-6	10,000	0.5	Note 3	Note 4	0.2	1
m,p-Xylenes	108-38-3/106-42-3	10,000	0.5	Note 3	Note 4	0.3	2
Styrene	100-42-5	100	0.5	Note 3	Note 4	0.2	1
Bromoform	75-25-2	80[2]	0.5	Note 3	Note 4	0.2	1
1,1,2,2-Tetrachloroethane	79-34-5	4	0.5	Note 3	Note 4	0.4	1
1,2-Dibromo-3-chloropropane	96-12-8	0.2	0.5	Note 3	Note 4	2.4	7

[1] Project Action Limits based on federal MCLs
[2] Project Action Limits based on Code of Maryland Regulations MCLs
[3] Formal MDLs are not listed for SW-846 8260.
[4] Method QLs given in Table B-3 of the DoD QSM

QAPP Worksheet #16 -- Project Schedule / Timeline Table (UFP-QAPP Manual Section 2.8.2)

See Section 4 of the Interim Measures Work Plan.

QAPP Worksheet #17 -- Sampling Design and Rationale (UFP-QAPP Manual Section 3.1.1)

Sampling Design and Rationale

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):

As explained in Worksheet #10, the USEPA has laid out a plan to sample groundwater at MW-125d and MW-126d after high concentrations of VOCs were found in November 2008. Groundwater samples will be collected twice at MW-125d and MW-126d over a 2-month period. In the same period, private wells within the study area (per USEPA guidance) will also be sampled for VOCs. Residents will be notified prior to the commencement of sampling.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations) [May refer to map or Worksheet #18 for details]:

Groundwater samples will be analyzed for VOCs (USEPA SW-846 8260B) to determine if VOC concentrations are below MCLs. Sampling concentrations are listed in Worksheet #15. A map of the area, which includes the locations of MW-125d and MW-126d, is included in the Work Plan. Groundwater samples will be collected from existing monitoring wells MW-125d, MW-126d, MW-123s, and MW-124s. These are two well clusters (125d/123s and 126d/124s) located in Odenton, Maryland. Each monitoring well will be sampled two times within a two-month period.

Groundwater samples will be collected from private and public wells within the study area. Each private well will be sampled two times within a two-month period. The number and locations of the private wells are currently unknown. Sampling locations of private wells will be based on availability of access from private owners. A signed Right-of-Entry will be necessary to access the site.

The full sampling approach is described in Section 3 of the Work Plan and the FSP.

QAPP Worksheet #18 -- Sampling Locations and Methods/SOP Requirements Table (UFP-QAPP Manual Section 3.1.1)

Sampling Locations and Methods/SOP Requirements Table

Sampling Location/ID Number	Matrix	Depth (feet)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates	Sampling SOP Reference[1]	Rationale for Sampling Location
MW-125d	Groundwater	94.88	VOC	Trace	2	SOP #1	See Worksheet #17
MW-126d	Groundwater	102.18	VOC	Trace	2	SOP #1	See Worksheet #17
MW-123s	Groundwater	45	VOC	Trace	2	SOP #1	See Worksheet #17
MW-124s	Groundwater	55	VOC	Trace	2	SOP #1	See Worksheet #17
Private Wells TBD[1]	Groundwater	TBD	VOC	Trace	TBD[2]	SOP #1	See Worksheet #17

Note:
ID – identification
TBD – to be determined

[1] Wells will be selected based on availability of access from private owners.
[2] It is believed that there will be between 20 and 25 wells based on USEPA estimates.

QAPP Worksheet #19 -- Analytical SOP Requirements Table (UFP-QAPP Manual Section 3.1.1)

Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type) [1]	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time[a] (preparation/ analysis)
Water	VOCs	Low	SW-846 8260B	3 x 40 ml	40 ml	HCl pH < 2, Cool 4 °C	Complete within 3 days of lab receipt

Note:
°C – degrees Celsius
HCl – hydrochloric acid
ml – milliliters

[a] Maximum holding time is calculated from the time the sample is collected to the time the sample is prepared/extracted.

QAPP Worksheet #20 -- Field QC Sample Summary Table (UFP-QAPP Manual Section 3.1.1)

Field QC Sample Summary Table

Matrix	**Analytical Group**	**Concentration Level**	**Analytical and Preparation SOP Reference**	**No. of Sampling Locations**	**No. of Field Duplicate Pairs**	**Inorganic No. of MS**	**No. of Field Blanks**	**No. of Equipment Blanks**	**No. of QA/QC Samples**	**Estimated Total No. of Field Samples to Lab**
Water	VOCs	Low	SW-846 8260B	4 MW plus private wells	5% of field samples	Not applicable (NA)	One per cooler	At least once a week, but no more than once a day	TBD	120

Note:
No. – number

QAPP Worksheet #21 -- Project Sampling SOP References Table (UFP-QAPP Manual Section 3.1.2)

Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work?	Comments
SOP 1	Groundwater Level Measurement Generally Accepted Procedure	Malcolm Pirnie	Electronic water level indicator, field book, decontamination materials	No	See FSP, Appendix A
SOP 2	Field Documentation	Malcolm Pirnie	Log books, maintenance logs, COC forms, laboratory data sheets, etc.	No	See FSP, Appendix A
SOP 3	Low Stress Groundwater Sampling Generally Accepted Procedure	Malcolm Pirnie	Multi-parameter water quality monitoring system, pump, polyethylene tubing, flow measurement device, water level probe	No	See FSP, Appendix A
SOP 4	Procedure for Management and Disposal of Investigation Derived Waste	Malcolm Pirnie	Storage and disposal containers, transfer equipment	No	See FSP, Appendix A
SOP 5	Sample Custody and Tracking	Malcolm Pirnie	Documentation and labels	No	See FSP, Appendix A
SOP 6	Sample Management	Malcolm Pirnie	COC and shipping labels	No	See FSP, Appendix A
SW846-8260B	Volatile Organic Compounds by GC/MS: Capillary Column Technique	Analytical Laboratory Services	GC/MS	No	See Attachment 1
EPA540-R-07-06	Contract Laboratory Program Guidance for Field Samplers, EPA540-R-07-06, July 2007	USEPA	Note book, personal computer, safety glasses, gloves, sample coolers, ice, sample labels and other materials described in the document etc.	No	To be used by the field team as a guide for collecting and preparing samples.

QAPP Worksheet #22 -- Field Equipment Calibration, Maintenance, Testing, and Inspection Table (UFP-QAPP Manual Section 3.1.2.4)

Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	CA	Responsible Person	SOP Reference
Electronic Water Level Indicator	See SOP 1	See SOP 1	See SOP 1	See SOP 1	Daily when in use	See SOP 1	See SOP 1	FTL	See SOP 1

QAPP Worksheet #23 -- Analytical SOP References Table (UFP-QAPP Manual Section 3.2.1)

Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
SW 846-8260B	Volatile Organic Compounds by (GC/MS): Capillary Column Technique	Definitive	VOCs in water	GC/MS	Analytical Laboratory Services, Inc.	No

Analytical Methods
If a subcontract laboratory is used for chemical analyses, the laboratory must be qualified in the analytical methods and, where applicable, certified through the programs listed below:

- National Environmental Laboratory Accreditation Program
- DoD QSM compliant

Each subcontract laboratory utilized for the project will undergo an evaluation to determine if their experience and capability in the requested analytical methods are appropriate for the project. When possible the test methods selected must be USEPA methods.

The analytical methods were selected based on the project objectives established for the project. Depending on the use of the data, different analytical methods may be required for the same parameters. The following subsections describe the techniques proposed for key laboratory analytical methods. Depending on the capabilities of laboratories employed to support the project, modifications may be made to the specific test methods and quality assurances described herein so long as the data quality is sufficient to meet project objectives, and all modifications are documented and approved by the PM.

QAPP Worksheet #24 -- Analytical Instrument Calibration Table (UFP-QAPP Manual Section 3.2.2)

Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP References
GC/MS	Check of mass spectral ion intensities (tuning procedure) SW-846 8260B	Prior to initial calibration and calibration verification (every 12 hours)	Must meet the USEPA method requirements before samples are analyzed.	Retune instrument and verify the tune acceptability	Lab Manager / Analyst	
	Minimum five-point initial calibration for target analytes, lowest concentration standard at or near the RL	Initial calibration prior to sample analysis	8260B: The minimum average for Chloromethane, 1,1-Dichloroethane, Bromoform is 0.05; for Chlorobenzene and 1,1,2,2-Tetrachloroethane is 0.1. 8260B: RSD is less than or equal to 15% for target analytes	Correct problem, then repeat initial calibration	Lab Manager / Analyst	
	Second-source calibration verification	Once per five-point initial calibration	Less than 25% difference for all target analytes	Correct problem, then repeat second-source verification. If it still fails, then repeat initial calibration	Lab Manager / Analyst	

Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP References
	Daily calibration verification	Before sample analysis and at beginning of every 12 hours of analysis time	8260B: The minimum average SPCC RF for Chloromethane, 1,1-Dichloroethane, Bromoform is 0.05; for Chlorobenzene and 1,1,2,2-Tetrachloroethane is 0.1. 8260B: The percent drift/ difference for RF is less than or equal to 20% for CCC analytes.	Correct problem, then repeat CCV. If still fails, repeat initial calibration	Lab Manager / Analyst	
	Internal standards	During acquisition of calibration standard	Areas within -50% to +100% of last initial calibration mid-point for each CCV	Inspect MS and GC for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning	Lab Manager / Analyst	

QAPP Worksheet #25 -- Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table (UFP-QAPP Manual Section 3.2.3)

Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	CA	Responsible Person	SOP Reference[1]
GC/MS	Clean sources, maintain vacuum pumps	Tuning	Instrument performance and sensitivity	Service vacuum pumps twice per year, other maintenance as needed	Tune and CCV pass criteria	Recalibrate instrument	Chemist	
GC/MS	Change septum, clean injection port, change or clip column, install new liner, change trap	Response factors and chromatogram review	Instrument performance and sensitivity	As needed	Tune and CCV pass criteria	Reinspect injector port, cut additional column, reanalyze CCV, recalibrate instrument	Chemist	

The maintenance of the analytical instruments, including the testing activity, inspection activity, frequency, acceptance criteria, responsible person and SOP reference must be documented in the laboratory's QC manual. See the SOPs referenced in Worksheet #23.

QAPP Worksheet #26 -- Sample Handling System (UFP-QAPP Manual Appendix A)

Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Malcolm Pirnie Field Team supervised by the FTL
Sample Packaging (Personnel/Organization): Malcolm Pirnie Field Team
Coordination of Shipment (Personnel/Organization): Malcolm Pirnie Field Team
Type of Shipment/Carrier: Courier for overnight delivery to laboratory
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Analytical Laboratory Services, Inc.
Sample Custody and Storage (Personnel/Organization): Analytical Laboratory Services, Inc.
Sample Preparation (Personnel/Organization): Analytical Laboratory Services, Inc.
Sample Determinative Analysis (Personnel/Organization): Analytical Laboratory Services, Inc.
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples will not be stored in the field, but will be shipped within 24 hours of collection. If, in a emergency, samples are stored in the field, they will be kept in a cooler or transferred to a refrigerator kept at 4 ^{o}C.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): Sample extraction and digestion must be conducted according to the holding time requirements given in Worksheet 19. VOCs analyses water samples must be completed within 3 days of receipt of the samples by the laboratory. Refer to Worksheet 19 for holding times for all other parameters.
Biological Sample Storage (No. of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: Analytical Laboratory Services, Inc.
Number of Days from Analysis: At least 60 days

QAPP Worksheet #27 -- Sample Custody Requirements (UFP-QAPP Manual Section 3.3.3)

Sample Custody Requirements

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): The field sample custody procedures including sample packing, shipment, and delivery requirements are discussed in the text below.
Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal): Each laboratory will have a sample custodian who accepts custody of the samples and verifies that the information on the sample labels matches the information on the COC. The sample custodian will document any discrepancies and will sign and date all appropriate receiving documents. The sample custodian will also document the condition of the samples upon receipt at the laboratory. The laboratory sample custody procedures ware discussed further in the following text.
Sample Identification Procedures: Each sample will be assigned a unique samples number which will include information on the sample location. The sample identification scheme to be used is fully described in Sections 3.12 and 3.13 of the FSP.
COC Procedures: A COC record will accompany the samples from the time of sampling through all transfers of custody. Examples COC forms are presented. Sample custody is discussed in SOP 2.

Sample Handling and Custody

Sample custody procedures ensure the timely, correct, and complete analysis of each sample for all parameters requested. A sample is considered to be in someone's custody if it:

- is in his/her possession;
- is in his/her view, after being in his/her possession;
- is in his/her possession and has been placed in a secured location; or
- is in a designated secure area.

Sample custody documentation provides a written record of sample collection and analysis. The sample custody procedures provide for specific identification of samples associated with an exact location, the recording of pertinent information associated with the sample, including time of sample collection and any preservation techniques, and a COC record, which serves as physical evidence of sample custody. Custody procedures will be similar to the procedures outlined in the USACE's Requirements for the Preparation of Sampling and Analysis Plans (USACE, 2001) and the USEPA's Contract Laboratory Program Guidance for Field Samplers (USEPA, 2004). The COC documentation system provides the means to individually identify, track, and monitor each sample from the time of collection through final data reporting. Sample custody procedures are developed in three areas: sample collection, laboratory analysis, and final evidence files, which are described below. See Attachment 5 for a copy of SOP No. HW-32, *Implementing the National Strategy for Procuring Analytical Services for All OSWER Programs,* which was issued in 2005. It includes the Region 2 requirements for obtaining analytical services for superfund projects and outlines the arrangements that must be made through the Region 2 Regional Sample Control Coordinator and gives examples forms that must be submitted.

Field Sample Handling and Custody

Field records provide a means of recording information for each field activity performed at the Site. COC procedures document pertinent sampling data and all transfers of custody until the samples reach the analytical laboratory. The sample packaging and shipment procedures summarized below will ensure that the samples arrive at the laboratory with the COC intact. Refer to SOP No. 2 in Appendix A of the FSP for sample management information, and SOP No. 3 in Appendix A of the FSP for sample preservation procedures. Worksheet 19 lists the specific sample preservation requirements for each test method.

Field Procedures

The general responsibilities of the field team are listed below:

- The field sampler is personally responsible for the care and custody of the samples until they are transferred to the Sample Management Officer (SMO) or until they are properly dispatched. As few people as possible should handle the samples.
- The FTL, or designee, is responsible for entering the proper information in the field logbook, including all pertinent information such as sample identification number, date and time of sample collection, type of analysis, and description of sample location. The information entered into the field logbook will be used to generate a COC.
- All sample containers will be labeled with the project identification, sample number, matrix, type of analysis required, and preservation requirements.
- The samples will be properly preserved, bagged, and packed into coolers. The original COC form will be placed into the lead cooler and will be shipped to the laboratory.
- The SMO or designee will review all field activities to determine whether proper custody procedures were followed during the field work and if additional samples are required.

Field Records

The field logbook will provide the means of recording data collection activities. Entries will be described in as much detail as possible so that persons going to the site can reconstruct a particular situation without reliance on memory. At the beginning of each day, the date, start time, weather, and names of all sampling team members present will be entered. The names of visitors to the site and the purpose of their visit will also be recorded. All field measurements, as well as the instrument(s), will be noted.

Sample Identification System

All samples collected from the site must be identified with a sample label in addition to an entry on a COC record. Indelible ink will be used to complete sample labels and handwritten COC records.

QAPP Worksheet #28 -- QC Samples Table (UFP-QAPP Manual Section 3.4)

QC Samples Table

Matrix	Water
Analytical Group	Volatile Organics
Concentration Level	Low
Sampling SOP	Volatile Organic Compounds by (GC/MS): Capillary Column Technique
Analytical Method/ SOP Reference	SW-846 8260B
Sampler's Name	Field Sampling Crew
Field Sampling Organization	Malcolm Pirnie
Analytical Organization	Analytical Laboratory Solutions, Inc.
No. of Sample Locations	4 MW + private wells

QC Sample:	**Frequency/Number**	**Method/SOP QC Acceptance Limits**	**CA**	**Person(s) Responsible for CA**	**DQI**	**Measurement Performance Criteria**
Equipment Blank and Trip Blank	Equipment blanks at least once a week but no more than once a day. Trip Blank with every cooler	Worksheet 12	Investigate source of contamination	Project Engineer/FTL	Sensitivity	Less than QL
Field Duplicates	1 per 20 field samples	Worksheet 12	If the limits exceed limits for the field replicate, this will be addressed by the Data Reviewer	Project Engineer/FTL and or Laboratory	Precision	RPD $\leq$30% for VOCs for duplicate values greater than or equal to 5 times the QL

QC Samples Table

Matrix	Water					
Analytical Group	Volatile Organics					
Concentration Level	Low					
Sampling SOP	Volatile Organic Compounds by (GC/MS): Capillary Column Technique					
Analytical Method/ SOP Reference	SW-846 8260B					
Sampler's Name	Field Sampling Crew					
Field Sampling Organization	Malcolm Pirnie					
Analytical Organization	Analytical Laboratory Solutions, Inc.					
No. of Sample Locations	4 MW + private wells					
QC Sample:	**Frequency/Number**	**Method/SOP QC Acceptance Limits**	**CA**	**Person(s) Responsible for CA**	**DQI**	**Measurement Performance Criteria**
Method Blank	One per analytical batch (8260B)	No target analytes ≥ ½ RL. For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements	Correct problem, then re-extract and reanalyze method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Lab Manager / Analyst	Accuracy/Bias Contamination	No target analytes ≥ RL

QC Samples Table

Matrix	Water
Analytical Group	Volatile Organics
Concentration Level	Low
Sampling SOP	Volatile Organic Compounds by (GC/MS): Capillary Column Technique
Analytical Method/ SOP Reference	SW-846 8260B
Sampler's Name	Field Sampling Crew
Field Sampling Organization	Malcolm Pirnie
Analytical Organization	Analytical Laboratory Solutions, Inc.
No. of Sample Locations	4 MW + private wells

QC Sample:	**Frequency/Number**	**Method/SOP QC Acceptance Limits**	**CA**	**Person(s) Responsible for CA**	**DQI**	**Measurement Performance Criteria**
MS/MSD	One MS/MSD per analytical/preparation batch	QSM or laboratory statistically derived control limits	Identify problem; if not related to matrix interference, re-extract and reanalyze MS/MSD and all associated batch samples in accordance with DoD QSM requirements	Lab Manager / Analyst	Precision and Accuracy/Bias	QSM or laboratory statistically derived control limits
LCS	One LCS per analytical/preparation batch	QSM or laboratory statistically derived control limits in accordance with DoD QSM requirements	Correct problem, then re-extract and reanalyze the LCS and all associated batch samples in accordance with DoD QSM requirements	Lab Manager / Analyst	Precision and Accuracy/Bias	QSM or laboratory statistically derived control limits

QC Samples Table

Matrix	Water					
Analytical Group	Volatile Organics					
Concentration Level	Low					
Sampling SOP	Volatile Organic Compounds by (GC/MS): Capillary Column Technique					
Analytical Method/ SOP Reference	SW-846 8260B					
Sampler's Name	Field Sampling Crew					
Field Sampling Organization	Malcolm Pirnie					
Analytical Organization	Analytical Laboratory Solutions, Inc.					
No. of Sample Locations	4 MW + private wells					
QC Sample:	**Frequency/Number**	**Method/SOP QC Acceptance Limits**	**CA**	**Person(s) Responsible for CA**	**DQI**	**Measurement Performance Criteria**
Surrogate standards	Every sample, spiked sample, standard, and method blank	In accordance with DoD QSM criteria and requirements	Correct problem, then re-extract and reanalyze all affected samples in accordance with DoD QSM requirements	Lab Manager / Analyst	Accuracy/Bias	QSM or laboratory statistically derived control limits
MDLs	Once per 12-month period or quarterly MDL verification	Detection limits established will be below the RLs in accordance with DoD QSM requirements	Correct problem, then repeat the MDL study in accordance with DoD QSM requirements	Lab Manager / Analyst	Sensitivity	Meets project RL requirements

QAPP Worksheet #29 -- Project Documents and Records Table (UFP-QAPP Manual Section 3.5.1)

Project Documents and Records Table

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records	Other
Field notes and or data sheets	Sample collection and custody records.	Copies of field notes COC records will be made and stored in the project files	Field Sampling Audit Check List	Prepared and submit to Project Team
Analytical and Testing Sample Data Packages	Custody records	Copies of all analytical data deliverables stored in laboratory and transfered to project files, instrument calibration records, lab, raw data stored in electronically or in hardcopy	Project Records	
Laboratory Chemistry EDDs	-	The EDDs received from the lab containing the chemistry data will be stored in an Access data base.	Project Records	
Data Validation Reports for any subcontract laboratory chemical data	Custody records	Stored in project files	QA Review sheet	
Final Interim Measures Report	-	Stored in the project files	-	Prepared and submit to Project Team
Field Notes and or data sheets	Sample collection and custody records.	Copies of field notes and COC records will be made and stored in the project files	Field Sampling Audit Check List	Prepared and submit to Project Team
Project log books	Project records and field notes	Copes of the Project lags will be kept in the project files	Project Records	

QAPP Worksheet #30 -- Analytical Services Table (UFP-QAPP Manual Section 3.5.2.3)

Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Location/ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number
Aqueous	VOCs	Low	TBD. A site map is included as Map 1-1 of the Work Plan.	Volatile Organic Compounds by (GC/MS): Capillary Column Technique	3 to 5 days	Analytical Laboratory Services, Inc. 34 Dogwood Lane Middletown, PA 17057 Contact: Cindy Dunkes (410) 858-7245	A backup subcontract laboratory has not been assigned at this time.

QAPP Worksheet #31 -- Planned Project Assessments Table (UFP-QAPP Manual Section 4.1.1)

Planned Project Assessments Table

Assessment Type	**Frequency**	**Internal or External**	**Organization Performing Assessment**	**Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)**	**Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)**	**Person(s) Responsible for Identifying and Implementing CA (Title and Organizational Affiliation)**	**Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)**
QC Reports of any nonconformance	Daily as required	Internal	Malcolm Pirnie	Field Team Members	PM	PM	PM
Field Safety Audit	Initially within the first week of field work and then at least quarterly if necessary	Internal	Malcolm Pirnie	Site Safety and Health Specialist	PM and FTL	QA/QC Officer	QA/QC Officer
Technical System Internal Audit	Initially within the first week and then at least quarterly if necessary	Internal	Malcolm Pirnie	Field Team Members	PM	PM	PM

QAPP Worksheet #32 -- Assessment Findings and CA Responses (UFP-QAPP Manual Section 4.1.2)

Assessment Findings and CA Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of CA Response Documentation	Individual(s) Receiving CA Response (Name, Title, Org.)	Timeframe for Response
Non-Conformance	See below	PM	As soon as possible	Complete nonconformance form	PM	As soon as possible
Technical System Field Audits	See Technical Systems Audit report SOP in Attachment	PM	Within week	See below section on Field CAs	FTL and PM	Within week
Internal Laboratory Audits	Per Laboratory Quality Manual	Laboroatory Management or designee	Annually	Per Laboratory Quality Manual	Laboratory Personnel	Per Laboratory Quality Manual

Non-Conformance

A non-conformance is defined as an identified or suspected deficiency or discrepancy with regard to an approved document (e.g., improper sampling procedures, improper instrument calibration, calculation, computer program); or an item where the quality of the end product itself or subsequent activities using the document or item would be affected by the deficiency; or an activity that is not conducted in accordance with the established plans or procedures.

Any staff member engaged in project work that discovers or suspects a nonconformance is responsible for initiating a nonconformance report to the PM, who will evaluate each nonconformance report and provide a disposition that describes the actions to be taken. The PM will verify that no further project work dependent on the nonconforming item or activity is performed until approval is obtained and the non-conformance is properly addressed. If the nonconformance is related to material, the PM shall be responsible for making or identifying, with the non-conformance report number, the nonconforming item (if practical) and indicating that it is nonconforming and is not to be used.

A copy of each nonconformance report will be included in the project file. Copies of all non-conformances shall be maintained by the PM.

QAPP Worksheet #33 -- QA Management Reports Table (UFP-QAPP Manual Section 4.2)

Identify the frequency and type of planned QA Management Reports, the projected delivery date, the personnel responsible for report preparation, and the report recipients.

QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Daily Quality Control Report	Daily	At the end of each week, or daily when significant issues are identified	FTL	USEPA
Progress Reports	Monthly	End of each month	PM	USEPA
Technical System Interanl Audit Report	Initally within the first month of field work and with follow up audits if significant deficiencies are found	Month after fieldwork begins	FTL	PM
Safety Audit Report	Per the Accident Prevention Plan	When deficiences are detected	FTL	PM
Nonconformance Report	When deficiences are detected	When deficiences are detected	FTL	PM
Data Validation Report	After laboratory data are received	Within 45 days after receiving data	Data Validator	PM

The USACE PM and USEPA PM will receive several types of management reports. These will include the results of any CA reports and data validation reports. In addition, the progress report will contain a section on QC reports. Problems or issues that arise between regular reporting periods may be identified to program management at any time. Information included in the progress report will include the following:

Results of Technical System field audits conducted during the period include:

- an assessment of any problems with the measurement data, including accuracy, precision, completeness, representativeness, and comparability;
- listing of the nonconformance reports, including Stop-Work Orders issued during the period, related CAs undertaken, and an assessment of the results of these actions; and

- identification of significant QA problems and recommended solutions, as necessary.

QAPP Worksheet #34 -- Verification (Step I) Process Table (UFP-QAPP Manual Section 5.2.1)

Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
COC	Form will be internally reviewed upon completion and verified against field logs and laboratory reports. Review will occur with the completetion of each report	I	FTL
Field report	Field reports will be verified with the field log books	I	FTL
Laboratory data packages	Laboratory data packages will be used to verify the report results in the project report and against QAPP criteria	I	FTL

Data Verification

The FTL or designee is required to review the logbook entries for errors or omissions. This information is transmitted to the PM for correction.

In addition, the PM or designee is responsible for reviewing field data for completeness and to verify that the field crew followed the QC requirements detailed in this QAPP (e.g., collecting QC samples at the required frequency, response checking the field instruments). If any problems are found, the PM or designee will document the problems.

Once the PM designee reviews the field data, he/she signs the bottom of the log book page as reviewed and approved.

QAPP Worksheet #35 -- Validation (Steps IIa and IIb) Process Table (UFP-QAPP Manual Section 5.2.2)

Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	Project and Field Documents	COC, sample receipt forms, case narratives, communication logs, and CA forms will be reviewed to ensure that samples were collected, transported, and analyzed for the requested parameters, and the laboratory used appropriate analytical methods.	Data validators
IIa/IIb	QC Summary Forms	In addition to project and field documents, the VOC QC sample results will also be evaluated against the MPC and the data flagged with validation qualifiers, accordingly.	Data validators
IIb	Raw Data	In addition to the requirements noted above, VOC raw data are reviewed, calculations are checked, and summary forms are verified to be accurate.	Data validators

The PM or designee will ensure that the methods and SOPs used during the project support implementation of the QAPP. The validator will use the COCs to examine traceability of the sample data from collection to the generation of the project report. If there are any deviations from the procedures laid out in the project plans, the PM will determine what the impact is to the project.

QAPP Worksheet #36 -- Validation (Steps IIa and IIb) Summary Table (UFP-QAPP Manual Section 5.2.2)

Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa/IIb	Soil/Ground Water	TCL VOC data	Low/Medium	National Functional Guidelines	The laboratory and Malcolm Pirnie

Subcontractor Laboratory Data (Analytical Laboratory Services, Inc.)

The data validator will conduct a validation review of at least the first sample delivery group received for VOCs. This means that the validator will review the raw data and logbook sheets and will recalculate 100% of the sample and QC sample results. If this validation indicates that the laboratory is producing acceptable data, the validation reviews may be scaled back and subsequent data packages will have a less rigorous review. The less rigorous validation would include a review of the raw data, but would not include calculation checks and a check for transcription errors.

After data validation of the VOC results is completed, a data validation report will be generated. The report will contain information regarding the parameters that are qualified, the reason for the qualification, and the direction of the bias (only for parameters qualified as estimated), when possible. Based upon the quality assurance review of the analytical data, specific codes (data qualifiers or 'flags') will be placed next to results to provide an indication of the quantitative and qualitative reliability of the results. The data qualifier codes in the National Functional Guidelines will be used for this project. Qualifiers assigned by laboratories will be defined by each laboratory in their data package and will be superseded by the data validator's qualifiers.

Field Data Evaluation

Options for evaluation of the field data for this program include reviewing the data entered into the logbooks to ensure that errors have not been made. The field data documented includes data generated during measurement of field parameters, observations, results of any QC sample analyses, and field instrument calibrations. These tasks will be the responsibility of a Data Reviewer with oversight by the Project QC Officer or designee.

QAPP Worksheet #37 -- Usability Assessment (UFP-QAPP Manual Section 5.2.3)

Usability Assessment

An experienced data validator will assigned to validate chemical data in accordance with the protocols outlined on Worksheet 36.
As part of the data validation process, the validator identifies any qualifications, the bias, if known, of the data, applies qualifiers and comments on the usability of the data. Once the validation package is received from the validator, the Project Quality Officer or a designee reviews it. Any QA/QC problems with the validation will be discussed with the validator and laboratories. The representatives of the data will be qualitatively assessed by evaluating whether the procedures outlined in this QAPP were followed. Completeness will be assessed using only validated data. Rejected (R) qualified data will be counted against completeness criteria. QC parameters used to assess completeness including holding times, surrogate/deuterated compound recoveries, laboratory and field duplicate RPDs, MS / matrix spike duplicates (MSDs), RPDs, and LCSs, and MS/MSD recoveries. Sample results that do not meet relevant QC criteria due to matrix effects, and re-analyzed past holding-time due to QC CA, and/or are qualified as estimated (J) because values are less than the RL will be considered usable and will not count against completeness assessment. The comparability evaluation will include a qualitative assessment of analytical techniques and data quality. Specific items to be assessed for comparability include sampling and analytical method equivalency, preservation methods, detection limits, reporting units, equivalent laboratory facilities and personnel (if applicable), QA/QC programs, project objectives, and precision and accuracy assessments. Where the aforementioned factors are generally equivalent, data sets used for comparison will be considered comparable. Relevant calculation will be performed as described in Worksheet 12.
The usability of the data is the responsibility of the project team. The PM will reconvene the project team after the all data have been validated and reviewed. The data completeness goals defined by the measurement performance criteria given in Worksheet 12 will be considered. The data users performing the remediation design will participate in a usability assessment and to determine if the data are sufficient to meet the data needs and the project objectives and will recommend if additional data are required. A data assessment report will be issued by the PM or his designee documenting the results of the usability assessment review performed by the project team. The report will be submitted to the USEPA and USAEC for their approval and regulatory review.

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UNCONTROLLED DOCUMENT

Document Title: Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS): Capillary Column Technique

Document Control Number: ______________________

Organization Title: ANALYTICAL LABORATORY SERVICE, INC. (ALSI)
Address: 34 Dogwood Lane
Middletown, PA 17057

Phone: (717) 944-5541

Approved by:

________________________	________
Helen MacMinn, Quality Assurance Manager	Date
________________________	________
Christopher Kahler, GC/MS Supervisor	Date
________________________	________
Erin Ripka, Validator	Date

Annual Review:

________________________	________
Reviewed By	Date Reviewed
________________________	________
Approved By	Date Approved

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Reviewed By	Date Reviewed
________________________	________
Approved By	Date Approved

Annual Review (continued):

Reviewed By Date Reviewed

Approved By Date Approved

Reviewed By Date Reviewed

Approved By Date Approved

Reviewed By Date Reviewed

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Reviewed By Date Reviewed

Approved By Date Approved

Reviewed By Date Reviewed

Approved By Date Approved

TABLE OF CONTENTS

1 Scope and Application

1.1 This standard operating procedure is adapted from “Test Methods for Evaluating Solid Waste Physical/Chemical Methods” (SW-846), Method 8260B, Revision 2, December 1996, Method 5035A, Revision 1, July 2002, and Method 5030C, Revision 3, December 2003. The method detection limits (MDLs) can be found in the most current GC/MS method detection limit book. The detection limits for a specific sample may differ from those listed due to the nature of interferences in a particular sample matrix.

1.2 Method 8260B is used to determine volatile organic compounds in a variety of solid waste matrices. This method is applicable to nearly all types of samples, regardless of water content, including ground water, aqueous sludges, caustic liquors, acid liquors, waste solvents, oily wastes, mousses, tars, fibrous wastes, polymeric emulsions, filter cakes, spent carbons, spent catalysts, soils and sediments. The following compounds can be determined by this method:

		Appropriate Technique
Analyte	CAS No.[b]	Purge-and-Trap
Acetone	67-64-1	pp
Acetonitrile	75-05-8	pp
Acrolein (Propenal)	107-02-8	pp
Acrylonitrile	107-13-1	pp
Allyl alcohol	107-18-6	ht
Allyl chloride	107-05-1	a
Benzene	71-43-2	a
Benzyl chloride	100-44-7	a
Bromacetone	598-31-2	pp
Bromochloromethane	74-97-5	a
Bromodichloromethane	75-27-4	a
4-Bromofluoraobenzene	460-00-4	a
Bromoform	75-25-2	a
Bromomethane	74-83-9	a
n-Butanol	71-36-3	ht
2-Butanone (MEK)	78-93-3	pp
Carbon disulfide	75-15-0	pp
Carbon tetrachloride	56-23-5	a
Chloral hydrate	302-17-0	pp
Chlorobenzene	108-90-7	a
Chlorobenzene	126-99-8	a
Chlorodibromomethane	124-48-1	a
Chloroethane	75-00-3	a
2-Chloroethanol	107-07-3	pp
bis-(2-Chloroethyl) sulfide	505-60-2	pp
2-Chloroethyl vinyl ether	110-75-8	a
Chloroform	67-66-3	a
Chloromethane	74-87-3	a
Chloroprene	126-99-8	a
3-Chloropropene	107-05-1	a
3-Chloropropionitrile	542-76-7	I
1,2-Dibromo-3-chloropropane	96-12-8	pp
1,2-Dibromoethane	106-93-4	a
Dibromomethane	74-95-3	a
1,2-Dichlorobenzene	95-50-1	a
1,3-Dichlorobenzene	541-73-1	a
1,4-Dichlorobenzene	106-46-7	a
cis-1,4-Dichloro-2-butene	1476-11-5	a
trans-1,4-Dichloro-2-butene	110-57-6	pp
Dichlorodifluoromethane	75-71-8	a
1,1-Dichloroethane	75-34-3	a
1,2-Dichloroethane	107-06-2	a
1,1-Dichloroethene	75-35-4	a
trans-1,2-Dichloroethene	156-60-5	a
1,2-Dichloropropane	78-87-5	a
1,3-Dichloro-2-propanol	96-23-1	pp
cis-1,3-Dichloropropene	10061-01-5	a
trans-1,3-Dichloropropene	10061-02-6	a
1,2,3,4-Diepoxybutane	1464-53-5	a
Diethyl ether	60-29-7	a
1,4-Difluorobenzene	540-36-3	a

1,4-Dioxane	123-91-1	pp
Epichlorohydrin	106-89-8	i
Ethanol	64-17-5	i
Ethyl acetate	141-78-6	i
Ethylbenzene	100-41-4	a
Ethylene oxide	75-21-8	pp
Ethyl methacrylate	97-63-2	a
Hexachlorobutadiene	87-68-3	a
Hexachloroethane	67-72-1	i
2-Hexanone	591-78-6	pp
2-Hydroxypropionitrile	78-97-7	i
Iodomethane	74-88-4	a
Isobutyl alcohol	78-83-1	pp
Isopropylbenzene	98-82-8	a
Malononitrile	109-77-3	pp
Methacrylonitrile	126-98-7	pp
Methylene chloride (DCM)	75-09-2	a
Methyl methacrylate	80-62-6	a
4-Methyl-2-pentanone (MIBK)	108-10-1	pp
Naphthalene	91-20-3	a
Nitrobenzene	98-95-3	a
2-Nitropropane	79-46-9	a
Pentachloroethane	76-01-7	i
2-Picoline	109-06-8	pp
Propargyl alcohol	107-19-7	pp
β-Propiolactone	57-57-8	pp
Propionitrile (ethyl cyanide)	107-12-0	ht
Propylamine	107-10-8	a
Pyridine	110-96-1	i
Styrene	100-42-5	a
1,1,1,2-Tetrachlorethane	630-20-6	a
1,1,2,2-Tetrachlorethane	79-34-5	a
Tetrachloroethene	127-18-4	a
Toluene	108-88-3	a
1,2,4-Trichlorobenzene	120-82-1	a
1,1,1-Trichloroethane	71-55-6	a
1,1,2-Trichloroethane	79-00-5	a
Trichloroethene	79-01-6	a
Trichlorofluoromethane	75-69-4	a
1,2,3-Trichloropropane	96-18-4	a
Vinyl acetate	108-05-4	a
Vinyl chloride	75-01-4	a
o-Xylene	95-47-6	a
m-Xylene	108-38-3	a
p-Xylene	106-42-3	a

a Adequate response by this technique.
b Chemical Abstract Services Registry Number.
ht Method analyte only when purged at 80°C.
i Inappropriate technique for this analyte.
pc Poor chromatographic behavior
pp Poor purging efficiency resulting in high EQLs.

NOTE: For the preparation of soils and solids, see the 19-5035 SOP.

1.3 Method 8260B can be used to quantitate most volatile organic compounds that have boiling points below 200°C and that are insoluble or slightly soluble in water. Volatile water-soluble compounds can be included in this analytical technique. However, for the more soluble compounds, quantitation limits are approximately ten times higher because of poor purging efficiency. Such compounds include low-molecular-weight halogenated hydrocarbons, aromatics, ketones, nitriles, acetates, acrylates, ethers and sulfides. The following analytes are also amenable to analysis by Method 8260B:

Bromobenzene	1-Chlorohexane
n-Butylbenzene	2-Chlorotoluene
sec-Butylbenzene	4-Chlorotoluene
tert-Butylbenzene	Crotonaldehyde
Chloroacetonitrile	Dibromofluoromethane
1-Chlorobutane	cis-1,2-Dichloroethene
1,3-Dichloropropane	Methyl-t-butyl ether
2,2-Dichloropropane	Pentafluorobenzene
1,1-Dichloropropene	n-Propylbenzene
Fluorobenzene	1,2,3-Trichlorobenzene
p-Isopropyltoluene	1,2,4-Trimethylbenzene
Methyl acrylate	1,3,5-Trimethylbenzene

1.4 The estimated quantitation limit (EQL) of Method 8260B for an individual compound is somewhat instrument dependent. Using standard quadruple instrumentation, limits shall be approximately 5 μg/kg (wet weight) for soil/sediment samples, 0.5 mg/kg (wet weight) for wastes, and 5 μg/L for ground water. EQLs will be proportionately higher for sample extracts and samples that require dilution or reduced sample size to avoid saturation of the detector.

1.5 Method 8260B is based upon a purge-and-trap, gas chromatographic/mass spectrometric (GC/MS) procedure. This method is restricted to use by, or under the supervision of, analysts experienced in the use of purge-and-trap systems and gas chromatograph/mass spectrometers, and skilled in the interpretation of mass spectra and their use as a quantitative tool.

1.6 An additional method for sample introduction is direct injection. This technique has been tested (by agencies other than ALSI) for the analysis of waste oil diluted with hexadecane 1:1 (vol/vol) and may have application for the analysis of some alcohols and aldehydes in aqueous samples. ALSI does not use the direct injection technique and the technique will not be covered by this standard operating procedure.

1.7 This standard operating procedure also describes the preparation of water-miscible liquids, non-water-miscible liquids, solids, wastes and soils/sediments for analysis by the purge-and-trap procedure.

1.8 This document states the laboratory's policies and procedures established in order to meet requirements of all certifications/accreditations currently held by the laboratory, including the most current NELAC standards.

1.9 The Method Detection Limits (MDLs) are on the ALSI network and maintained and updated by the QA Department. The detection limits for a specific sample may differ from those listed due to the nature of interferences in a particular sample matrix.

1.10 Individual project requirements may override criteria listed in this SOP.

2 Summary of Method

2.1 An inert gas is bubbled through a 5-mL water sample contained in a purging chamber at ambient temperature. The purgeables are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent trap where the purgeables are trapped. After purging is completed, the trap is heated and back-flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables, which are then detected with a mass spectrometer.

3 Interferences

3.1 Impurities in the purge gas, organic compounds outgassing from the plumbing ahead of the trap and solvent vapors in the laboratory, account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.4. The use of non-Teflon plastic tubing, non-Teflon thread sealants, or flow controllers with rubber components in the purge and trap system shall be avoided.

3.2 Samples may be contaminated by diffusion of volatile organics (particularly fluorocarbons and methylene chloride) through the septum seal into the sample during shipment and storage. A field reagent blank prepared from organic-free reagent water and carried through the sampling and handling protocol can serve as a check on contamination.

3.3 Contamination by carry-over can occur whenever a low level sample is analyzed immediately after a high level sample. To reduce carry-over, the purging device and sample syringe must be rinsed with reagent water between sample analyses. Whenever an unusually concentrated sample is encountered, one or more cleaning blanks shall be analyzed to check for cross contamination. For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds or high purgeable levels, it may be necessary to wash the purging device with a soap solution, rinse with organic-free reagent water, and then dry in an oven at 105°C. The trap and other parts of the system are also subject to contamination; therefore, frequent baking and purging of the entire system may be needed. In extreme situations, the whole purge and trap device may require dismantling and cleaning.

3.4 Special precautions must be taken to analyze for methylene chloride. The analytical and sample storage area shall be isolated from all atmospheric sources of methylene chloride. Otherwise random background levels will result. Laboratory clothing worn by analysts shall be clean since exposure to methylene chloride fumes during extraction procedures can contribute to sample contamination.

4 Safety

4.1 The toxicity or carcinogenicity of each reagent in this method has not been precisely defined; however, each chemical compound shall be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available.

4.2 Analysts shall consult the material safety data sheets (MSDS) for each chemical used in the analysis. ALSI maintains MSDSs on all chemicals used in this procedure. ALSI recommends that all individuals performing this SOP familiarize themselves with the MSDSs associated this method prior to SOP performance. MSDSs are available to all staff and are located in hard copy in the QA office and electronically on the ALSI server in the MSDS folder.

4.3 The following parameters covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: benzene, carbon tetrachloride, chloroform, 1,4-dichlorobenzene and vinyl chloride. Primary standards of these toxic compounds shall be prepared in a hood.

4.4 Since the chemical makeup of the samples is not known, analysts shall treat the samples with extreme caution. Precautionary steps would include using chemical resistant gloves, wearing a fully-buttoned lab coat, and safety glasses.

5 Apparatus and Materials

5.1 Purge-and-trap device (Example system provided below)

5.1.1 Purge and Trap concentrator: Tekmar 3000, Model #14-30000-000, Serial #93133003, or equivalent.

5.1.2 Autosampler: Archon-EST, Model #D4-505220-16, Serial #12543, or equivalent.

5.1.3 Trap: VocarbJ 3000, Purge Trap K, purchased from Supelco, catalog #2-4920, or equivalent, or equivalent.

5.2 Gas chromatography/mass spectrometer/data system. (Example system provided below.)

5.2.1 Gas chromatograph: Hewlett Packard 5890 Series II, Serial # 3336A50415, or equivalent.

5.2.2 Gas chromatographic column: 75 m x 0.53 mm ID megabore capillary column coated with DB624 (J & W Scientific), 3 µm film thickness, or equivalent.

5.2.3 Mass spectrometer: Hewlett Packard 5970 Series Mass Selective Detector, Model #5970B, Serial #3004A12574, or equivalent.

5.2.4 Electron Multiplier: K and M Model #7596M, purchased from CPI, part #4200-01, or equivalent.

5.2.5 GC/MS Interface

5.2.5.1 Jet separator if necessary: purchased from SIS, part #13505, or equivalent.

5.2.5.2 Transfer line: 0.53 ID fused silica guard column, phenyl methyl deactivated, purchased from Restek, catalog #0045, or equivalent. Not needed with split injector and EPC (electronic pressure control).

Note: Currently, none of the GCMS instruments have need of a jet separator but may require one in the future.

5.2.6 GC Inlet: O-I Low-Dead-Volume Injector Port kit, O-I-Analytical, Part #176926, or equivalent.

5.2.7 Data System

5.2.7.1 Hewlett Packard MS DOS Chemstation, used for instrument tuning and data collection.

5.2.7.2 Hewlett Packard 4920 ChemServer with Envision and Target 4.13 software.

5.2.8 See the instrument maintenance logbooks, located in the data review area of the GC/MS laboratory, for serial number and all pertinent information relating to all other GC/MS instruments used for the analysis of 8260B volatile samples.

5.3 Microsyringes: Hamilton gastight, various volumes between 10 µL and 100 µL: VWR #60376-220,230,241,252,263,274, or equivalent.

5.4 Syringe valve: two-way, with Luer ends.

5.5 Syringes: 5 mL, Hamilton Gastight: VWR # 60376-321, or equivalent.

5.6 Balance – ACCULAB VI-200; 200 gm capacity; 0.01 gm resolution or equivalent.

5.7 Micro Reaction Vessels: 1.0 mL, Supelco #3-3293 or equivalent.

5.8 Mininert Valves: 15 mm, Supelco #614160 or equivalent.

5.9 Vials: 40 mL I-CHEM: VWR # IRS136-0040, or equivalent.

5.10 Vials: 20 mL I-CHEM: VWR # IRS126-0020, or equivalent.

5.11 Teflon faced liners: VWR # 66001-236, or equivalent.

5.12 Disposable pipettes: Pasteur, VWR 5 ¾" # 14672-200, or equivalent.

5.13 Volumetric flasks: Class A, various volumes, with ground-glass stoppers.

5.14 Spatula: stainless steel VWR # 57952-107, or equivalent.

6 Reagents

NOTE: Unless otherwise noted in this section all chemicals are stored at room temperature and labeled with an expiration date of five years from receipt. Manufacturer's labeled expiration dates, when less than five years, take precedent over all other expiration dates.

6.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all inorganic reagents shall conform to the specifications of The Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 Reagent water: Reagent water is water in which an interference is not observed at the analyte of interest. For this purpose, tap water is used. De-ionized water shall not be used for this method as it has been shown to contain interferences due to cartridge bleed. NOTE: Once resolved, DI water may be used.

6.3 Compressed Helium gas: ultrahigh purity grade.

6.4 Methanol: EM Science Purge & Trap grade, # MX0482-6 or equivalent.

6.5 Primary Stock Solutions: Primary stock solutions may be prepared from pure standard materials or purchased as certified solutions. Standards for all 8260B compounds are purchased as certified solutions. These certified solutions are stored in flame-sealed ampoules in the small freezer marked "Volatile Standards" located in the GCMS volatile area of the laboratory at -10°C to -20°C. Each certified solution has an expiration date and needs to be properly discarded if that date is exceeded. For all secondary working solutions, vials are labeled with the name of the standard, the date prepared, the expiration date, the preparer's initials and the reference to the volume and page number in the GCMS VOC Standards Logbook. All standard preparations must be documented in the GCMS VOC Standards Logbook. Storage location is the volatile standards freezer.

6.5.1 If the primary stock solutions are to be prepared from pure standard materials, follow the instructions in Section 5.7 of Method 8260B.

6.5.2 As an alternative to Section 5.7 of Method 8260B, the following procedure may be used to prepare standards from pure standard materials that are a liquid at room temperature.

6.5.2.1 Determine the desired concentration, **C**, in µg/mL of the stock solution.

6.5.2.2 Determine the desired volume, **V**, in mL of the stock solution.

6.5.2.3 Lookup the density, **D**, of the liquid analyte.

6.5.2.4 Find the purity, **P**, in percent of the chemical. If it is 96% or greater, assume the purity is 100%.

6.5.2.5 Determine the volume, **VA**, in µL of chemical necessary to prepare the standard using the following equation.

$$\mathbf{VA} = (\mathbf{C}*\mathbf{V})/(10*\mathbf{P}*\mathbf{D})$$

6.5.2.6 Partially fill a **V** mL volumetric flask with purge and trap methanol.

6.5.2.7 Add **VA** µL of the chemical. Note more than one chemical may be added to a solution using this procedure.

6.5.2.8 Dilute to volume and invert three times to mix.

6.6 Tuning Solution: The tuning solution is prepared containing 50 µg/mL of 4-Bromofluorobenzene in P+T (purge and trap) Methanol.

6.6.1 Place about 48 mL of P+T methanol in a 50-mL Class A volumetric flask.

6.6.2 Add 1.25 mL of Restek's 2000 µg/mL 4-Bromofluorobenzene mix, Cat. #30026, to the methanol, dilute mixture to volume, and invert 3 times to mix.

6.6.3 Note: Preparations of varied amounts are acceptable for this standard as long as the ratio of BFB to methanol is 1:40 (50 µg/mL).

6.6.4 This solution has a six-month expiration date from the time prepared and is stored in the volatile standards freezer.

6.7 Internal Standard (IS) solution: The internal standard solution is prepared containing 150 µg/mL of the 8260A internal standards. This standard is abbreviated as 826IS.

Note, since the auto sampler adds the spiking solution, the sample loop must be calibrated according to manufacturer's instructions and the IS solution may need to be prepared at a slightly different concentration to spike the standards at 30 ppb. Record the preparation of the alternate solution in the standard logbook with the identification of the system it will be used with.

6.7.1 The IS solution contains the following compounds at 150 µg/mL: chlorobenzene-d5, fluorobenzene, and 1,4-dichlorobenzene-d4.

6.7.2 IS solution preparation. (Note: The ratio of standard to methanol will remain the same if different volumes are prepared.)

6.7.2.1 Place about 23 mL of P+T methanol in a 25-mL Class A volumetric flask.

6.7.2.2 Add 1.5 mL of Restek's 2500 µg/mL 8260A Internal Standard Mix, cat. #30241, dilute mixture to volume, and invert 3 times to mix.

6.7.2.3 This solution has a six-month expiration from the date prepared and is stored in the volatile standards freezer.

6.8 8260 Surrogate Solution. The 8260 surrogate solution is prepared containing 150 µg/mL of the 8260A surrogate compounds. This solution is used to prepare samples. This standard is abbreviated as **826SS**. Note: since the auto sampler adds the spiking solution, the sample loop must be calibrated according to manufacturer's instructions and the SS solution may need to be prepared at a slightly different concentration to spike the standards at 30 ppb. Record the preparation of the alternate solution in the standard logbook with the identification of the system it will be used with.

6.8.1 The 8260 surrogate solution contains the following compounds at 150 µg/mL: 4-bromofluorobenzene, 1,2-dichloroethane-d4, dibromofluoromethane, and toluene-d8.

6.8.2 8260 surrogate solution preparation. Note: Any volume can be prepared as long as the ratio of surrogate mix to methanol is 1:50.

6.8.3 Place about 48 mL of P+T methanol in a 50-mL Class A volumetric flask.

6.8.4 Add 1.0 mL of Restek's 2500 µg/mL 8260A Surrogate Standard Mix, cat. #30240, dilute mixture to volume, and invert 3 times to mix.

6.8.5 This solution has a six-month expiration date from the time prepared and is stored in the volatile standards freezer.

6.9 High 8260 Surrogate Solution. The 8260 surrogate solution is prepared containing 250 µg/mL of the 8260A surrogate compounds. This solution is used to prepare initial calibrations. This standard is abbreviated as **H826SS**.

6.9.1 The H8260 surrogate solution contains the following compounds at 250 µg/mL: 4-bromofluorobenzene, 1,2-dichloroethane-d4, dibromofluoromethane, and toluene-d8.

6.9.2 H8260 surrogate solution preparation. Note: Any volume can be prepared as long as the ratio of surrogate mix to methanol is 1:10.

6.9.2.1 Place slightly less than 9 mL of P+T methanol in a 10 mL volumetric flask.

6.9.2.2 Add 1.0 mL of Restek's 2500 µg/mL 8260A surrogates mix, Cat. #30240, to the methanol.

6.9.2.3 Dilute mixture to volume.

6.9.2.4 Invert the flask 3 times to mix and place the solution into labeled sub-vials.

6.9.2.5 This solution has a six-month expiration date from the time prepared and is stored in the volatile standards freezer.

6.10 Calibration Solutions.

6.10.1 The following stock solutions are purchased to prepare the calibration and calibration check standards:

Name	***Catalog #***	***Abbreviation***
502.2 CAL2000 MEGA MIX	30431	VCSMEGA
Custom V standard Acrolein	54588	VCS Acrolein
8260B Acetates Mix	30489	VCS Acetates
Custom Ketones Mix (10,000 µg/mL)	559848	VCS Ketones
2-Chloroethylvinylether Standard	30265	VCS 2 CEVE
502.2 Calibration mix 1A	30439	V Gas
Custom VOA Additions Mix (2000-50,000 µg/mL)	559847	VCS Additions

6.10.2 The concentrations of the stock solutions and their concentration in the calibration solutions are recorded in Appendix A.

6.10.3 Preparation of VOA NEW, a secondary stock standard.

6.10.3.1 Add approximately 3.0 mL (but no more than 4.0 mL) of P+T methanol to a 10-mL volumetric flask.

6.10.3.2 Add 1.0 mL of the following stock standards: VCSMEGA, VCS Acetates, VCS Ketones, VCS Additions, VCS Acrolein, and VCS 2 CEVE.

6.10.3.3 Dilute mixture to volume.

6.10.3.4 Invert the flask 3 times to mix and place the solution into labeled sub vials.

6.10.3.5 This solution has a two-month expiration date from the time prepared and is stored in the volatile standards freezer.

6.11 Quality control sample solutions.

6.11.1 The following stock solutions are purchased to prepare the matrix spikes and blank spikes:

Name	***Catalog #***	***Abbreviation***
502.2 CAL200 MEGA Mix	30432	QCS MEGA
Custom Acetates Mix	560215	QCS Acetates
Custom Q Acrolein	54589	QCS Acrolein
Custom 2-Chloroethylvinylether Std	560216	QCS2CEVE
Custom Q Gases	52911	QGAS
Custom Ketones Mix (1000µg/mL)	560214	QCS Ketones
Custom VOA Additions Mix (200-5000 µg/mL)	560213	QCS Additions

6.11.2 The concentrations of the stock solutions and their concentration in the calibration verification solution are recorded in Appendix B.

6.11.3 Preparation of QVOALCS, a secondary stock standard.

6.11.3.1 Add approximately 6.0 mL (but no more than 7.0 mL) of P+T methanol to a 10-mL volumetric flask.

6.11.3.2 Add 0.5 mL of the following stock standards: QCSMEGA, QCS Acetates, QCS Ketones, QCS Additions, QCS Acrolein, and QCS2CEVE.

6.11.3.3 Dilute mixture to volume.

6.11.3.4 Invert flask 3 times and place into labeled sub-vials.

6.11.3.5 This solution has a two-month expiration from the date prepared and is stored in the volatile standards freezer.

6.12 Antifoam Agent (Sigma – SE-15, product #A8582 or equivalent).

6.12.1 10 µL of antifoam is added to 5 mL of sample. An antifoam blank shall precede any samples run with antifoam to prove that there are no target analytes present in the antifoam solution. If using an Archon sampler, add 100 µL to the 40-mL vial.

6.13 DPD Free Chlorine Reagent, HACH # 21055-60, or equivalent.

7 Instrument Calibration

7.1 The specific configuration of each volatile instrument (ms01, ms03, ms05, and ms07) is recorded in the instrument's maintenance logbook.

7.2 The purge and trap program of each volatiles instrument is recorded in the instrument maintenance logbook.

7.3 The GC/MS methods are printed out with each analytical batch. This includes the tune reports and the methods. NOTE: If no changes have been made to the methods, photocopies of the latest updated method can be produced from the originals. These copies are archived with the associated raw data.

7.4 Tuning Requirements. Before the beginning of the analysis of samples, blanks, MS/MSDs, duplicates, or standards; the instrument must be hardware tuned to meet the requirements stated below.

7.4.1 Inject or purge 1.0 µL (50 ng of BFB) of the tuning solution into the instrument.

7.4.2 When the run is complete, process the data on the Target system using the BFB method.

7.4.3 BFB performance may be evaluated using the following scans: apex, left of the apex, right of the apex, average of the apex (left, apex, and right), average of the entire BFB peak, or any of the preceding with background subtraction.

Note: if background subtraction is performed, the background scan must elute within 10 scans before BFB begins to elute.

NOTE: The current software criteria set up in our BFB method uses the average of three scans: the apex, scan left of the apex, and scan right of the apex. These criteria satisfy DoD specifications.

7.4.4 Compare the performance of BFB to the following table:

Mass (m/z)	Abundance Criteria
50	15 to 40% of mass 95
75	30-60% of mass 95
95	Base peak, 100% Relative abundance
96	5-9% of m/z 95
173	<2% of mass 174
174	>50% of mass 95
175	5 to 9% of mass 174
176	>95% but <101% of mass 174
177	5 to 9% of mass 176

7.4.5 When the instrument meets the above requirements analysis may begin and continue for 12 hours from the injection of the tuning solution. For example, if the tuning solution is injected at 0100 on 12/1/98, the last sample may inject at 1300 on12/1/98.

7.5 Initial calibration.

7.5.1 Each instrument in the laboratory could have a specific initial calibration curve analyzed on it but mainly use the following concentrations.

7.5.1.1 The following calibration standards are analyzed for the initial calibration, VSTD001, VSTD005, VSTD020, VSTD050, VSTD100, and VSTD200.

7.5.2 Prepare calibration solutions following the table in appendix A. For the Archon auto sampler, simply place these solutions in a 40-mL VOC vials, the auto sampler will add the IS solution automatically.

NOTE: Appendix A allows for surrogate standards to be elevated along with the same concentration of each individual calibration standard resulting in a multi-point calibration.

7.5.3 Calibration Criteria.

7.5.3.1 The average fit must have a %RSD of less than 15% over at least five calibration points (Six points are normally analyzed). It is acceptable to drop calibration points from either end of the calibration. Note: if the high calibration standard is dropped for a compound, the limit of quantitation must be lowered to the next calibration concentration for that compound.

7.5.3.2 The calibration curves are generated with the Target software. A primary or secondary curve fit may also be used for any compound with a %RSD greater than 15%, but shall be less than 50%. (**DoD requires less than %30**)

7.5.3.2.1 Power and quadratic fits require 6 points. The R value must be 0.99 or greater. **(DoD requires $\geq$ 0.995)**Our Target software uses R^2 so it must be $\geq$ 0.98 and 0.99 for DoD.

7.5.3.2.2 The linear primary fit requires at least 5 points. The R value must be 0.99 or greater. **(DoD requires $\geq$. 995)** Our Target software uses R^2 so it must be $\geq$ 0.98 and 0.99 for DoD.

7.5.3.2.3 A %RSD of <30% must be achieved for the Calibration Check Compounds (CCCs) before the curve passes. If it is between 15% and 30% RSD, a primary or secondary curve fit must be used. The CCCs are as follows:

1,1-Dichloroethane
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl Chloride

7.5.4 Structural isomers that have very similar mass spectra and less than 30 seconds difference in retention time can be explicitly identified only if the resolution between isomers in a standard is acceptable. Acceptable resolution is achieved if the baseline to valley height between isomers is less than 25 % of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs. In other words, sum the isomers and report any results as total of the isomer X and Y. Isomers of this type need to be calibrated as a sum also.

7.5.4.1 After an initial calibration, a blank spike (LCS) must be analyzed before the analysis of samples can begin. The recoveries of the LCS must fall within laboratory acceptable limits for each compound of interest. If these recovery limits are met, samples may be run under the initial calibration to finish the 12-hour tune. **DoD requires** the second source verification meet 25% recovery of expected value.

7.6 GC/MS calibration verification

7.6.1 Prior to the analysis of samples, inject the BFB standard. The resultant mass spectra for the BFB must meet all of the criteria as stated in the standard operating procedure for tuning the GC/MS system. These criteria must be demonstrated each twelve hours of operation.

7.6.1.1 When the analysis of **DoD samples** is to take place, BFB must meet criteria by the average of three (3) scans. The scans include the apex, the scan left of the apex, and the scan right of the apex.

7.6.2 The initial calibration curve for each compound of interest must be checked and verified once every twelve hours during analysis with the introduction technique used for samples. Analyzing a 50 ppb calibration standard and checking the SPCCs and CCCs accomplish this.

Note: When DoD samples are to be analyzed for 15 or less analytes, all of the target analytes shall meet the same criteria as the CCCs.

7.6.2.1 When the analysis of **DoD samples** is to take place, a continuing calibration standard may need to be analyzed following the samples in a 12-hour period.

7.6.3 System Performance Check Compounds (SPCCs) - Once the continuing calibration check standard is analyzed (Section 7.6.2), the SPCCs are checked. If the SPCC criteria are met, a comparison of relative response factors is made for all compounds. This is the same check applied during the initial calibration. If the minimum relative response factors are not met, the system must be evaluated and corrective action must be taken 4 before sample analysis begins. Some possible problems are standard mixture degradation, injection port inlet contamination, contamination at the front end of the analytical column, and active sites in the column or chromatographic system.

7.6.3.1 The minimum relative response factor for volatile SPCCs are as follows:

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

7.6.4 Calibration Check Compounds (CCCs) - After the system performance check is met, CCCs listed below are used to check the validity of the initial calibration. If the %RSD for each CCC is less than or equal to 20%, the initial calibration is assumed valid. If the criterion is not met (> 20% RSD), for any one CCC, corrective action must be taken. Problems similar to those listed under SPCCs could affect this criterion. If no source of the problem can be determined after corrective action has been taken, a new six-point calibration MUST be generated. This criterion MUST be met before quantitative sample analysis begins.

1,1-Dichloroethane
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl Chloride

7.6.5 The internal standard responses and retention times in the check calibration standard must be evaluated immediately after or during data acquisition. If the retention time for any internal standard changes by more than 30 seconds from the midpoint (50) standard of the last initial calibration check (12 hours), the chromatographic system must be inspected for malfunctions and corrections must be made, as required. If the EICP area for any of the internal standards changes by a factor of two (-50% to +100%) from the midpoint (50) standard of the last initial calibration, the mass spectrometer must be inspected for malfunctions and corrections made. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is necessary. NOTE: During the course of a 12-hour tune period, all samples and blanks must also follow these criteria when referenced against the continuing calibration standard run in that tune period.

8 Quality Control

8.1 All policies and procedures in the most current revision of the ALSI QA Plan shall be followed when performing this procedure.

8.2 ALSI operates a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory shall maintain records to document the quality of the data generated. Ongoing quality checks are compared to established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard shall be analyzed to confirm that the measurements were performed in an in-control mode of operation. (i.e.: If the MS/MSD fails, an LCS shall be analyzed.) It is the practice of the GC/MS department to analyze a laboratory control sample in every 12-hour tune period.

8.3 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.9. If the analyst meets the acceptance criteria, they are now capable of running actual samples. Ongoing proficiency must be established annually as specified in the QA plan, Technical Training.

8.4 Each day, a reagent water blank must be analyzed to demonstrate that interferences from the analytical system are under control.

8.5 The method blank shall be performed at a frequency of one per 12-hour tune period per matrix type or preparation method. The results of this analysis shall be one of the QC measures to be used to assess tune period acceptance. The source of method blank contamination shall be investigated, and measures taken to correct, minimize, or eliminate the problem if the concentration exceeds one-half the reporting limit. If one-half the reporting limit (RL) is exceeded, the laboratory shall evaluate whether reanalysis of the samples are necessary, based on the following criteria:

8.5.1 The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparatory batch, or

8.5.2 The blank contamination is greater than 1/10 of the project specified limit.

8.5.3 Any samples associated with a blank that fail these criteria shall be reanalyzed, except when the sample analysis resulted in a non-detect. If no sample volume remains for reanalysis, the results shall be reported with appropriate data qualifying codes.

8.5.4 The current laboratory practice is to comment on a sample associated with a method blank in which one or more analytes were detected at or above the reporting limit in the blank and also in the sample. (i.e. If j-values are detected, no comment is necessary)

8.5.5 **DoD:** If the method blank concentration is greater than or equal to ½ the reporting limit AND is greater than $^1/_{10}$ the sample concentration, the source of the contamination must be investigated and measures take to minimize or eliminate the problem and affected samples reanalyzed. If reanalysis is not possible, data shall be reported with a qualifying statement.

8.6 The laboratory must, on an ongoing basis, analyze a spike and spike duplicate on a minimum of 5 % of all samples to monitor and evaluate laboratory data quality. It is the policy of the GC/MS department to spike one sample per every 20 samples. Samples selected for duplicate and matrix spike analysis shall be rotated among client samples so that various matrix problems may be noted and/or addressed. Poor performance in a duplicate or spike may indicate a problem with the sample composition and shall be reported to the client whose sample produced the poor recovery.

8.6.1 Analyze one 5-mL sample aliquot to determine the background concentration (B) of each parameter.

8.6.2 Spike a second 40-mL sample vial with 84 µL and 42 µL of the QVOALCS/QGAS(see Section 6.11 and Appendix B) using an 100-µL gastight syringe and analyze it twice, and determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as:

$$P = \frac{\text{Spiked sample conc. - unspiked sample conc.}}{T} \quad X \quad 100\%$$

where T = the known true value of the spike

8.6.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in the most current listing of QC recovery limits.

8.6.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. However, since some failures may occur due to sample matrix interferences, if the LCS (Section 8.7) passes the set criteria for those failing compounds, the system performance is acceptable. In this case, a comment needs to go on the background sample stating that one or more compounds failed in the MS/MSD associated but passed in the associated LCS. If the LCS is acceptable and the specific matrix interference is identified, report with a qualifying statement. If the specific matrix interference is unknown, reanalyze the sample and matrix spike to determine matrix effect or analytical error.

8.7 If any parameter fails the acceptance criteria for recovery in Section 8.6, a Laboratory Control Sample (LCS) containing each parameter that failed must be prepared and analyzed. Note: The current practice is to run an LCS at the same frequency as the method blank, which is one per 12-hour tune period. This is more than the method requires but allows for QC to be more closely associated with each sample in that 12-hour tune period.

8.7.1 Prepare a Laboratory Control Sample (LCS) by using a 100 or 250 µL gastight syringe and adding 50 µL of QGAS and 100 µL of QVOALCS listed in Section 6.11 to 50 mL of reagent water and analyze.

8.7.2 Analyze the Laboratory Control Sample (LCS) to determine the concentration measured (A) of each failed parameter. Calculate each percent recovery (P_s).

8.7.3 Compare the percent recovery (P_s) for each failed parameter with the corresponding LCS acceptance criteria found in the latest control charts generated for the Method 8260 LCS. **DoD requires** specific acceptance criteria found in the DoD Quality Systems Manual. If the recovery of any such parameter, which failed in the MS/MSD, falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter, if detected in any samples associated with that LCS, is suspect and shall not be reported for regulatory compliance purposes. If any results are reported, a comment must accompany that result stating the failure and the possibility of a low or high bias to the data. If the LCS fails for one or more compounds that met criteria in the associated MS/MSD, the MS/MSD can prove that the instrument performance is valid as long as the acceptance criteria are as stringent as the criteria for the LCS.

8.7.4 It will be the judgment of the analyst and/or supervisor to approve the data acquired using the initial calibration. If evaluation of the system in addition to the failed QCs indicates a lack of integrity of the data, it will be reanalyzed.

8.8 As a quality control check, the laboratory must spike all samples with the surrogate standard spiking solution and calculate the percent recovery of each surrogate compound. Recoveries must fall within the calculated limits. See Section 8.13 for the development of surrogate control limits. If the surrogate recoveries do not fall within the calculated limits, the sample shall be re-analyzed and the system shall be evaluated for malfunctions. If the surrogate recovery is acceptable in the re-analysis, report the data from the re-analysis. If data must be reported in which a surrogate(s) is out, report with a comment.

8.8.1 HORIZON LIMS standard verbiage comment V8L - One or more 8260 surrogates were recovered outside of the recovery limits. Then it lists the current limits.

8.8.2 HORIZON LIMS standard verbiage comment VSM - One or more volatile surrogate(s) was recovered outside of the recovery limits. Its recovery was confirmed by re-analysis indicating a significant matrix effect.

NOTE: A sample with a surrogate out will normally be re-analyzed followed by reporting with a comment VSM. However, if holding time is expired, comment V8L will be used, and the sample will not be re-analyzed.

8.9 To establish the ability to generate accuracy and precision, the analyst must perform the following operation as an initial demonstration of capability.

8.9.1 A quality control (QC) check sample concentrate is prepared containing each parameter of interest. The concentrate must be from an external source, different from the source used for the calibration standards.

8.9.2 Using a 100 or 250 µL gastight syringe, inject 50 µL and 100 µL of the QGAS/QVOALCS solutions into a 50 mL volumetric flask containing reagent water. This is done four (4) times. See Appendix B.

8.9.3 Calculate the average recovery $(\overline{X})$ in µg/L, and the standard deviation of the recovery (s) in µg/L, for each parameter of interest using the four results.

8.9.4 For each parameter, compare s and X with the DOC forms of the corresponding acceptance criteria in the latest control charts generated for 8260B MS/MSDs, respectively. If s and X for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of samples can begin. If any individual s exceeds the precision limit or any individual X falls outside the range for accuracy, the system performance is unacceptable for that parameter.

8.10 If one or more of the parameters tested fail at least one of the acceptance criteria from Section 8.9, the analyst must proceed according to Section 8.10.1 or 8.10.2.

8.10.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.9.2.

8.10.2 Beginning with Section 8.9.2, repeat the test only for those parameters that failed. Repeated failure will confirm a general problem with the measurement system. If this occurs, locate and correct the problem and repeat the test for all compounds of interest beginning with Section 8.9.2.

8.11 The laboratory must, on an ongoing basis, demonstrate through the analysis of

Laboratory Control Samples (LCSs) that the operation of the measurement system is in control. The procedure is described in Section 8.7. The frequency of the check standard analysis is equivalent to 5 % of all samples analyzed. This 5% is equivalent to 1 in 20 samples, which is what the GCMS department defines as a batch. This may be reduced if spike recoveries from samples (see Section 8.6) meet all specific control criteria. It is the practice of the GCMS department to analyze a LCS every 12-hour tune period even though the method does not require it. A batch will typically consist of two or more 12-hour tune periods until 20 samples have been analyzed including all QC.

8.12 The laboratory must maintain performance records to document the quality of data generated.

8.13 As part of the QC program, control limits for samples must be assessed and records must be maintained. After the analysis of at least 20 spiked samples as in Section 8.6, calculate the average percent recovery (P) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from P - $3s_p$ to P + $3s_p$ (i.e., If P = 100% and s_p = 10%, the accuracy interval is expressed as 70 - 130%). Update the accuracy assessment for each parameter at least annually.

8.14 MDL Studies. Method detection limit studies are performed annually to statistically determine the concentration levels an analytical system is capable of determining. MDL studies must be performed according to SOP 99-MDL or the reference method, whichever is more frequent. Reporting limits are set approximately 3-5 times the method detection limit, but not lower than the lowest initial calibration standard. (For DoD reporting purposes, reporting limits are set at least 3 times the MDL, and not more than 10 times the MDL.)

8.14.1 The group leader will determine at what level (concentration) the MDL study will be performed. At least seven replicates are to be analyzed. All replicates analyzed must be included in the MDL study. Note: The current concentration used for MDL studies is 0.8 µg/L.

8.14.2 The QLCS and the QGAS standards can be used to prepare the MDL studies, but using the initial calibration standards, VOANEW and VGAS, is a more commonly used method.

8.14.3 Use the Target software to generate an MDL study report.

9 Sample Collection, Preservation and Handling

9.1 Sample Collection

9.1.1 Standard 40-mL glass screw-cap VOA vials with Teflon-lined silicone septa may be used for liquid samples.

9.1.2 When collecting the samples, liquids shall be introduced into the vials gently to reduce agitation, which might drive off volatile compounds. In general, liquid samples shall be poured into the vial without introducing any air bubbles within the vial as it is being filled. Shall bubbling occur as a result of violent pouring, the sample must be poured out and the vial refilled. The vials shall be completely filled at the time of sampling, so that when the septum cap is fitted and sealed, and the vial inverted, no headspace is visible. The sample shall be hermetically sealed in the vial at the time of sampling, and must not be opened prior to analysis to preserve their integrity.

9.1.2.1 Due to differing solubility and diffusion properties of gases on liquid matrices at different temperatures, it is possible for the sample to generate some headspace during storage. This headspace will appear in the form of micro bubbles, and shall not invalidate a sample for volatile analysis.

9.1.2.2 The presence of a macro bubble in a sample vial generally indicates either improper sampling technique or a source of gas evolution within the sample. The latter case is usually accompanied by a buildup of pressure within the vial (e.g., carbonate-containing samples preserved with acid). Studies conducted by the USEPA (EMSL-Ci, unpublished data) indicate the Pea-sized bubbles (i.e., bubbles not exceeding 1/4 inch or 6 mm in diameter) did not adversely affect volatiles data. These bubbles were generally encountered in wastewater samples, which are more susceptible to variations in gas solubility than are groundwater samples. NOTE: **For DoD samples**, any size air bubble will be commented on the lab report. See Section 9.3.2.

9.1.3 If the aromatic compounds benzene, toluene, and ethyl benzene are to be determined; a second separate sample shall be collected as follows because refrigeration alone may not preserve these compounds for more than seven days. Collect about 500 mL of sample in a clean container. Adjust the pH to about 2 while stirring vigorously by adding 1:1 HCl. Check the pH with narrow range (1.4 to 2.8) pH paper. Fill the sample vial as described in Section 9.1.2.

9.2 Sample Preservation

9.2.1 Preserve aqueous samples using HCl to a pH <2. Sample preservation shall be performed immediately upon sample collection. The sample shall then be iced above the freezing point of water up to 6°C in transport.

9.2.2 Ascorbic acid preservative is added to the vial prior to shipping to the sample site if the sample contains residual chlorine. Immediately following collection of the sample, shake the vial vigorously for one minute. Maintain the hermetic seal until the time of sample analysis.

9.2.3 Once samples are received, they must be refrigerated above the freezing point of water up to 6°C until analysis.

9.3 Sample Handling

9.3.1 All samples must be analyzed within 14 days of collection. All samples not analyzed within this time frame must be discarded and re-sampled for analysis, unless permission is given by the client to run the sample past its hold time. If this occurs, it must be clearly noted on the laboratory report.

9.3.1.1 If a dilution of the sample was analyzed after the hold time due to compounds exceeding the calibration range in the initial (and reportable) analysis, the standard verbiage comment VDL in the HORIZON LIMS may be used.

9.3.2 Check the run logbook to see if there was headspace in the sample. Add a comment to the report if it was present. The standard verbiage code for this in the HORIZON LIMS is HSP.

9.3.3 Check the run logbook to see if the pH of the sample was greater than 2. Add comment to the report if it exceeded 2. The standard verbiage code for this in the HORIZON LIMS is PH>.

9.3.4 Chlorine: Check the run logbook to see if there was free chlorine in the sample. Add a comment to the report if it was present.

10 Procedure

10.1 Daily tuning criteria and GC/MS calibration verification criteria must be met before analyzing samples.

10.2 All samples must be allowed to warm to ambient temperature before analysis.

10.3 Sample preparation and analysis.

10.3.1 Blanks must be free from target analytes above the established reporting limits.

10.3.1.1 Using the Archon autosampler, fill a 40-mL VOC vial with reagent water and cap, load on the autosampler and run. The Archon will add the IS/SS automatically.

10.3.2 Laboratory Control Samples (LCSs).

10.3.2.1 Using the Archon autosampler, place slightly less than 50 mL of reagent water in a 50-mL volumetric flask. Add 100 µL of QVOA LCS and add 50 µL of QGAS. Dilute to volume, invert 3 times, and place in a 40-mL VOC vial. The Archon will add the IS/SS automatically.

10.3.3 Samples:

10.3.3.1 Note in the run logbook whether or not the sample has headspace. Mark a Y in the HSP column if there is an air bubble bigger than a large pea (one quarter inch in diameter). Otherwise, mark an N in this column.

10.3.3.2 In order to prevent system overload it is a good practice to check each sample's history in the LIMS before analyzing the sample. If the sample has no history, then immediately before loading the instrument, open the vial, lift to within approximately 2-3 inches of the nose, wave a hand across the top of the sample towards the nose. Run the sample at a dilution if it has a polluted or organic chemical odor.

10.3.3.3 To composite samples, gently pour the sample containers into a clean appropriately sized beaker. Swirl the beaker gently to mix, and pour contents back into the sample vials. Mark the sample vials with a "C" to denote that they were composited. NOTE: Only at a client's request are 8260 samples ever composited.

10.3.3.4 Prepare sample dilutions according to the following table (Note: This table may not be inclusive of every dilution that will need to be performed. It may be necessary to perform intermediate dilutions or to use a larger volumetric flask to perform the larger dilutions): Note: **For DoD samples;** dilutions shall be limited to steps that are less than 100-fold.

Dilution factor	***Water volume (mL)***	**Sample added**	***Final Volume (mL)***
2	2.5	2.5 mL	5.0
2	25	25 mL	50
4	3.75	1.25 mL	5.0
4	37.5	12.5 mL	50

5	4.0	1.0 mL	5.0
5	40	10 mL	50
10	4.5	500 µL	5.0
10	45	5.0 mL	50
20	4.75	250 µL	5.0
20	47.5	2.5 mL	50
50	4.9	100 µL	5.0
50	49	1000 µL	50
100	4.95	50 µL	5.0
100	49.5	500 µL	50
200	4.97	25 µL	5.0
200	49.7	250 µL	50
500	4.99	10 µL	5.0
500	49.9	100 µL	50
1000	5.0	5.0 µL	5.0
1000	50	50 µL	50
2000	5.0	2.5 µL	5.0
2000	50	25 µL	50
5000	5.0	1.0 µL	5.0
5000	50	10 µL	50
10000	50	5.0 µL	50
20000	50	2.5 µL	50
50000	50	1.0 µL	50

10.3.3.5 Dilutions with a 5.0 mL final volume are prepared in the following manner.

10.3.3.5.1 Rinse a 5.0-mL syringe several times with reagent water.

10.3.3.5.2 Fill the syringe with reagent water and adjust the water volume to the appropriate mark.

10.3.3.5.3 Move the plunger back to 5 mL.

10.3.3.5.4 Quickly add the volume of sample, then prepare for the appropriate autosampler.

10.3.3.6 Prepare dilutions in Class A volumetric flasks in the following manner.

10.3.3.6.1 Partially fill a clean volumetric with reagent water.

10.3.3.6.2 Quickly add the appropriate volume of sample.

10.3.3.6.3 Quickly dilute to volume. Invert 3 times to mix. Prepare for the appropriate autosampler.

10.3.3.7 Using the Archon autosampler, place the sample vial (it may be necessary to remove the label) or a capped 40-mL VOC vial filled with diluted sample on the autosampler, and run. The Archon will add the IS/SS automatically.

10.3.3.8 Antifoam may be added to prevent foaming. It is added 100 µL at a time to a 40-mL vial or 50-mL flask, or 10-µL to a 5-mL syringe.

10.3.3.9 Check the pH of the unused sample (this includes sample spikes if they were taken from a different vial) with pH paper. Record in column of the run logbook either the pH or whether or not the pH was less than or equal to 2 denoted "<2", if greater than 2 it is denoted ">2".

10.3.3.10 Check for the presence of free chlorine with an aliquot of DPD free chlorine reagent added to 10 mL of sample. It will turn pink if chlorine is present. In the Cl column of the run logbook, record a "Y" if free chlorine was detected, record an "N" if it was not. Note: We use a dispenser purchased from HACH to determine the aliquot size.

10.3.3.11 If running low or med level soils by 8260B, see the SOP for the 5035 Method (02-5035).

10.3.4 Sample spikes (MS/MSD).

10.3.4.1 Using the Archon auto sampler, inject 84 µL of QVOALCS and 42 µL of QGAS through the vial's septum. Shake or roll the vial to mix contents. Place the sample vial (it may be necessary to remove the label) or a capped 40-mL VOC vial filled with diluted sample on the auto sampler and run. The Archon will add the IS/SS automatically.

10.3.5 Duplicates.

10.3.5.1 Prepare duplicates the same way as normal samples. Duplicates shall only be prepared on samples that have historically had target hits. Otherwise, matrix spike duplicates shall be analyzed. The RPD acceptable limit is <40 %. **DoD requires** the RPD acceptable limit is <30%.

10.4 Data analysis.

10.4.1 Tune time. All analyses must have an injection time within 12 hours of the injected 50 ng BFB tuning solution, which met method criteria. The only exception to this is ending calibration checks that are requested by some clients. They shall run within 24 hours of the BFB (immediately after the last sample in the sequence).

10.4.2 Internal standard areas and retention times.

10.4.2.1 The internal standard areas in each analysis shall be within a factor of two of their abundance in the calibration verification standard. Note, this is not only a method requirement, but also a good laboratory practice as it helps to ensure that the instrument system is functioning normally.

10.4.2.2 The retention times of internal standards in each analysis shall be within 0.5 minutes of their retention times in the calibration verification standard. Note, this is not only a method requirement, but also a good laboratory practice as it helps to ensure that the instrument system is functioning normally.

10.4.2.3 The internal standard areas may vary due to the following reasons: instrument malfunction, wrong amount of IS/SS mix added, partially open sample valve, sample overload (i.e., shall have been run very diluted), etc.

10.4.2.3.1 ALSI LIMS standard verbiage comment VIS – One or more volatile internal(s) was recovered outside of the recovery limits. Its recovery was confirmed by re-analysis indicating a significant matrix effect.

10.4.2.4 The retention times may vary due to the following reasons: sample overload, sample foaming, plug or obstruction in the instrument, instrument malfunction, unstable room temperature, etc.

10.4.3 Surrogates.

10.4.3.1 The surrogates shall be recovered within the recovery limits. If they are not the sample shall be re-analyzed and the system shall be evaluated for malfunctions. If the surrogate recovery is acceptable in the re-analysis, report the data from the re-analysis. If data must be reported in which a surrogate(s) is out, report with a comment.

10.4.3.1.1 HORIZON LIMS standard verbiage comment V8 - One or more 8260 surrogates recovered outside of the recovery limits. Then it lists the current limits.

10.4.3.1.2 HORIZON LIMS standard verbiage comment VSM - One or more volatile surrogate(s) was recovered outside of the recovery limits. Its recovery was confirmed by re-analysis indicating a significant matrix effect.

NOTE: A sample with a surrogate out will normally be re-analyzed followed by reporting with a comment VSM. However, if holding time is expired, comment V8 will be used, and the sample will not be re-analyzed.

10.4.4 Target hits.

10.4.4.1 Positive hits. Identified by comparing the mass spectrum of the compound with a reference mass spectrum of the compound from a standard, which was analyzed on the same instrument. Obtain EICPs (the overlays on the right of the Target review window) for the primary (quantitating) mass and at least two secondary masses for each parameter of interest. The following criteria must be met to make a qualitative identification.

10.4.4.1.1 The characteristic masses of each parameter of interest must maximize in the same scan or within one scan of each other. Beware of co eluting interferences.

10.4.4.1.2 The retention time must fall within ± 30 seconds of the retention time of the compound in the daily QC calibration verification check.

10.4.4.1.3 The relative peak heights of the characteristic masses in the EICPs must fall within ± 20 % of the relative intensities of the masses in a reference mass spectrum.

10.4.4.2 Negative hits. Hits which do not meet the requirements for a positive hit are marked as unknown on Target.

10.4.4.3 Over-range hits. If a requested target analyte is a positive hit (be aware that if an analyte is present at a high enough concentration, its mass spectrum may be distorted) and exceeds the instrument's initial calibration range, the sample shall be rerun at a dilution until the analyte is within the instrument's calibration range (preferably in the upper half of the calibration range). If internal and surrogate recoveries are acceptable in the original analysis, all compounds except those that exceeded the calibration range will be reported from this run. Those that did exceed the calibration range will be reported from the dilution analysis (DL).

10.4.4.4 If manual integrations are required, the procedure in SOP 99-Integration is followed.

10.4.5 Blanks: Blanks shall have no target hits present at the reporting limit. A blank's surrogates shall be within the surrogate recovery limits. If a requested analyte is present above the reporting limit in the blank and it is present above the reporting limit in a sample(s), the sample shall be rerun. If that is not possible fill out a corrective action form explaining the situation and report the data with a comment similar to the following: "This sample had a hit of 8 µg/L of TCE which was present in the associated method blank at 1 µg/L." **NOTE**: **For DoD samples,** blanks shall have no target hits present above 2 times the calculated MDL. Blanks must not exceed one-half the reporting limit. See Section 8.5 under quality control for additional information.

10.4.6 QC samples (MS/MSD, blank spikes, duplicates).

10.4.6.1 Generate a MS/MSD report (form 3) using Quickforms in the Target software.

10.4.6.2 Compare the percent recovery, P, of each parameter with the corresponding QC acceptance criteria. If the spike sub-list MS/MSD.spk is used, these shall be the limits present on MS/MSD report generated with Quickforms.

10.4.6.3 If any individual P falls outside the designated range for recovery in either the MS or MSD, that parameter has failed the acceptance criteria. A blank spike containing each parameter that failed shall have been analyzed.

10.4.6.3.1 Analyze the blank spike to determine the concentration measured (A) of each failed parameter. Compounds which did not fail in the MS/MSD are not considered. The target software will calculate the percent recoveries of the blank spike. Use the spike sub-list WATERQC. The equation to calculate percent recovery (P) in a blank spike follows. T is the known true value of the spike.

$$P = A * 100\% / T$$

10.4.6.3.2 Compare the percent recovery, P, of each parameter with the corresponding QC acceptance criteria found in Appendix C. If the spike sub-list WATERQC is used, these shall be the limits present on blank spike report generated with Quickforms.

10.4.6.3.3 If the recovery of any such parameter, P, falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes. If the data must be reported due to either the samples hold time or a lack of sufficient sample for re-analysis, fill out a corrective action form explaining the problem, and comment on the sample report.

10.4.6.3.4 It will be the judgment of the analyst and/or supervisor to approve the data acquired using this initial calibration. If evaluation of the system in addition to the failed QCs indicates a lack of integrity of the data, the samples will be reanalyzed.

10.4.6.4 Duplicates (including MSD) shall have a % Repeatability of 40 % or less. NOTE: **For DoD samples**, control limits calculated by using LCS data will be used to determine acceptable Relative Percent Difference.

10.4.7 Library searches.

10.4.7.1 The selection and quantitation of non-target peaks is performed automatically by the Target software. Note: The sample shall be processed for client specific compounds only. Otherwise, the Target software will not pick any other target compounds as library peaks. If a sub-list containing client specific analytes is not used, the analyst must add, to the library search form, any compounds that were detected in the analysis that the client does not want reported. Also, if any changes have been made to the sample such as deleting or integrating peaks, the library search must be redone by selecting "process unknowns" in Target.

10.4.7.2 If the software selects any internal standard, surrogate, or target compounds, delete them in Target. The air peak (the first large peak on the chromatogram usually, its primary m/e will be 44) shall be deleted also. Also, early eluters with mass 40 can be deleted.

10.4.7.3 The Target software will perform a library search on and estimate the concentration of the 20 largest non-target peaks.

10.4.7.4 Only after visual comparison of sample spectra with the nearest library searches shall a tentative identification be assigned to the peak. The analyst will need to search each non-target peak on the Target system to view the library searches. Consider the following sets of guidelines before making a tentative identification.

10.4.7.5 Guidelines for making tentative identification of non-target compounds. In other words, making a specific identification of non-target compounds, i.e., limonene, hexamethylbenzene. These guidelines are from a contract laboratory program statement of work.

10.4.7.5.1 Major ions (ions greater than 10% of the most abundant ion) in the reference spectrum shall be present in the sample spectrum.

10.4.7.5.2 The relative intensities of the major ions shall agree within plus or minus 20%. Example: For an ion with an abundance of 50% in the reference spectrum, the corresponding sample ion abundance must be between 30 and 70%.

10.4.7.5.3 Molecular ions present in the reference spectrum shall be present in the sample spectrum.

10.4.7.5.4 Ions present in the reference spectrum but not in the sample spectrum shall be reviewed for possible subtraction from the sample spectrum because of background contamination or co eluting peaks. Data system library reduction programs can sometimes create these discrepancies.

10.4.7.5.5 If in the analyst's technical judgment, no valid identification is possible, the compound shall be reported as unknown. If possible give an additional classification to the compound (i.e., unknown phthalate, unknown hydrocarbon, unknown acid type, unknown chlorinated compound, etc.). If the probable molecular weights can be determined, include them.

10.4.7.6 Guidelines for making tentative ID based on match quality.

10.4.7.6.1 If a non-target compound is present in the calibration mixes it can be identified as that compound no matter how good or bad the match quality is as long as the criteria for identifying the spectra of target compounds are met for those compounds, i.e., hexane, benzyl chloride, 1,2,4-trimethylbenzene, etc.

10.4.7.6.2 If a tentatively identified compound has a match of greater than 90% and the next closest match is greater than 30 % less, tentatively identify the peak as that compound.

10.4.7.6.3 If the match quality of 2 or more isomers are very close together and greater than 70% with no other unrelated compounds within 10 %, identify that peak as ____________ isomer. Be as specific as possible.

10.4.7.6.4 Identify classes of compounds if all the compounds above 50 % match belong to the same class, or if the 2 or 3 closest matches belong to one chemical class and the next matches have significantly different match quality.

10.4.7.6.5 Use the analyst's experience when possible. Also, be consistent throughout a group of samples, referring back to retention times as a guide.

11 Calculations

11.1 All calculations are performed by the Target software.

12 Reporting Results

12.1 Horizon LIMS results are reported to three significant figures but limited to the number of decimal places in the reporting limit for the individual compound or analyte.

12.2 When entering data into the Horizon LIMS do not round off results: Horizon will automatically round off to 3 significant figures after all internal calculations are completed.

12.3 Report the actual result, even if it is less than the reporting limit. Any sample with a result less than the reporting limit is reported as ND (non-detectable); LIMS will automatically report the appropriate detection limit. The client may request that "J values" be reported. J values are hits between the reporting limit and the method detection limit. They are reported with a "J" flag.

12.4 If the primary analysis of a sample was diluted, the reporting limits must be raised proportionate to the dilution factor. The following standard verbiage comments in the LIMS may be added to explain to the client why the reporting limits are elevated.

12.4.1 VLE - Sample was run at a dilution due to late eluting non-target compounds.

12.4.2 VNT - Sample was run at a dilution due to the level of non-target compounds.

12.4.3 VTC - Sample was run at a dilution due to the level of target compounds.

12.5 Any errors must be marked through with a single line with the analyst's initial, the date, and the correction.

12.6 All raw data used for reporting results must be dated and initialed by the qualified laboratory personnel performing first and second review.

13 Waste Disposal

13.1 Refer to ALSI SOP 19-Waste Disposal.

14 Pollution Prevention

14.1 Pollution prevention encompasses any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operations. Management shall consider pollution prevention a high priority. Extended storage of unused chemicals increases the risk of accidents. The laboratory shall consider smaller quantity purchases which will result in fewer unused chemicals being stored and reduce the potential for exposure by employees. ALSI tracks chemicals when received by recording their receipt in a traceable logbook. Each chemical is then labeled according to required procedures and stored in assigned locations for proper laboratory use.

15 Definitions

15.1 Refer to ALSI QA Plan under Laboratory Quality Control Checks for general definitions.

16 Troubleshooting

16.1 Refer to maintenance logs and instrument manuals for guidance in troubleshooting specific problems related to the instrumentation used in this method.

TABLE 1
BFB KEY M/Z ABUNDANCE CRITERIA

MASS	M/Z ABUNDANCE CRITERIA
50	15 TO 40% OF MASS 95
75	30 TO 60% OF MASS 95
95	BASE PEAK, 100% RELATIVE ABUNDANCE
96	5 TO 9% OF MASS 95
173	<2% OF MASS 174
174	>50% OF MASS 95
175	5 TO 9% OF MASS 174
176	>95% BUT <101% OF MASS 174
177	5 TO 9% OF MASS 176

APPENDIX A

Theoretical Standard Concentrations

Initial Calibration
SW846 Method 8260B

VOANEW = 1.0 mL of VCSMEGA, VCS Acetates, VCS Ketones, VCS Additions, VCS Acrolein, and VCS2CEVE to a final volume of 10 mL in P & T methanol.

Prepare the 6 initial calibration standards from the following table:

Standard ID	Volume Added			Flask Volume (mL)
	VOANEW	VGas	H826SS	
VSTD200	50 µL	50 µL	40 µL	50
VSTD100	25 µL	25 µL	20 µL	50
VSTD050	25 µL	25 µL	20 µL	100
VSTD020	20 µL	20 µL	16 µL	200
VSTD005	12.5 µL	12.5 µL	10 µL	500
VSTD001	2.5 µL	2.5 µL	2 µL	500

Compound Name	Standard Mix	Stock (ppm)	VSTD200	VSTD100	VSTD050	VSTD020	VSTD005	VSTD001
Benzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Bromobenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Bromochloromethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Bromodichloromethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Bromoform	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
n-Butylbenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Sec-Butylbenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Tert-Butylbenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Carbon tetrachloride	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Chlorobenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Chloroform	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
2-Chlorotoluene (o)	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
40Chlorotoluene (p)	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Dibromochloromethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,2-Dibromo-3-chloropropane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,2-Dibromoethane (EDB)	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Dibromomethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,2-Dichlorobenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,3-Dichlorobenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,4-Dichlorobenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,1-Dichloroethene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Cis-1,2-Dichloroethene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Trans-1,2-Dichloroethene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb

Compound Name	Standard Mix	Stock (ppm)	VSTD200	VSTD100	VSTD050	VSTD020	VSTD005	VSTD001
1,2-Dichloropropane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,3-Dichloropropane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
2,2-Dichloropropane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,1-Dichloropropene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Cis-1,3-Dichloropropene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Trans-1,3-Dichloropropene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Ethylbenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Hexachlorobutadiene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Isopropylbenzene (Cumene)	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
p-Isopropyltoluene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Methylene Chloride	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Naphthalene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
n-Propylbenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Styrene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,1,1,2-Tetrachloroethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,1,2,2-Tetrachloroethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Tetrachloroethene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Toluene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,2,3-Trichlorobenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,2,4-Trimethylbenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,3,5-Trimethylbenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
m-xylene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
p-xylene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
o-xylene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,1-Dichloroethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,1,1-Trichloroethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,2-Dichloroethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,2,3-Trichloropropane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,2,4-Trichlorobenzene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,1,2-Trichloroethane	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Trichloroethene	VCSMEGA	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb

Vinyl Acetate	VCS Acetates	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Methyl acetate	VCS Acetates	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Ethyl acetate	VCS Acetates	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb

Acetone	VCS Ketones	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
2-Butanone	VCS Ketones	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
4-Methyl-2-pentanone	VCS Ketones	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
2-Hexanone	VCS Ketones	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
1,1-Dichloro-2-propanone	VCS Ketones	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb

Pentane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
3-Chloroprene (allyl chloride)	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Di-isobutylene	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1-Chlorohexane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Methyl-tert-butyl ether	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb

Compound Name	Standard Mix	Stock (ppm)	VSTD200	VSTD100	VSTD050	VSTD020	VSTD005	VSTD001
Ethyl ether	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Freon 113 (1,1,2-TCTFE)	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Hexane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Heptane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Cyclohexane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Benzyl chloride	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Iodomethane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Carbon Disulfide	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Chloroprene	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Octane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Acrylonitrile	VCS Additions	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
2-Nitropropane	VCS Additions	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
Tetrahydrofuran	VCS Additions	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
Tert-Butyl alcohol	VCS Additions	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
Trans-1,4-Dichloro-2-butene	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Methyl methacrylate	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Isobutyl alcohol	VCS Additions	20000	2000 ppb	1000 ppb	500 ppb	200 ppb	50 ppb	10 ppb
Hexachloroethane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Ethyl methacrylate	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
2-Propanol	VCS Additions	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
1-Propanol	VCS Additions	20000	2000 ppb	1000 ppb	500 ppb	200 ppb	50 ppb	10 ppb
Propionitrile	VCS Additions	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
Methacrylonitrile	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
1,4-Dioxane	VCS Additions	50000	5000 ppb	2500 ppb	1250 ppb	500 ppb	125 ppb	25 ppb
Pentachloroethane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Nitrobenzene	VCS Additions	20000	2000 ppb	1000 ppb	500 ppb	200 ppb	50 ppb	10 ppb
Methyl acrylate	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Chloroacetonitrile	VCS Additions	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
1-Chlorobutane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Dichlorofluoromethane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
tert-amyl methyl ether	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Ethyl tert-butyl ether	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Di-isopropyl ether	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Methyl cyclohexane	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Acetonitrile	VCS Additions	10000	1000 ppb	500 ppb	250 ppb	100 ppb	25 ppb	5 ppb
1,2,3-Trimethylbenzene	VCS Additions	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Acrolein	V Acrolein	50000	5000 ppb	2500 ppb	1250 ppb	500 ppb	125 ppb	25 ppb
2-Chloroethyl vinyl ether	VCS2CEVE	2000	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Bromomethane	V Gases	200	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Chloroethane	V Gases	200	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Chloromethane	V Gases	200	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Dichlorodifluoromethane	V Gases	200	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Trichlorofluoromethane	V Gases	200	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb
Vinyl Chloride	V Gases	200	200 ppb	100 ppb	50 ppb	20 ppb	5 ppb	1 ppb

APPENDIX B

Theoretical Standard Concentrations
Quality Control Standard / Spike
EPA Method 524.2

QVOALCS = 0.5 mL of QCS MEGA, QCS Acetates, QCS Ketones, QCS Additions, QCS Acrolein, and QCS 2CEVE to a final volume of 10.0 mL in P & T methanol.

Stock mix ID	Volume Added		
	5 mL Final Volume	**50 mL Final Volume**	**100 mL Final Volume**
QVOALCS	10 µL	100 µL	200 µL
QGASES	5 µL	50 µL	100 µL

Compound Name	Standard Mix	Stock (ppm)	Working Conc.
Benzene	QCSMEGA	200	20 ppb
Bromobenzene	QCSMEGA	200	20 ppb
Bromodichloromethane	QCSMEGA	200	20 ppb
Bromoform	QCSMEGA	200	20 ppb
n-Butylbenzene	QCSMEGA	200	20 ppb
Sec-Butylbenzene	QCSMEGA	200	20 ppb
Tert-Butylbenzene	QCSMEGA	200	20 ppb
Carbon tetrachloride	QCSMEGA	200	20 ppb
Chlorobenzene	QCSMEGA	200	20 ppb
Chloroform	QCSMEGA	200	20 ppb
2-Chlorotoluene (o)	QCSMEGA	200	20 ppb
40Chlorotoluene (p)	QCSMEGA	200	20 ppb
Dibromochloromethane	QCSMEGA	200	20 ppb
1,2-Dibromo-3-chloropropane	QCSMEGA	200	20 ppb
1,2-Dibromoethane (EDB)	QCSMEGA	200	20 ppb
Dibromomethane	QCSMEGA	200	20 ppb
1,2-Dichlorobenzene	QCSMEGA	200	20 ppb
1,3-Dichlorobenzene	QCSMEGA	200	20 ppb
1,4-Dichlorobenzene	QCSMEGA	200	20 ppb
1,1-Dichloroethene	QCSMEGA	200	20 ppb
Cis-1,2-Dichloroethene	QCSMEGA	200	20 ppb
Trans-1,2-Dichloroethene	QCSMEGA	200	20 ppb
1,2-Dichloropropane	QCSMEGA	200	20 ppb
1,3-Dichloropropane	QCSMEGA	200	20 ppb
2,2-Dichloropropane	QCSMEGA	200	20 ppb
1,1-Dichloropropene	QCSMEGA	200	20 ppb
Cis-1,3-Dichloropropene	QCSMEGA	200	20 ppb
Trans-1,3-Dichloropropene	QCSMEGA	200	20 ppb
Ethylbenzene	QCSMEGA	200	20 ppb
Hexachlorobutadiene	QCSMEGA	200	20 ppb
Isopropylbenzene (Cumene)	QCSMEGA	200	20 ppb

Compound Name	Standard Mix	Stock (ppm)	Working Conc.
p-Isopropyltoluene	QCSMEGA	200	20 ppb
Methylene Chloride	QCSMEGA	200	20 ppb
Bromochloromethane	QCSMEGA	200	20 ppb
1,1-Dichloroethane	QCSMEGA	200	20 ppb
1,1,1-Trichloroethane	QCSMEGA	200	20 ppb
1,2-Dichloroethane	QCSMEGA	200	20 ppb
1,2,3-Trichloropropane	QCSMEGA	200	20 ppb
1,2,4-Trichlorobenzene	QCSMEGA	200	20 ppb
1,1,2-Trichloroethane	QCSMEGA	200	20 ppb
Trichloroethene	QCSMEGA	200	20 ppb
Naphthalene	QCSMEGA	200	20 ppb
n-Propylbenzene	QCSMEGA	200	20 ppb
Styrene	QCSMEGA	200	20 ppb
1,1,1,2-Tetrachloroethane	QCSMEGA	200	20 ppb
1,1,2,2-Tetrachloroethane	QCSMEGA	200	20 ppb
Tetrachloroethene	QCSMEGA	200	20 ppb
Toluene	QCSMEGA	200	20 ppb
1,2,3-Trichlorobenzene	QCSMEGA	200	20 ppb
1,2,4-Trimethylbenzene	QCSMEGA	200	20 ppb
1,3,5-Trimethylbenzene	QCSMEGA	200	20 ppb
m-xylene	QCSMEGA	200	20 ppb
p-xylene	QCSMEGA	200	20 ppb
o-xylene	QCSMEGA	200	20 ppb

Methyl acetate	QCS Acetates	200	20 ppb
Ethyl acetate	QCS Acetates	200	20 ppb
Vinyl Acetate	QCS Acetates	200	20 ppb

Acetone	QCS Ketones	1000	100 ppb
2-Butanone	QCS Ketones	1000	100 ppb
4-Methyl-2-pentanone	QCS Ketones	1000	100 ppb
2-Hexanone	QCS Ketones	1000	100 ppb
1,1-Dichloro-2-propanone	QCS Ketones	1000	100 ppb

Pentane	QCS Additions	200	20 ppb
3-Chloroprene (allyl chloride)	QCS Additions	200	20 ppb
Di-isobutylene	QCS Additions	200	20 ppb
1-Chlorohexane	QCS Additions	200	20 ppb
Methyl-tert-butyl ether	QCS Additions	200	20 ppb
Ethyl ether	QCS Additions	200	20 ppb
Freon 113 (1,1,2-TCTFE)	QCS Additions	200	20 ppb
Hexane	QCS Additions	200	20 ppb
Heptane	QCS Additions	200	20 ppb
Cyclohexane	QCS Additions	200	20 ppb
Benzyl chloride	QCS Additions	200	20 ppb
Iodomethane	QCS Additions	200	20 ppb
Carbon Disulfide	QCS Additions	200	20 ppb
Chloroprene	QCS Additions	200	20 ppb

Compound Name	Standard Mix	Stock (ppm)	Working Conc.
Octane	QCS Additions	200	20 ppb
Acrylonitrile	QCS Additions	1000	100 ppb
2-Nitropropane	QCS Additions	1000	100 ppb
Tetrahydrofuran	QCS Additions	1000	100 ppb
Tert-Butyl alcohol	QCS Additions	1000	100 ppb
Trans-1,4-Dichloro-2-butene	QCS Additions	200	20 ppb
Methyl methacrylate	QCS Additions	200	20 ppb
Isobutyl alcohol	QCS Additions	2000	200 ppb
Hexachloroethane	QCS Additions	200	20 ppb
Ethyl methacrylate	QCS Additions	200	20 ppb
2-Propanol	QCS Additions	1000	100 ppb
1-Propanol	QCS Additions	2000	200 ppb
Propionitrile	QCS Additions	1000	100 ppb
Methacrylonitrile	QCS Additions	200	20 ppb
1,4-Dioxane	QCS Additions	5000	500 ppb
Pentachloroethane	QCS Additions	200	20 ppb
Nitrobenzene	QCS Additions	2000	200 ppb
Methyl acrylate	QCS Additions	200	20 ppb
Chloroacetonitrile	QCS Additions	1000	100 ppb
1-Chlorobutane	QCS Additions	200	20 ppb
Dichlorofluoromethane	QCS Additions	200	20 ppb
tert-amyl methyl ether	QCS Additions	200	20 ppb
Ethyl tert-butyl ether	QCS Additions	200	20 ppb
Di-isopropyl ether	QCS Additions	200	20 ppb
Methyl cyclohexane	QCS Additions	200	20 ppb
Acetonitrile	QCS Additions	1000	100 ppb

Acrolein	Q Acrolein	1500	150 ppb

2-Chloroethyl vinyl ether	QCS2CEVE	200	20 ppb

Bromomethane	Qgas mix	20	20 ppb
Chloroethane	Qgas mix	20	20 ppb
Chloromethane	Qgas mix	20	20 ppb
Dichlorodifluoromethane	Qgas mix	20	20 ppb
Trichlorofluoromethane	Qgas mix	20	20 ppb
Vinyl Chloride	Qgas mix	20	20 ppb

APPENDIX C

TABLE 2

CALIBRATION AND QC ACCEPTANCE CRITERIA

PARAMETER	RANGE FOR Q (ug/L)	LIMIT FOR s (ug/L)	RANGE FOR X (ug/L)	RANGE FOR P, P$_s$ (%)
Benzene	12.8-27.2	6.9	15.2-26.0	37-151
Bromodichloromethane	13.1-26.9	6.4	10.1-28.0	35-155
Bromoform	14.2-25.8	5.4	11.4-31.1	45-169
Bromomethane	2.8-37.2	17.9	D-41.2	D-242
Carbon Tetrachloride	14.6-25.4	5.2	17.2-23.5	70-140
Chlorobenzene	13.2-26.8	6.3	16.4-27.4	37-160
Chloroethane	7.6-32.4	11.4	8.4-40.4	14-230
2-Chloroethylvinyl ether	D-44.8	25.9	D-50.4	D-305
Chloroform	13.5-26.5	6.1	13.7-24.2	51-138
Chloromethane	D-40.8	19.8	D-45.9	D-273
Dibromochloromethane	13.5-26.5	6.1	13.8-26.6	53-149
1,2-Dichlorobenzene	12.6-27.4	7.1	11.8-34.7	18-190
1,3-Dichlorobenzene	14.6-25.4	5.5	17.0-28.8	59-156
1,4-Dichlorobenzene	12.6-27.4	7.1	11.8-34.7	18-190
1,1-Dichloroethane	14.5-25.5	5.1	14.2-28.5	59-155
1,2-Dichloroethane	13.6-26.4	6.0	14.3-27.4	49-155
1,1-Dichloroethene	10.1-29.9	9.1	3.7-42.3	D-234
trans-1,2-Dichloroethene	13.9-26.1	5.7	13.6-28.5	54-156
1,2-Dichloropropane	6.8-33.2	13.8	3.8-36.2	D-210
cis-1,3-Dichloropropene	4.8-35.2	15.8	1.0-39.0	D-227
trans-1,3-Dichloropropene	10.0-30.0	10.4	7.6-32.4	17-183
Ethylbenzene	11.8-28.2	7.5	17.4-26.7	47-150
Methylene chloride	12.1-27.9	7.4	D-41.0	D-221
1,1,2,2-Tetrachloroethane	12.1-27.9	7.4	13.5-27.2	46-157
Tetrachloroethene	14.7-25.3	5.0	17.0-26.6	64-148
Toluene	14.9-25.1	4.8	16.6-26.7	47-150
1,1,1-Trichloroethane	15.0-25.0	4.6	13.7-30.1	52-162
1,1,2-Trichloroethane	14.2-25.8	5.5	14.3-27.1	52-150
Trichloroethene	13.3-26.7	6.6	18.6-27.6	71-157
Trichlorofluoromethane	9.6-30.4	10.0	8.9-31.5	17-181
Vinyl chloride	0.8-39.2	20.0	D-43.5	D-251

Appendix D

GC/MS VOLATILE SAMPLE INFORMATION

Instrument MS03

DATE(S):	CALIBRATION VERIFIED BY:	BATCH CONTINUED FROM PAGE:
DATA FILE NAME:	BFB INJECTED: ICAL DATE:	BATCH CONTINUED TO PAGE:
BATCH NAME:	12-HOUR ENDING:	METHOD:

METH #	POS. #	RUN #	SAMPLE	CLIENT	SAMPLE INFORMATION	DIL.	ANALYST	TEST	pH / %M	HDSP / Wt.	Cl-	First Review	COMMENT	SDG

IS: ____________ SS: ____________ VGas____________ Qgas____________ Page:________

Prev.______ Current______ Total______

Batch:________ Prev.:______ Current:______ Total:______

Rev. 7/05

Appendix E

Batch Review Checklist

TARGET BATCH: ____________ HORIZON BATCH: ____________

INSTRUMENT: METHOD: ICAL DATE(S):

Reviewer 1	Reviewer 2	
______	______	BFB Reviewed
______	______	Calibration/Continuing Calibration reviewed
______	______	Continuing Calibration passes +/- ISTD area - CCAL is zeroed
______	______	Correct ICAL referenced (Y__/N__) (correct start/end times/dates (Y__/N__)
______	______	Any raised reporting limits due to ICAL (Y__/N__) - See attached spreadsheet
______	______	Blank reviewed - Any detections (Y__/N__) If yes, what__________
______	______	LCS/second source reviewed - List failures in comment section
______	______	MS/MSD reviewed - List failures on unspiked sample
______	______	All samples within 12/24-hour tune period (Y__/N__)
______	______	Compound retention times reviewed
______	______	ISTDs for each sample reviewed
______	______	Surrogates for each sample reviewed
______	______	Soil weights/volumes correct
______	______	Samples checked for over-range detections and put back in for reanalysis
______	______	Spectra and Ions have been reviewed for each analyte detected
______	______	Library search has been performed for clients requesting it
______	______	Container IDs in LIMS batch (Y__/N__) - If no, which samples

REPORTS:

______	Photocopy of runlog
______	Batch summary printed
______	ICAL Summary printed
______	BFB Reports
______	Calibration/CCAL reports
______	Reports printed for all samples (include library search if necessary)
______	Logbook complete - All standard information included
______	Tests scheduled in LIMS
______	Data review signed
______	Data reported signed
______	Data approved signed

COMMENTS:

Rev. 8/06

SOP Change History Sheet

Section No.	Section	Reason for Change
5.2.5	Apparatus and Materials	Correction to current SOP
6.10 – 6.11	Reagents	Correction to current SOP
7.5.1	Instrument Calibration	Correction to current SOP
7.5.3.2	Instrument Calibration	DoD audit response
7.6.2	Instrument Calibrations	Correction to current SOP
8.6.4	Quality Control	Correction to current SOP
8.7.3	Quality Control	Correction to current SOP
8.5.4	Quality Control	Correction to current SOP
8.11	Quality Control	Correction to current SOP
10.3.1	Procedure	Correction to current SOP
10.3.2	Procedure	Correction to current SOP
10.3.3.4	Procedure	DoD audit response
10.3.7.7 & 9	Procedure	Correction to current SOP
10.3.7.9	Procedure	Correction to current SOP
10.3.3.12	Procedure	Correction to current SOP
10.3.4.1 & 3	Procedure	Correction to current SOP
A & B	Appendix	Correction to current SOP
Revision 8:03/06/2006		**(**Revisions made throughout to update Section references)
1.1	Scope and Application	Updated method revision
1.10	Scope and Application	Added project criteria requirements verbiage

SOP Change History Sheet (continued)

Section No.	Section	Reason for Change
4.2	Safety	Added MSDS availability
5.3, 5.5, 5.12	Apparatus and Materials	Added vendor information
5.9-5.11	Apparatus and Materials	Revised vendor information
5.14	Apparatus and Materials	Removed pipette reference
6.4	Reagents	Added vendor information
6.5	Reagents	Revised temperature range
6.6.2, 6.7.2.2, 6.8.4, 6.9.2.3, 6.10.3.3, 6.11.3.1, 6.11.3.3	Reagents	Added word "mixture"
6.7, 6.9	Reagents	Added abbreviation verbiage
6.8	Reagents	Added abbreviation verbiage and note
6.10.1	Reagents	Added calibration check standard verbiage, revised catalog #'s
6.10.3.1	Reagents	Revised preparation volumes
6.10.3.2, 6.11.3.2	Reagents	Revised preparation volumes, added standards
6.10.4.2	Reagents	Added volume amount of Acrolein
6.11.1	Reagents	Removed calibration check standard verbiage, revised catalog #'s
6.13	Reagents	Added DPD Free Chlorine to list
7.1	Instrument Calibration	Added instrument and recording location

SOP Change History Sheet (continued)

Section No.	Section	Reason for Change
7.4.2, 10.4.4.2, 10.4.7.2, 10.4.7.4, 11.1	Instrument Calibration Procedure Calculations	Updated reference from "Chemserver" to read "Target"
7.4.3, 7.6.1.1, 7.6.2.1, 8.14	Instrument Calibration Quality Control	Revised "USACE" to read "DoD"
7.5.4.2, 7.5.5.1, 8.7.3, 10.3.5.1, 10.4.5	Instrument Calibration Quality Control Procedure	Added DoD requirements
7.6.1	Instrument Calibration	Revised wording from "purge" to "inject"
7.6.1.1	Instrument Calibration	Added verbiage concerning scanning
8.3	Quality Control	Added verbiage about ongoing proficiency
8.6.2	Quality Control	Removed reference to third aliquot, added/revised volumes
8.7.1, 8.9.2	Quality Control	Added LCS and QC check sample preparation details
8.14	Quality Control	Added reference to SOP 99-MDL/reference method
9.3, 10.4.3	Sample Collection… Procedure	Replaced "AMS" with "Horizon", revised comment
10.3.3.5	Procedure	Removed references for performing dilutions in 50mL flasks
10.3.3.6	Procedure	Added reference to Class A flasks
10.3.3.10	Procedure	Removed reference to vendor
10.3.4	Procedure	Added mixing directions

SOP Change History Sheet (continued)

Section No.	Section	Reason for Change
10.4.4.3	Procedure	Added sample reruns to be rerun "at a dilution"
10.4.4.4	Procedure	Added reference to SOP 99-Integration
10.4.6.3.1, 10.4.6.3.2	Procedure	Revised spike sublist reference
10.4.7.5	Procedure	Added verbiage to include "guidelines"
12.3	Reporting Results	Added verbiage for reporting limits and J-values
12.6	Reporting Results	Added instructions to date and initial 1st and 2nd reviews
16	Troubleshooting	Added Section
A, B	Appendix	Substantial revisions throughout both tables

Revision 9: 08/17/2006

6.10-6.11	Reagents	Made current with lab practice as per internal audit findings
A, B, E	Appendix	Made current with lab practice as per internal audit findings

Revision 10: 11/12/07

Spelling, grammar, and formatting changes may have been made throughout SOP.

8.6.2	Reagents	Update spike amounts
10.3.4.1	Procedure	Update spike amounts

SOP Concurrence Form
for the Distribution and Revision of Standard Operating Procedures

I have read, understood, and concurred with the Standard Operating Procedure (SOP) described above and will perform this procedure as it is written in the SOP.

Print Name	Signature	Date

Analyte	Units	Reg Limit	MDL	PQL	RDL
TARGET COMPOUND LIST - AQUEOUS MATRIX					
8260WTCL 8260B, TCL Volatiles VOC					
Chloromethane	ug/L		0.2	1	1
Vinyl Chloride	ug/L		0.2	1	1
Bromomethane	ug/L		0.2	1	1
Chloroethane	ug/L		0.3	1	1
Acetone	ug/L		4	10	10
1,1-Dichloroethene	ug/L		0.2	1	1
Methylene Chloride	ug/L		0.1	1	1
Carbon Disulfide	ug/L		0.1	1	1
trans-1,2-Dichloroethene	ug/L		0.2	1	1
1,1-Dichloroethane	ug/L		0.1	1	1
2-Butanone	ug/L		3	10	10
cis-1,2-Dichloroethene	ug/L		0.2	1	1
Bromochloromethane	ug/L		0.2	1	1
Chloroform	ug/L		0.2	1	1
1,2-Dichloroethane	ug/L		0.2	1	1
1,1,1-Trichloroethane	ug/L		0.2	1	1
Carbon Tetrachloride	ug/L		0.2	1	1
Benzene	ug/L		0.4	1	1
1,2-Dichloropropane	ug/L		0.2	1	1
Trichloroethene	ug/L		0.2	1	1
Bromodichloromethane	ug/L		0.2	1	1
cis-1,3-Dichloropropene	ug/L		0.2	1	1
4-Methyl-2-Pentanone(MIBK)	ug/L		1.3	5	5
trans-1,3-Dichloropropene	ug/L		0.2	1	1
1,1,2-Trichloroethane	ug/L		0.2	1	1
Toluene	ug/L		0.2	1	1
2-Hexanone	ug/L		0.7	5	5
Chlorodibromomethane	ug/L		0.2	1	1
1,2-Dibromoethane	ug/L		0.3	1	1
Tetrachloroethene	ug/L		0.4	1	1
Chlorobenzene	ug/L		0.2	1	1
Ethylbenzene	ug/L		0.3	1	1
mp-Xylene	ug/L		0.3	2	2
Bromoform	ug/L		0.2	1	1
Styrene	ug/L		0.2	1	1
1,1,2,2-Tetrachloroethane	ug/L		0.2	1	1
o-Xylene	ug/L		0.2	1	1
Total Xylenes	ug/L		0.4	3	3

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Analyte	Units	Reg Limit	MDL	PQL	RDL
1,2-Dibromo-3-chloropropane	ug/L		2.4	7	7
Dibromofluoromethane	ug/L				
1,2-Dichloroethane-d4	ug/L				
Toluene-d8	ug/L				
4-Bromofluorobenzene	ug/L				

TARGET COMPOUND LIST - LOW-LEVEL SOIL MATRIX

Analyte	Units	Reg Limit	MDL	PQL	RDL
8260/5035L 8260B/5035 TCL VOC -LOW					
Chloromethane	ug/kg		0.3	2	2
Vinyl Chloride	ug/kg		0.3	2	2
Bromomethane	ug/kg		0.5	4	4
Chloroethane	ug/kg		0.5	2	2
Acetone	ug/kg		8	25	25
1,1-Dichloroethene	ug/kg		0.5	2	2
Methylene Chloride	ug/kg		0.7	2	2
Carbon Disulfide	ug/kg		0.3	2	2
trans-1,2-Dichloroethene	ug/kg		0.4	2	2
1,1-Dichloroethane	ug/kg		0.3	2	2
2-Butanone	ug/kg		2	10	10
cis-1,2-Dichloroethene	ug/kg		0.5	2	2
Bromochloromethane	ug/kg		0.5	2	2
Chloroform	ug/kg		0.3	2	2
1,2-Dichloroethane	ug/kg		0.3	2	2
1,1,1-Trichloroethane	ug/kg		0.4	2	2
Carbon Tetrachloride	ug/kg		0.5	2	2
Benzene	ug/kg		0.4	2	2
1,2-Dichloropropane	ug/kg		0.3	2	2
Trichloroethene	ug/kg		0.5	2	2
Bromodichloromethane	ug/kg		0.3	2	2
cis-1,3-Dichloropropene	ug/kg		0.4	2	2
4-Methyl-2-Pentanone(MIBK)	ug/kg		1	10	10
trans-1,3-Dichloropropene	ug/kg		0.6	2	2
1,1,2-Trichloroethane	ug/kg		0.8	2	2
Toluene	ug/kg		0.3	2	2
2-Hexanone	ug/kg		0.8	10	10
Chlorodibromomethane	ug/kg		0.5	2	2
1,2-Dibromoethane	ug/kg		0.3	2	2
Tetrachloroethene	ug/kg		0.5	2	2
Chlorobenzene	ug/kg		0.4	2	2
Ethylbenzene	ug/kg		0.3	2	2
mp-Xylene	ug/kg		1	4	4

Analyte	Units	Reg Limit	MDL	PQL	RDL
Bromoform	ug/kg		1.1	2	2
Styrene	ug/kg		0.3	2	2
1,1,2,2-Tetrachloroethane	ug/kg		0.5	2	2
o-Xylene	ug/kg		0.3	2	2
Total Xylenes	ug/kg		1	6	6
1,2-Dibromo-3-chloropropane	ug/kg		1	4	4
Dibromofluoromethane	ug/kg				
1,2-Dichloroethane-d4	ug/kg				
Toluene-d8	ug/kg				
4-Bromofluorobenzene	ug/kg				

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

Appendix E - Community Relations Plan

MALCOLM PIRNIE

2118151 / BAL

FINAL

COMMUNITY RELATIONS PLAN FOR
FORT GEORGE G. MEADE, MARYLAND

Prepared by

EA Engineering, Science, and Technology, Inc.
Woodbridge Office Center
1319 Woodbridge Station Way
Edgewood, Maryland 21040
(410) 671-9016

October 2005 EA Project No. 61917.08

Regulatory Contacts and Lists of Officials updated 27 march 2009.

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FINAL

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EA Engineering, Science, and Technology, Inc.
Woodbridge Office Center
1319 Woodbridge Station Way
Edgewood, Maryland 21040
(410) 671-9016

David Mercadante — Date
Task Manager

Timothy A. Reese, P.E. — Date
Project Manager

October 2005

CONTENTS

Page

CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
ASL	Active Sanitary Landfill
AST	Aboveground Storage Tank
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFD	Clean Fill Dump
CFR	Code of Federal Regulations
CRP	Community Relations Plan
CSL	Closed Sanitary Landfill
DERA	Defense Environmental Restoration Account
DOD	Department of Defense
DOL	Department of Logistics
DPW	Department of Public Works
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
EPA	Environmental Protection Agency
FGGM	Fort George G. Meade
ft	Foot or Feet
gal	Gallon(s)
HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendments
IAP	Installation Action Plan
IRP	Installation Restoration Program
MDE	Maryland Department of the Environment
MMRP	Military Munitions Response Program
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NSA	National Security Agency
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PLF	Post Laundry Facility
PRR	Patuxent Research Refuge

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

ppb	Part(s) Per Billion
PSA	Public Service Announcement
RAB	Restoration Advisory Board
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
TAG	Technical Assistance Grant
TAPP	Technical Assistance for Public Participation
TOSC	Technical Outreach Services for Communities
TPH	Total Petroleum Hydrocarbons
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
UST	Underground Storage Tank
VOC	Volatile Organic Compound

1. OVERVIEW OF COMMUNITY RELATIONS PLAN

The U.S. Army has developed this Community Relations Plan to facilitate local community involvement with the environmental investigation and cleanup program at Fort George G. Meade (FGGM), Maryland.

Appropriate and effective communication as well as the timely exchange of information is imperative for maintaining community understanding and support for Fort Meade and to ensure the success of community relations. Therefore, it is the continuing goal of Fort Meade to:

- Establish effective and comprehensive mechanisms for informing the community of installation restoration program activities

- Solicit input and identify concerns the local community may have regarding ongoing and planned environmental program activities

- Maintain a strategy fostering ongoing, two-way communication between the Army and the local community

The Community Relations Plan (CRP) details outreach activities that encourage two-way communication between Fort Meade and the local community. This communication includes providing opportunities for the community to learn about and comment on the Installation Restoration Program (IRP).

The community involvement activities recommended in this CRP are tailored to the distinct needs of the local community based on feedback received during community interviews. The community interviews helped the Army to identify local perceptions regarding what activities were appropriate for communicating information and to address community concerns.

The local community interviewed to form the foundation of this CRP includes individuals from the following groups:

- Federal, state, and local officials and agencies
- Local business and civic interests
- Fort Meade’s civilian and military on-post residents

- Local citizens and neighbors

This CRP updates the previous June 2000 CRP [U.S. Army Corps of Engineers (USACE) 2000] by aligning the findings of the recent community interviews with the current status of environmental restoration at the installation and appropriate regulatory guidance. The updated Fort Meade Community Relations Plan has been prepared in accordance with current U.S. Environmental Protection Agency (EPA) guidance, including the Superfund Community Involvement Handbook (U.S. EPA 2002) and the Resource Conservation and Recovery Act (RCRA) Public Participation Manual (U.S. EPA 1986). These handbooks outline the community involvement requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986; the 1976 RCRA, as amended by the Hazardous and Solid Waste (HSWA) of 1984; and as stipulated in the guidance that interpret the Superfund legislation: the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The following sections of the Community Relations Plan summarize the history of the installation and the IRP; profile the local community audience; summarize community involvement activities since the previous Community Relations Plan; identify community questions, concerns, perceptions, and communication preferences; and detail the current activities available for communicating with the public.

For more information regarding this document or the Fort Meade environmental program, please contact the following person:

Mr. Michael P. Butler
Chief – Environmental Management Office
ATTN: IMNE-MEA-PWE (Mick Butler)
2234 Huber Street
Fort George G. Meade, MD 20755-5115
Phone: (301) 677-9648
Fax: (301) 677-9001
Email – mick.butler@us.army.mil

2. INSTALLATION SITE DESCRIPTION

The following subsections present an overview of Fort Meade.

2.1 HISTORY OF OPERATIONS AT FORT MEADE

Fort George G. Meade (Fort Meade) became an Army installation in 1917. Authorized by an Act of Congress in May 1917, it was one of 16 cantonments built for troops drafted for the war with the Central Powers in Europe. The present Maryland site was selected on 23 June 1917. Actual construction began in July 1917. The first contingent of troops arrived here that September.

The post was originally named Camp Meade for Major General George Gordon Meade, whose defensive strategy at the Battle of Gettysburg proved a major factor in turning the tide of the Civil War in favor of the North.

During World War I, more than 100,000 men passed through Fort Meade, a training site for three infantry divisions, three training battalions, and one depot brigade.

In 1928, when the post was renamed Fort Leonard Wood, Pennsylvanians registered such a large protest that the installation was permanently named Fort George G. Meade on 5 March 1929. This action was largely the result of a rider attached to the Regular Army Appropriation Act by a member of the House of Representatives from the Keystone State. Fort Meade became a training center during World War II, its ranges and other facilities used by more than 200 units and approximately 3,500,000 men between 1942 and 1946. The wartime peak-military personnel figure at Fort Meade was reached in March 1945—70,000. With the conclusion of World War II, Fort Meade reverted to routine peacetime activities, but was later to return to build-up status. Many crises, including Korea, West Berlin, and Cuba, along with Vietnam-related problems, were to come.

One key post-World War II event at Fort Meade was the transfer from Baltimore of the Second U.S. Army Headquarters on 15 June 1947. This transfer brought an acceleration of post activity, because Second Army Headquarters exercised command over Army units throughout a then seven-state area. A second important development occurred on 1 January 1966 when the Second U.S. Army merged with the First U.S. Army. The consolidated headquarters moved from Fort Jay, New York, to Fort Meade to administer activities of Army installations in a 15-state area.

In August 1990, Fort Meade began processing Army Reserve and National Guard units from several states for the presidential call-up in support of Operation Desert Shield. In addition to processing reserve and guard units, Fort Meade sent two of its own active duty units—the 85th Medical Battalion and the 519th Military Police Battalion—to Saudi Arabia. In all, approximately 2,700 personnel from 78 partner units deployed from Fort Meade during Operations Desert Shield/Desert Storm.

The Base Realignment and Closure (BRAC) Commission recommended the closure of Fort Meade's range and training areas, including Tipton Airfield, in 1988. This move realigned Fort Meade from an active army post to an administrative center. In 1991, the Army transferred 7,600 BRAC acres to the Department of Interior's Patuxent Research Refuge (PRR) followed by a second transfer of approximately 500 acres in 1993. In 1998, another 366-acre BRAC parcel, including the former Tipton Airfield, were transferred to Anne Arundel County for use as a General Aviation Facility.

Today, Fort Meade provides support and services for more than 50 tenant units, which include the Defense Information School Headquarters (DINFOS), the U.S. Army Field Band, and the National Security Agency (NSA).

2.2 SITE DESCRIPTION/LOCATION

Fort Meade is a permanent U.S. Army installation situated in the northwest corner of Anne Arundel County, Maryland. Anne Arundel County is located in central Maryland on the western shore of the Chesapeake Bay. Nearby communities include Odenton, Severn, Jessup, and Laurel. Fort Meade is close to the border of Howard County on the west and Prince George's County on the south. Fort Meade is located almost equidistant (12 miles) between Baltimore, Maryland and Washington, DC. Fort Meade is located in a region of significant population. The resident and working populations of Fort Meade approach 50,000. Figure 2-1 presents the location of Fort Meade.

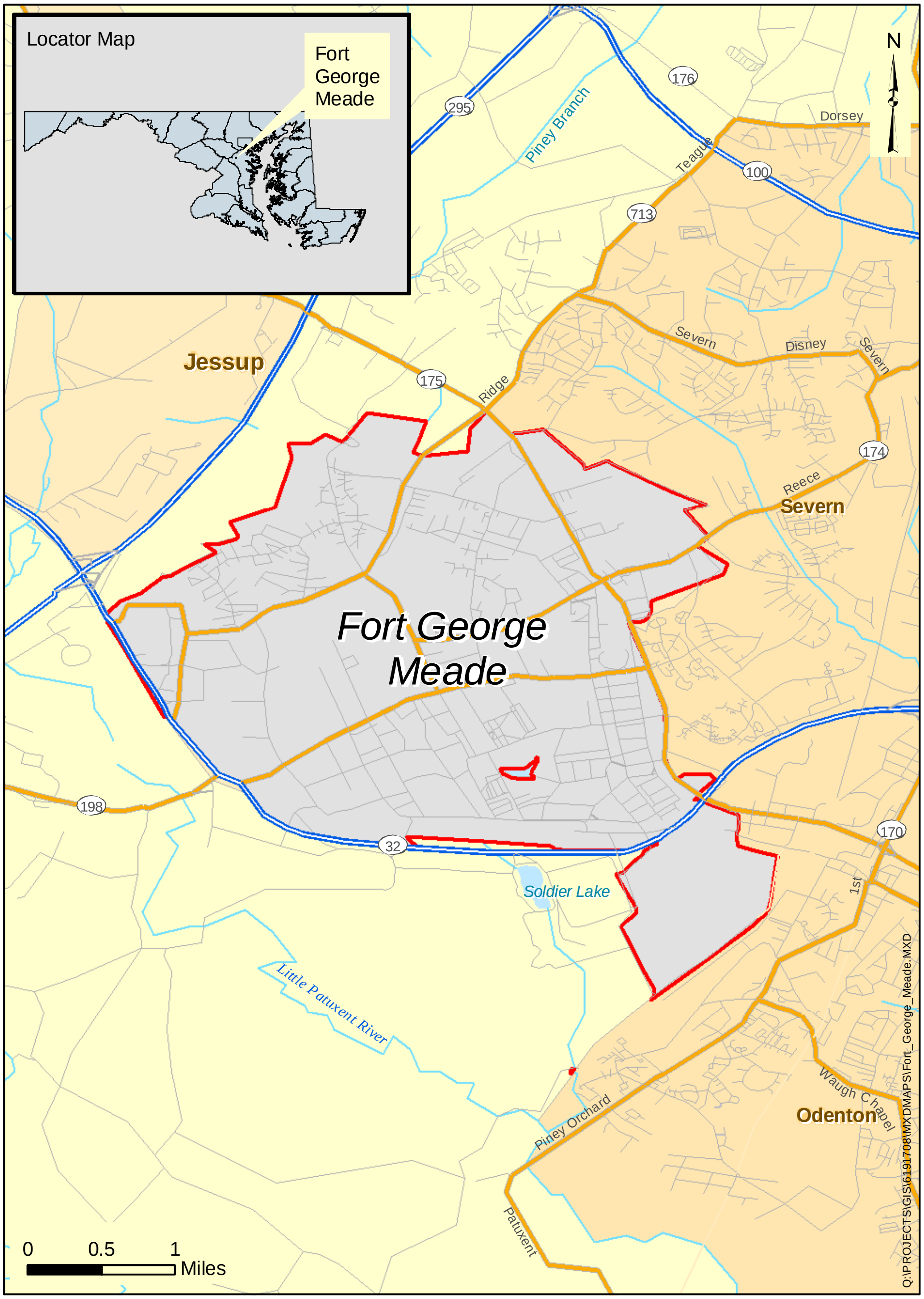


Figure 2-1. Fort George Meade Location Map

2.3 CLEANUP ACTIVITIES

2.3.1 Program Overview

In 1976, Congress enacted RCRA, designed to regulate the generation, transportation, storage, processing, and disposal of hazardous waste. U.S. EPA began promulgating regulations pursuant to the authorities granted under this statute in 1980, including the definition of the materials that were to be regulated as hazardous wastes. Many manufacturers and industrial facilities are regulated under this statute, either because they generate hazardous waste or because they treat, store, and dispose of hazardous waste at their facilities. Congress amended and reauthorized RCRA in 1984 through the HSWA, which broadened and expanded EPA's authority for ensuring corrective action at facilities subject to RCRA.

Fort Meade applied for a RCRA Part B Permit subsequent to the HSWA. In accordance with RCRA provisions, Fort Meade began investigating potential solid waste management units (SWMU) in 1987.

At the same time, site investigations began at the Active Sanitary Landfill (ASL), the Defense Reutilization and Marketing Office (DRMO) site, the Clean Fill Dump (CFD) site, and the Post Laundry Facility ('PLF') site. Contaminants including solvents, pesticides, polychlorinated biphenyls (PCBs), heavy metals, waste fuels, and waste oils were identified in soil and groundwater. Based on the results of these investigations, U.S. EPA added Fort Meade to the CERCLA National Priorities List (NPL) in 1998.

CERCLA, administered by U.S. EPA, was enacted by Congress on 11 December 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA was amended in 1986 by SARA. Under these two acts, federal facilities are required to fund their own studies and cleanup. For the Department of Defense (DOD), this fund is called the Defense Environmental Restoration Account (DERA) and is managed under the IRP.

These two acts are implemented through the NCP, which provides basic policy directive for federal action under CERCLA. The NCP sets forth the Hazard Ranking System (HRS) and procedures and standards for responding to releases of hazardous substances, pollutants, and contaminants. EPA uses the Hazard Ranking System to determine which sites should be listed on the NPL. The NPL identifies the most serious hazardous waste sites that may need possible long-term cleanup. Sites receiving higher hazard rankings are slated for cleanup before sites with lower scores (from a minimum of 28.5 points to a maximum of 100).

Under CERCLA, the Department of Army is the lead agency responsible for the Fort Meade investigations and cleanups with oversight by U.S. EPA and the Maryland Department of the Environment (MDE). Fort Meade environmental investigations and cleanups are funded by the IRP and DERA, as well as BRAC funding. In addition to CERCLA requirements, EPA is also responsible for ensuring that the Army also addresses all RCRA SWMUs and areas of concern (AOCs) at Fort Meade.

To coordinate planning information between the IRP manager, U.S. Army Environmental Center (USAEC), installations, executing agencies, regulatory agencies, and the public, an Installation Action Plan (IAP) was completed for Fort Meade for Fiscal Year 2005 (USAEC 2005). The IAP is used to track requirements, schedules, and budgets for all major Army installation restoration programs. The plan identifies environmental cleanup requirements at each site or area of concern, and proposes a comprehensive, installation-wide approach, with associated costs and schedules, to conduct investigations and necessary remedial actions.

2.3.2 Program History

The Fort Meade environmental program has contained as many as 31 CERCLA sites in the Installation Restoration Program and 150 RCRA SWMUs and AOCs.

Fort Meade completed the review of the approximately 150 SWMUs. The SWMUs were placed into four categories as follows: (1) no further action, (2) continue further action under CERCLA, (3) continue further action under RCRA, and (4) status to be determined based on additional sampling.

As of 2005, 17 of the 31 ERA IR sites have reached response complete closure and include the following sites:

- FGGM 03 Water Treatment Plant Building 8688
- FGGM 05 Troop Boiler Plant
- FGGM 08 Comp Ammo Supply Point (ASP) #1
- FGGM 11 Chemical Weapons
- FGGM 14 Hazardous Waste Storage Facility
- FGGM 18 ASP #2

- FGGM 19 Adv. Wastewater Treatment Facility
- FGGM 33 Battery Shop Building 2283
- FGGM 36 Photo Labs Building 4553, 6530
- FGGM 37 Kimbrough Army Hospital
- FGGM 45 Calibration Lab Building 2220
- FGGM 49 DOL Building 2246
- FGGM 51 Building 2216
- FGGM 70 Building 6513 Indoor Range
- FGGM 71 Building 6512 Ex Indoor Range
- FGGM 75 Underground Storage Tanks (USTs) Prior to 1984
- FGGM 78 Granite Nike

BRAC Sites

All the BRAC installation restoration and BRAC munitions response sites have reached response-in-place or response complete. Records of Decision (RODs) were signed for FGGM Operable Units 1 and 2 (Tipton Airfield BRAC sites) in 1999, and for FGGM Operable Unit 7 (Clean Fill Dump BRAC site) in 2000. U.S. EPA deleted the Tipton Airfield parcel from the Fort Meade NPL Site in November 1999. To date, 8,100 BRAC acres have been transferred to the Department of Interior's PRR for use as a wildlife refuge, and 366 acres including the former Tipton Airfield were transferred to Anne Arundel County for use as a General Aviation Facility.

2.3.3 Current Site Status

The remaining 14 active IRP sites are summarized below.

FGGM 07 DRMO Drum Site

During the 1995 construction of a new building at the DRMO scrap yard, a large number of metal drums containing unknown substances were discovered. Excavation operations discovered approximately 190 drums, 4 transformers/electrical boxes, and 7 decontamination drums which were subsequently removed. A groundwater plume beneath the burial area extends several hundred feet south of the source onto Department of Interior property. Most recent investigations have delineated the plume. A Draft Focused Feasibility Study evaluating several remedial alternatives was published in 2004. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 13 Pesticide Shop Building 6621

Former Building 6621 was located at the southwest corner of the intersection of York Avenue and Gordon Street. The structure was historically used as the installation's pesticide shop. The structure was used regularly for the storage and mixing of pesticides from 1958 to 1978. In 1978, pesticide operations were transferred to Building 294. In 1996, the building was demolished and the site regraded. Pesticide-contaminated soils were spread across the area. A site assessment was conducted in 1997. The site is contaminated with DDD and DDT at levels exceeding Industrial Risk Based Screening Criteria. A Remedial Investigation/Feasibility Study (RI/FS) is currently underway.

FGGM 17 Closed Sanitary Landfill

The closed sanitary landfill (CSL) encompasses 130 acres and was constructed as an unlined facility in 1958. The trench fill method was used from 1958 to 1976, and the area fill method was used from 1976 to 1996 until the landfill was officially closed and capped. A detection of carbon tetrachloride in an upgradient landfill monitoring well was discovered in the lower Patapsco Formation Aquifer. Detections exceeded maximum contaminant levels for this constituent. To date, Fort Meade has installed 24 wells in the lower Patapsco formation in an attempt to identify a point source of carbon tetrachloride. A point source could not be identified. The Army plans to include these data for the CSL Remedial Investigation. Contaminants of concern associated with the contents of the CSL will also be evaluated. Monitoring of wells in the upper and lower aquifers continues per RCRA solid waste closure requirements. The RI/FS is currently underway.

FGGM 47 Post Laundry Building 2250

Building 2250 was constructed in the 1940s during World War II and remained a laundry/dry cleaning facility until the mid-1980s. After its closure, the existing facility was converted to a recycling center. Initial soils investigations indicated that elevated levels of tetrachloroethene (PCE) were present in soils, groundwater, and surface water. A soil gas survey was completed in 1990 to further define the extent of contamination. Due to the soil gas results, vadose zone soil sampling and groundwater sampling was scheduled. Groundwater monitoring wells were not installed because groundwater was not encountered above a clay layer found throughout the site.

Based on this study, there appeared to be no significant impact to the substrate and the nearest shallow groundwater had not been affected. In 1994, MDE issued a corrective action order requiring Fort Meade to perform an investigation and to delineate the nature and extent of the problem. A comprehensive site investigation was completed to comply with the order. Additional investigations are planned. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 74 Architect of the Capital

This site is a 100-acre parcel of land bounded by Maryland Route 32 to the south, Rock Avenue to the north, Pepper Road to the east, and Remount Road to the west. The area includes warehouse facilities, USTs, and one motor pool. This property was deeded to the Architect of the Capital in October 1994, for the future construction of an archive facility for the Library of the Congress. The Army is responsible for investigating the environmental condition of the property and to restore the property as necessary in accordance with existing environmental laws and regulations. During 2000, a follow-on Site Investigation (SI) was conducted, showing low levels of semivolatile organic compounds (SVOCs), metals, and pesticide exceeding U.S. EPA Region III risk screening criteria. An RI/FS is currently underway.

FGGM 83 Trap and Skeet Range

This site (approximately 66 acres) was discovered during an Environmental Baseline Survey. In September 1998, a contract was awarded to investigate the site. Since that time, two separate SIs have been conducted. Both studies revealed the presence of lead and polycyclic aromatic hydrocarbons (PAHs) above the risk-based concentration levels. Field work for development of an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate the feasibility of a removal action was completed in 2004. Investigations are ongoing. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 86 Former Motorpool Maintenance Facility

This site was identified in a 1994 solid waste management unit study and further evaluated in two separate SIs during Fiscal Years 1999 and 2000, respectively. Historical review of records has indicated that this site was constructed as a motor pool maintenance facility and, therefore, it is being investigated under these criteria. Remedial investigation field work for Building 2286 commenced in 2004. Preliminary data suggest that a groundwater plume extends to and around Building 2276. The size of the plume is roughly double what was anticipated. Volatile organic compounds (VOCs) are present in the groundwater plume. Metals and total petroleum hydrocarbons (TPH) in soil have been identified in SI level investigations. Additional remedial investigation work is required to delineate the nature and extent of the problem. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 87 Former NIKE Control Site

The Former NIKE Fire Control Site was constructed in 1955 and supported NIKE missile activities until 1972. The four-building complex is presently used by the Directorate of Information Management for Fort Meade. This site was identified in a 1994 solid waste management unit study and further evaluated in two separate SIs during 1999 and 2000, respectively. Investigations identified exceedances of SVOCs, arsenic, and TPH in soils, and VOCs, SVOCs, metals, and TPH in groundwater. A remedial investigation is underway and a feasibility study will be completed in 2006. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 88 Former Tank Maintenance Facility Shop-1

This site was identified in a 1994 solid waste management unit study and further evaluated in two separate SIs during 1999 and 2000, respectively. Originally constructed to support tank maintenance activities, this facility now acts as a warehouse. The Department of Public Works (DPW) Storage and Receiving Yard is located approximately 150 ft southwest of the intersection of 1st Street and Chisholm Avenue. Current land use at the site is for maintenance.

The site includes Building 2207 (SWMU 37, DPW Storage and Receiving Warehouse), Building 2201 (DPW Storage and Supply Warehouse), Building 2206 (offices), Building 2204 (storage building), and Building 2200 (metal canopy for outdoor storage). Constructed in 1918, Building 2207 was used as a tank maintenance facility prior to 1973. Since at least the mid-1980s, it has been in use by DPW as a receiving and storage facility. It is currently used for receiving materials for distribution to other facilities (main floor), and storing supplies such as filters, light bulbs, and pipe clamps (upper floor). The grounds are also used for storage of construction materials, refrigerators, non-PCB-containing transformers, and fluorescent light bulbs. Records indicate that a spill had occurred from a transformer in the yard; however, the material was tested and found not to contain PCBs.

Investigations conducted at the site to date identified exceedances of screening criteria for the following compounds in soil: arsenic and TPH–diesel; and groundwater: arsenic and TPH. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 89 Former Tank Maintenance Facility Shop-2

The Department of Logistics (DOL) Electric Shop Building 2217, SWMU 39, and the DPW Storage Yard are located on 2nd Street between Pepper Road and Chisholm Avenue. Current and future land uses at the site is maintenance.

Building 2217 is located in the southeast corner of the site. A former wash rack (SWMU 41) and a former oil/water separator (SWMU 40) were located in the northwest corner of the site. The asphalt and gravel yard is currently used for storage of electrical transformers (non-PCB), electrical cables, boilers, water heaters, dishwashers, motors, and other equipment and machinery.

Constructed in 1918, Building 2217 was used as a tank maintenance facility until 1973. The building is currently used for storage of military vehicles, equipment, and small motors. The associated wash rack was used to wash vehicles and construction equipment; waste washwater was discharged to the oil/water separator and then to the sanitary sewer system. The wash rack and oil/water separator were demolished and removed in 1999 or 2000.

Investigations conducted at the site to date identified exceedances of screening criteria for the following compounds in soil: arsenic and TPH–diesel; and groundwater: arsenic, beryllium, copper, lead thallium, VOCs (benzene; naphthalene; n-propylbenzene; chlorobenzene; 1,4-dichlorobenzene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene), TPH–gasoline, and TPH–diesel. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 90 Former Tank Cleaning Supply Warehouse

The DOL Storage Services and Supply Division Complex is located in the northwest quadrant of the intersection of Pepper Road and Rock Avenue. Current and anticipated future land use is for maintenance operations.

The complex includes Buildings 2240 (SWMUs 45, 46), 2241(SWMUs 47, 48), 2242 (SWMUs 49, 50), 2243, 2247, 2248 (SWMUs 51, 52), and 2249 (SWMUs 53, 54). Building 2240 (DOL Laundry and Dry Cleaning Services) is a separate single-story brick structure.

Buildings 2241, 2242, and 2243 are connected in sequence and are elevated on wooden piers. Buildings 2247, 2248, and 2249 are smaller, wooden garage-type structures located behind the larger buildings. Other features on the site include a propane storage pen (Building 2247A), a flammable gas storage pen (Building 2248A), an empty compressed gas storage pen north of Building 2249, and a former 1,000-gallon aboveground storage tank (AST) storing No. 2 fuel oil located behind Building 2242, removed in 1995.

Constructed in 1934, Building 2240 has been used as a storage and supply facility since construction in 1934, and currently is a receiving/transfer location for computer equipment and laundry/dry cleaning. Buildings 2241 and 2242 were constructed in 1918 and have always been used for receiving and short-term storage of supplies and materials before shipping. The receiving areas stored a variety of lube oil cleaners, degreasers, carbon removers, detergent cleaners, and waxes; vehicle batteries and electronic components have also been stored recently. Building 2247, constructed in 1941, currently stores surplus office furniture but formerly stored hazardous materials. Buildings 2248 and 2249, also constructed in 1941, were formerly used as standard ordnance shops and as storehouses. Both are currently used for furniture storage. A railroad line once crossed the site, but is not currently apparent.

Investigations at the site have identified arsenic in soil above risk-based concentrations (RBC). VOCs, SVOCs, metals, herbicides, TPH–diesel, arsenic, and heptachlor were all detected above RBCs in groundwater. An RI/FS is ongoing. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 91 Former Missile Repair Shop

Building 2220, located approximately 150 ft north of the intersection of 2nd Street and Pepper Road, is used as an electronic maintenance and equipment calibration shop. It was also used in the past as a missile repair shop in the 1960s, and as a warehouse and as a troop-training center. Current and future land uses at the site are designated as “maintenance.”

No hazardous chemicals are currently in use at the facility. Past activities in the building have used solvents and produced solvent waste. Small amounts of cleaning solvent and gasoline were formerly stored in a shed outside the building. Two fuel oil USTs were formerly located at the south side of the building; one was removed in 1992, and the other was removed and replaced in 1988, then removed in 1997. During the 1988 UST removal, corrosion holes were noted at the end of the tank. EMO records include a report of a 1-gallon spill of fuel oil in 1993 at the site. An RI/FS is ongoing. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 92 Former Heavy Gun Cleaning/Repair

The Department of Logistics Tactical & Support Vehicle/Heavy Equipment Maintenance Facility, Building 2246 (SWMUs 55-58), is located at the southwest corner of the intersection of Pepper Road and Huber Road. Building 2253 (SWMUs 61-62) is located approximately 400 ft northeast of the intersection of Rock Avenue and Huber Road. Current and future land uses at the site, according to the Fort George G. Meade Land Use Plan, designate the area for “maintenance.”

The maintenance facility includes two main structures, Buildings 2246 (SWMUs 55-56), which includes a wing containing vehicle service bays, and 2246D; and two smaller structures, Buildings 2244 and 2245. A wash rack (SWMU 58) and associated oil/water separator (SWMU 57) are present at the southwest side of Building 2246D. Other features at the site include a relatively new 800-gallon aboveground used oil storage tank at the eastern corner of Building 2246D, an out-of-service wash rack on the north side of the Building 2246 vehicle maintenance wing, and an out-of-service fuel pump on the north side of the vehicle maintenance wing. The fuel pump formerly dispensed fuel from an underground diesel fuel storage tank, which was removed in the 1990s.

Building 2246 has been used as a warehouse and vehicle and equipment maintenance facility since 1934; it was also used as a heavy gun repair shop from 1934 until the mid-1980s, and a portion of the building is also believed to have been used as a tank repair shop in the past. The facility currently provides all levels of maintenance and repair of heavy equipment and installation vehicles.

Building 2253 was constructed in 1934, and has been used for vehicle maintenance in the past. Since 1992, the Director of Community Activities has used the facility for storage and maintenance of grounds-keeping equipment and supplies (e.g., tractors, gas cylinders); prior to 1992, DOL used the building warehouse. Building 2253 was transferred back to the DOL in 2001. Contents of the building include small quantities of petroleum products. The north end of the building interior is currently unoccupied and secured because of the presence of lead paint and asbestos-containing materials. An outdoor storage locker stores accumulated hazardous wastes, which are transferred to Building 2250 when the locker is full. An 800-gallon AST in the parking lot on the west side of the building serves as a collection point for used oil from vehicle maintenance. A gas cylinder storage cage is located adjacent to the hazardous waste storage locker.

Investigations conducted in these areas have identified arsenic, TPH–diesel, and the herbicide MCPP at elevated concentrations in soil. VOCs, SVOCs, TPH–diesel, and arsenic were detected at elevated concentration in groundwater. An RI/FS is ongoing. This site is now covered under performance based contracting as of Fiscal Year 2005.

FGGM 93 Manor View Dump Site

The Manor View Dump Site is located behind Manor View Elementary School, adjacent to Picerne Military Housing Neighborhood No. 1. The area was discovered during the excavation and grading to facilitate construction of the new housing. A preliminary assessment/site investigation was conducted during Spring 2003. This investigation was limited to surface and subsurface soil in and around the dump area. Contaminants found in the soil exceeding screening criteria included inorganic compounds, TPH, and PAHs. A passive vent trench was recently constructed to mitigate migration of methane gas in soil on the western edge of the dump. In addition, a remedial investigation is currently underway.

Munitions Response Sites

There are four active sites that are part of the Military Munitions Response Program (MMRP) at Fort Meade. The four sites include:

- FGGM-003 – Mortar Range
- FGGM-004 – Grenade and Bayonet Range
- FGGM-005 – Pistol Range A
- FGGM-006 – Pistol Range B

All four sites are currently scheduled for site investigations starting in 2006. A fifth MR site, Inactive Landfill 2, was originally part of the Tipton Maneuver and Buffer area and was addressed as part of FGGM-85 site investigations. The site is currently response complete/remedy-in-place with ongoing long-term monitoring.

For a detailed listing or access to all environmental studies and cleanup actions conducted at Fort Meade, refer to the Administrative Record/Information Repository (see Appendix H for the locations).

3. COMMUNITY BACKGROUND

The subsections that follow present an overview of the community and a general chronology of community relations and communication to date, as well as the results of the community interviews.

3.1 COMMUNITY PROFILE

Fort Meade is approximately equidistant between Washington, DC and the city of Baltimore, Maryland. The installation is located in northwestern Anne Arundel County and is bordered by Prince George's County to the south and Howard County to the northwest. Anne Arundel County is located on the Chesapeake Bay and has more than 432 miles of shoreline. The largest communities closest to Fort Meade are the city of Laurel and the town of Odenton.

3.1.1 Fort George G. Meade (Anne Arundel County)

Fort Meade is a census-designated place located in Anne Arundel County, Maryland. As of the 2000 census, Fort Meade had a total population of 9,882, with 2,432 households, and 2,307 families residing there. The population density is 1,500.5 people per square mile. There are 2,789 housing units at an average density of 422.5 per square mile. The racial makeup of Fort Meade is 62.46 percent White, 25.21 percent African American, 0.46 percent Native American, 2.98 percent Asian, 0.26 percent Pacific Islander, 3.58 percent from other races, and 5.06 percent from two or more races.

There are 2,432 households, of which 78.7 percent have children under the age of 18 living with them, 81.0 percent are married couples living together, 10.6 percent have a female householder with no husband present, and 5.1 percent are non-families. The average household size is 3.48 and the average family size is 3.58.

In Fort Meade the age distribution is spread out, with 38.9 percent under the age of 18, 16.8 percent from 18 to 24 years old, 40.3 percent from 25 to 44 years old, 3.7 percent from 45 to 64 years old, and 0.3 percent who are 65 years of age or older. The median age is 23 years. For every 100 females there are 110.8 males.

The median income for a household in Fort Meade is $40,661, and the median income for a family is $40,491. Males have a median income of $27,474 versus $22,165 for females. The per capita income for Fort Meade is $13,466, with 5.4 percent of the population and

4.7 percent of families below the poverty line. Of the total population, 5.6 percent of those under the age of 18 and none of those 65 and older are living below the poverty line.

3.1.2 Anne Arundel County

As of the 2000 census, the population of Anne Arundel County is 489,656. The estimated population for 2003 was 506,620. The county seat is Annapolis, which is also the capital of the state. Anne Arundel County is located to the southeast of the city of Baltimore. According to the U.S. Census Bureau, the county has a total area of 588 square miles, with 416 square miles of land and 172 square miles of water. It is located on the western shore of the Chesapeake Bay.

Anne Arundel County is the home of Baltimore/Washington International - Thurgood Marshall Airport, commonly referred to as BWI. BWI serves as the main airport for greater Baltimore. It is also an increasingly popular alternative airport to residents of the Washington, DC, area. BWI is an east coast hub for Southwest Airlines, meaning that low-cost direct flights are available between BWI and much of the country. The southern portion of the Maryland Transit Administration's Light Rail system, connecting downtown Baltimore with BWI, runs through part of Anne Arundel County.

The county is served by one main-line interstate, Interstate 97, which is the only main-line interstate highway contained completely within one county. Interstate 695 is the McKeldin Beltway (formerly the Baltimore Beltway), and runs through the northern part of the county. Interstate 895 is the Harbor Tunnel Thruway, and runs through the county towards the tunnel. Interstate 195 serves BWI Airport. Interstate 595 also runs through central Anne Arundel County. This highway, however, is not signed. It is referred to by its more common names, US 50 and US 301. The Chesapeake Bay Bridge is also in the county, connecting the Western Shore with the Eastern Shore in Queen Anne's County.

As of the census of 2000, there are 489,656 people, 178,670 households, and 129,178 families residing in the county. The population density is 1,177 people per square mile. There are 186,937 housing units at an average density of 449 per square mile. The racial makeup of the county is 81.24 percent White, 13.57 percent Black or African American, 0.30 percent Native American, 2.29 percent Asian, 0.06 percent Pacific Islander, 0.85 percent from other races, and 1.69 percent from two or more races.

There are 178,670 households, of which 34.90 percent have children under the age of 18 living with them, 57.20 percent are married couples living together, 11.10 percent have a female householder with no husband present, and 27.70 percent are non-families. The average household size is 2.65 and the average family size is 3.09.

In the county the age distribution is spread out, with 25.20 percent under the age of 18, 8.10 percent from 18 to 24 years old, 32.80 percent from 25 to 44 years old, 23.90 percent from 45 to 64 years old, and 10.00 percent who are 65 years of age or older. The median age is 36 years. For every 100 females there are 99.10 males.

The median income for a household in the county is $61,768, and the median income for a family is $69,019. Males have a median income of $43,747 versus $32,348 for females. The per capita income for the county is $27,578 with 5.10 percent of the population and 3.60 percent of families below the poverty line. Of the total population, 6.30 percent of those under the age of 18 and 5.80 percent of those 65 and older are living below the poverty line.

Anne Arundel County contains only two incorporated municipalities: the city of Annapolis, incorporated in 1708, and the town of Highland Beach, incorporated in 1922. Unincorporated areas are also considered as towns by many people and listed in many collections of towns, but they lack local government. Various organizations, such as the United States Census Bureau, the United States Postal Service, and local chambers of commerce, define the communities they wish to recognize differently, and since they are not incorporated, their boundaries have no official status outside the organizations in question.

3.1.3 Odenton (Anne Arundel County)

Odenton is a census-designated place located in Anne Arundel County, Maryland. As of the 2000 census, Odenton has a total population of 20,534. The town is named after former Governor of Maryland, Oden Bowie. According to the United States Census Bureau, Odenton has a total area of 12.4 square miles, with 12.4 square miles of it land and none of it water.

As of the census of 2000, there are 20,534 people, 7,594 households, and 5,551 families residing in Odenton. The population density is 1,653.3 people per square mile. There are 7,900 housing units at an average density of 636.1 per square mile. The racial makeup of Odenton is 80.15 percent White, 12.76 percent African American, 0.37 percent Native

American, 3.06 percent Asian, 0.08 percent Pacific Islander, 0.98 percent from other races, and 2.61 percent from two or more races.

There are 7,594 households, of which 37.7 percent have children under the age of 18 living with them, 58.8 percent are married couples living together, 10.5 percent have a female householder with no husband present, and 26.9 percent are non-families. The average household size is 2.70, and the average family size is 3.13.

In Odenton the age distribution is spread out, with 26.9 percent under the age of 18, 7.0 percent from 18 to 24 years old, 38.7 percent from 25 to 44 years old, 20.5 percent from 45 to 64 years old, and 6.8 percent who are 65 years of age or older. The median age is 33 years. For every 100 females there are 94.9 males.

The median income for a household in Odenton is $65,563, and the median income for a family is $69,098. Males have a median income of $45,965 versus $32,659 for females. The per capita income for Odenton is $26,124, with 2.5 percent of the population and 1.6 percent of families below the poverty line. Of the total population, 1.8 percent of those under the age of 18 and 5.2 percent of those 65 and older are living below the poverty line.

3.2 HISTORY OF COMMUNITY RELATIONS

The following section outlines the various opportunities that the environmental cleanup program has provided for community participation since the 2000 Community Relations Plan.

Fort Meade originally followed a community relations program that focused on inter-agency, local community, and employee communication techniques. These techniques included:

- Maintaining the Restoration Advisory Board (RAB) that was established in 1995. The RAB consists of volunteer community members, Army representatives, and federal/state/local regulators who review the status of the IRP and participate in the decision-making process.

- Utilizing public notifications, meetings, and public comment periods at appropriate milestones for public involvement and review of specific site investigation results and decisions. Responsiveness summaries were to be prepared following the open comment periods to summarize and address comments.

- Producing press and fact sheet releases to inform the public of investigation results as specific milestones were reached, including the preparation of fact sheets detailing Final Engineering Designs.

- Coordinating community meetings and briefings with regulators and local officials to discuss project activities with the general public and local officials.

- Maintaining a mailing list of interested community members and local officials for distribution of status updates, fact sheets, and public notifications.

- Maintaining the Information Repositories providing public access to investigation reports, feasibility studies, responsiveness summaries, RODs, fact sheets, remedial designs, and news releases. The information repositories were established at the Provinces Public Library, Crofton Public Library, Odenton Public Library, and Fort Meade.

- Establishing a Point of Contact at the Public Affairs Office to assist with inquiries about the environmental program and obtain technical assistance as needed.

- Making available other as-needed techniques including site tours, installation newspaper articles, and articles in civic organization newsletters.

- Creating a website to provide public access to news, meeting announcements, and available documents.

Since the 2000 Community Relations Plan, the community relations program has not changed significantly with respect to the above techniques. The most notable exception involves the absence of updated documents in the Information Repositories at the public libraries. However, with the establishment of a new repository site at the Western County Area Library, Anne Arundel County, this is expected to change. In addition, a website was not developed due to a lack of resources and security concerns at the installation.

Fort Meade has remained committed to using community relations activities appropriate to the environmental program. An active and engaged RAB continues to meet every other month to review the status of the IRP. The installation has used a number of communication techniques including letters to the mailing list and to affected parties, press notifications, residence visits, public meetings, and phone calls in recent efforts to increase community awareness and involvement, particularly during recent activities at the Manor View site (FGGM-93).

3.3 COMMUNITY FEEDBACK

This section describes the methodology that Fort Meade used to collect community input to develop this Community Relations Plan. It also summarizes the communication preferences and concerns that the interviewees voiced.

3.3.1 Methodology

3.3.1.1 Regulatory Compliance

DOD, and thus Fort Meade, follows the NCP, Title 40 Code of Federal Regulations (CFR) Subpart E, Part 300 Section 415(n)3(iii), requirements for developing Community Relations Plans. The NCP requires interviews with a minimum of 10 to 15 community members. The purpose of the interviews is to obtain qualitative information about each community member’s level of familiarity with cleanup, their concerns, and their preferences for receiving cleanup information. These interviews are not intended to extract quantitative information (that is, information that can be used for statistical analysis).

3.3.1.2 Interview Participants

To update this Community Relations Plan, the Army conducted community interviews with people in the Fort Meade and Anne Arundel County area from 9 through 10 August 2005. Additionally, a number of people who were not available during this time period were interviewed at their convenience over the phone. In total, 15 people participated in the interviews, as indicated below. Interviewees included general community members and residents who live adjacent to Fort Meade, officials from surrounding communities (including elected officials and government departments), businesspersons, regulators, and educators. It is important to note that many of these participants live and work in all the surrounding communities of Fort Meade. They also could be classified in more than one category; for example, a local educator could also live in a neighborhood adjacent to Fort Meade.

To protect confidentiality, Fort Meade will not disclose the names of interview participants.

3.3.1.3 Recruiting Efforts

The installation prepared a mailing list of potential interview participants to represent a broad spectrum of the community. The list included representatives from the following groups:

- Federal, state, and local Environmental/Health Agency representatives (Appendix A)
- Local, state, and federal officials including the mayor, supervisors/council members, police chief, fire chief, solicitor, etc. (Appendix B, C, and D)
- Residents from the neighborhoods surrounding the installation
- Residents within known paths of contaminant migration
- Civic leaders including presidents of service/civic clubs (e.g., Kiwanis, Rotary), Chamber of Commerce officers, educational and religious organizations, and neighborhood associations (Appendix E)
- Individuals (including on-post residents) identified by the installation as interested parties

An invitation from the installation was mailed to each individual on the list approximately 2 weeks before the scheduled interview period of 9 through 10 August 2005. Phone calls were placed, a week prior to the interview period, to each individual on the mailing list to schedule an interview at a time and place convenient for the participant.

Interviews were conducted at participants' place of business or over the phone when a meeting could not be arranged. Invitations were mailed to 147 people, and 15 interviews were conducted. Interview findings are summarized in Appendix I.

4. COMMUNITY RELATIONS ACTIONS

This Community Relations Plan has been designed to allow the community to learn about and participate in the environmental cleanup process. Effective communication and timely information with the public are essential for maintaining understanding and support of the Army's mission and for implementing successful environmental restoration activities.
In order to be effective, community relations efforts will be directly proportional to the community's needs for information and willingness to participate in the process.

Section 4.1 discusses the objective of the Community Relations Program for Fort Meade. Section 4.2 presents the methods and mechanisms for implementing the Community Relations Program. Section 4.3 defines the schedule for specific ongoing community relations actions and those performed at project milestones. Section 4.4 outlines grant opportunities available to the community for technical assistance.

4.1 OBJECTIVES

The Community Relations Plan is designed to encourage the public's involvement in the environmental program by providing information to the public and media on a timely basis. The program is also designed to be flexible so that as community information needs evolve and change, the Community Relations Program can be adjusted.

Therefore, Fort Meade has set several objectives for this Community Relations Program:

- Establish effective and comprehensive mechanisms for informing the community of environmental program activities

- Solicit input and identify concerns the local community may have regarding ongoing and planned environmental program activities

- Maintain a strategy fostering ongoing, two-way communication between the Army and the local community

These objectives will be addressed by implementing the community relations actions described in the following section.

4.2 COMMUNITY RELATIONS ACTIVITIES

The community relations activities presented in this section are based on feedback from the community interviews and regulatory guidance outlined in the U.S. EPA's Superfund Community Involvement Handbook (U.S. EPA 2002) and the RCRA Public Participation Manual (U.S. EPA 1996). The activities are presented below in the order of those required to occur at particular milestones throughout the program followed by those that may be appropriate for the program depending on community interest or project circumstances. The proposed schedule for these activities is detailed in Section 4.3.

4.2.1 Point of Contact

The Point of Contact for community relations at Fort Meade is the Installation Program Project Manager in conjunction with the Chief, Environmental Management Office and the Public Affairs Office. The Project Manager is responsible for drafting information about the environmental restoration program and for ensuring that inquiries about the progress of the investigations, remedial actions, and other cleanup activities at Fort Meade are responded to in a timely and accurate manner. The Project Manager also determines which activities are required or appropriate to meet the objectives of the Community Relations Plan based on effectiveness and community interest. The Project Manager will coordinate all community relations activities in conjunction with the Public Affairs Office. As the environmental program and community relations evolve over time, the Project Manager will adjust and tailor the Community Relations Plan to the changing circumstances.

The Point of Contact for Fort Meade is:

> Mr. Michael P. Butler
> Chief – Environmental Management Office
> ATTN: IMNE-MEA-PWE (Mick Butler)
> 2234 Huber Street
> Fort George G. Meade, MD 20755-5115
> Phone: (301) 677-9648
> Fax: (301) 677-9001
> Email – mick.butler@us.army.mil

4.2.2 Information Repository

An Information Repository has been established at the Environmental Management Office on the installation. Additional repositories will be established at the new West County Library. The West County Library is a new library with a modern facility including computer access and storage facilities. A public Information Repository is required under CERCLA to provide interested parties background and technical information about the environmental program at Fort Meade. The Information Repository includes work plans, technical reports, summary documents, and other information of public interest (e.g., fact sheets and news releases). Examples of items currently contained in the Information Repository include:

- The Community Relations Plan
- Final Remedial Investigation Reports
- Final Feasibility Study Reports
- Proposed Remedial Action Plans
- Signed Records of Decision
- Collections of press releases, community notices, public meeting minutes, and fact sheets

The Project Manager will also supplement all hard copy versions of available repository documents and future additions with electronic versions on CDs or DVDs for older documents to ease demands on library storage space. The address, phone number, and hours of operation for the buildings housing the Information Repository are presented in Appendix H.

4.2.3 Administrative Record

The Administrative Record is currently located and maintained in the Project Manager's office at Fort Meade. For sites undergoing CERCLA investigations, the NCP requires that an Administrative Record be established at or near the facility under investigation. The Administrative Record includes information that may form the basis for selecting a response or remedial action. It includes all documents leading to the selection of any response action at the installation and contains documents similar to those located in the Information Repository. The address, phone number, and hours of operation for the buildings housing the Administrative Record are presented in Appendix H.

4.2.4 Public Notices

Public notices will be issued to announce the following milestone events expected before 2008 (with the exception of NPL site delisting):

- The publication and availability of the Remedial Investigation/Feasibility Study
- The publication and availability of the Proposed Plan of action at a site
- The publication and availability of Final RODs
- Regulatory related decisions – The delisting of NPL sites

Public notices serve as official notification to the local community of project plans for environmental activities, upcoming public involvement opportunities, and the availability of documents at the Information Repositories.

Public notices can be prepared and placed in local newspapers, made available as public service announcements (PSAs) to broadcast media, and/or included along with fact sheets sent to those on the mailing list as determined appropriate by the Project Manager. A notice must be placed in the *Federal Register* to announce the intent to delete the NPL sites.

4.2.5 Public Meetings

Public Meetings will be held when requested to present and discuss the Proposed Plans expected in the next 5 years. Public meetings, both informal and formal, are intended to inform the community about ongoing site activities and to discuss and receive feedback from the public on proposed courses of action. A public notification will precede the public meeting and the corresponding comment period. The public comment period lasts for at least 30 calendar days, allowing time for review and comment on the proposed changes. Public comments will be recorded at these meetings and during the comment period, and will be responded to through a responsiveness summary.

All meetings will be announced through public notices, news releases, direct mailings, or a combination of the three. Appendix G contains suggested meeting locations.

4.2.6 Public Comment Periods

Public comment periods will be made available at the following CERCLA milestones:

- Publication of the Remedial Investigation/Feasibility Study

- Publication of the Proposed Plan of action at a site

- Regulatory related decisions – The delisting of the NPL sites

Following notification, the public will have a 30-day period to review and provide comments on the delisting documents or cleanup methods. Public comments will be recorded during the comment period and will be responded to through a responsiveness summary.

4.2.7 Responsiveness Summaries

A responsiveness summary will be prepared given the receipt of comments during the public comment period. At the conclusion of the public comment periods, the Army will prepare a responsiveness summary or minutes that summarize and respond to the comments received during the public comment period, including those comments given at the public meeting. The responsiveness summary is issued as part of the document under comment or ,in the case of a Proposed Plan, included as part of the Decision Document/ROD and made available in the Information Repositories listed in Appendix H.

4.2.8 Mailing List Update

The Public Affairs Office in conjunction with the Project Manager will maintain and update the current mailing list. Mailing lists are an important component of effective community outreach which ensure that interested community members, as well as other stakeholders and communities impacted by or interested in response activities, are kept informed of activities and opportunities for community involvement. A mailing list is used to distribute news releases, fact sheets, and other types of pertinent information for project activities.

As this is considered one of the cornerstones of an effective outreach strategy, the installation has established and will maintain a project mailing list consisting of interested individuals, local officials, and media representatives. The installation will update this mailing list as necessary and appropriate, and will provide information during all community relations activities as to how individuals and groups can be added to the mailing list. Additionally, an Email mailing list can be developed for those community members and stakeholders who prefer to receive project information in an electronic format.

4.2.9 Restoration Advisory Board

The installation will continue to support a RAB as installation restoration activities continue. The Fort Meade has supported an active and engaged RAB since 1995. The RAB reviews the technical information developed during and following the Remedial Investigation. The RAB provides an open forum for discussion and exchange of information between the public and the government agencies involved. The members also assist Fort Meade in sharing information with the local community. Included in this group are leaders of local community groups, citizen representatives, and local public officials. The RAB currently meets every other month and will continue to do so as the status of the program warrants.

4.2.10 Media Releases

Media releases including fact sheets or status reports will be distributed to community newsletters (i.e., civic organizations, community associations, etc.) as well as local and installation newspapers on an annual basis. The status reports will provide regular information about program and site activities to a broad community audience. In addition to providing status updates, releases will highlight upcoming community relations activities (including the RAB meeting schedule), point of contact information, and instructions detailing how to join the mailing list. All media releases will be coordinated through the Public Affairs Office.

4.2.11 Update Community Relations Plan

The Community Relations Plan will be updated every 5 years or earlier, as needed, based on changes in program requirements or community concerns and needs. This Community Relations Plan is a working document to guide the project staff. The Community Relations Plan will be re-evaluated at these times to ensure that the schedule of community relations activities is appropriate.

4.3 ACTIVITY SCHEDULE

Table 4-1 summarizes community relations activities that are intended to keep the community informed of and involved in the investigation and cleanup activities. Activities required at set milestones identified by CERCLA are presented, as well as additional activities recommended for inclusion in the Fort Meade Community Relations Program based on community needs and installation resources. Table 4-2 details the expected CERCLA milestones requiring community relations activities at Fort Meade.

4.4 COMMUNITY GRANT OPPORTUNITIES

Three programs are available to assist communities in obtaining the technical resources needed to effectively review and evaluate environmental restoration activities. These three programs are summarized in the following sections.

4.4.1 Technical Assistance Grant Program

The Technical Assistance Grant (TAG) Program, which was established under the SARA of 1986, promotes community involvement by providing qualified community groups (RABs, Technical Review Committees, etc.) with funds to help the community participate in the decision-making process at NPL sites. TAGs allow community groups to obtain objective, independent scientific and engineering support by hiring a technical advisor, who can assist the community in interpreting and commenting on the cleanup process. TAG awards are limited to $50,000 per NPL site and are subject to certain regulations. Specific information regarding the TAG Program is available at the following Internet site: http://www.epa.gov/superfund/tools/tag.

4.4.2 Technical Outreach Services for Communities

The Technical Outreach Services for Communities (TOSC) program, which is partially funded by grants from U.S. EPA, helps communities understand the environmental cleanup and site re-use process. This program uses the resources of researchers and professionals in the environmental science and engineering fields from more than 30 major research universities to provide communities with free, independent technical information needed to actively participate in solving environmental problems. Specific information regarding the TOSC program is available at the following Internet site: http://www.toscprogram.org.

TABLE 4-1 SCHEDULE OF COMMUNITY RELATIONS PLAN ACTIVITIES

Activity	Frequency
Required Activities	
Maintain a Point of Contact	Continuous
Update and Maintain Information Repository	Continuous
Update and Maintain Administrative Record	Continuous
Public Notification	RI/FS, Proposed Plan, Final ROD Announcement, and NPL Delisting
Hold Public Meetings	Proposed Plan
Provide for a Public Comment Period	RI/FS, Proposed Plan, and NPL Delisting
Complete and Distribute a Responsiveness Summary	RI/FS, Proposed Plan, and NPL Delisting
Update and Maintain Mailing List	Continuous
Additional Activities	
Maintain Restoration Advisory Board	Continuous
Publish and Distribute Media Releases	Annually (or as needed)
Update Community Relations Plan	As needed or every 5 years

TABLE 4-2 MILESTONES REQUIRING COMMUNITY RELATIONS PLAN ACTIVITIES

Milestone	Activity
CERCLA Requirements	
Remedial Investigation/Feasibility Study	Public Notification of Document Availability
	Public Meeting to review findings
	Receive Public Comments over at least a 30-day period
	Responsiveness Summary completed and distributed as part of Decision Document/ROD
Proposed Plan	Maintain Administrative Record and Information Repository
	Public Meeting to review findings
	Receive Public Comments over at least a 30-day period
	Responsiveness Summary completed and distributed as part of Decision Document/ROD
	Maintain Administrative Record and Information Repository
Record of Decision	Public Notification of Document Availability
Notice of Intent to Delete from NPL	Public Notification
	Receive Public Comments over at least a 30-day period
	Responsiveness Summary completed and distributed

4.4.3 DOD Technical Assistance for Public Participation

Section 324 of the National Defense Authorization Act of 1996 authorized DOD to develop a program to provide technical assistance to RAB community members. This program is similar to the U.S. EPA TAG program. The purpose of the Technical Assistance for Public Participation (TAPP) is to assist RAB community members in obtaining independent assistance in interpreting scientific and engineering data related to environmental hazards and restoration at DOD installations with environmental restoration programs. TAPP funds are limited to an annual limit of $25,000 or 1 percent of the cost to complete, whichever is less, and $100,000 over the life of the environmental restoration program at the installation. For further information regarding TAPP grants, see the following Internet site: http://www.dtic.mil/envirodod/Policies/TAPP/tapphandbk_contents.htm.

REFERENCES

U.S. Army Corps of Engineers (USACE). 2000. *Fort Meade Community Relations Plan.* Baltimore, MD.

U.S. Army Environmental Center (USAEC). 2005. *Fort Meade Installation Action Plan (IAP).* Aberdeen Proving Ground, MD.

U.S. Environmental Protection Agency (EPA). 1996. *RCRA Public Participation Manual.* Office of Solid Waste, Washington, D.C.

U.S. Environmental Protection Agency (EPA). 2002. *Superfund Community Involvement Handbook*. EPA 540-K-01-003. Office of Emergency and Remedial Response, Washington, D.C. April.

APPENDIX A
REGULATORY CONTACTS

APPENDIX A. REGULATORY CONTACTS

U.S. Environmental Protection Agency, Region III

Robert W. Stroud (3HS11)
U.S. EPA Region III
701 Mapes Road
Fort Meade, MD 20755
Phone: 410-305-2748
Email: stroud.robert@epa.gov

Steven Hirsh
hirsh.steven@epa.gov
1650 Arch Street
Philadelphia, PA 19103

Maryland Department of the Environment
Waste Management Administration
1800 Washington Blvd., Suite 825
Baltimore, MD 21230
Phone: 410-537-3000
Toll free at 1-800-633-6101

APPENDIX B
LOCAL OFFICIALS

APPENDIX B. LOCAL OFFICIALS

ANNE ARUNDEL COUNTY COUNCIL
Annapolis Office: Arundel Center, 44 Calvert Street, Annapolis, Maryland 410-222-1401
Glen Burnie Office: 101 N. Crain Highway, Glen Burnie, Maryland 410-222-6890
Anne Arundel County Executive
John R. Leopold (R), County Executive
Arundel Center
44 Calvert St.
Annapolis, MD 21404 - 1831
Phone: 410-222-7000
Fax: 410-222-1155
E-mail: aacwebq@ aacounty.org

District 4
The Honorable G. James Benoit (D)
Legislative Assistant: Veronica Jagoe
Annapolis Office: 410-222-1401
Work: 410-721-0595
E-mail: james.benoit@aacounty.org,
veronica.jagoe@aacounty.org

County Seat
Mayor of Annapolis
Elected by Voters to 4-year terms (Nov.):
Ellen O. Moyer (D), *Mayor (4-year term),* 2005
City Hall, Room 105
160 Duke of Gloucester Street
Annapolis, Maryland 21401
Phone: 410-263-7997
Fax: 410-216-9284
E-mail: mayor@annapolis.gov

Annapolis City Council
Elected by Voters to 4-year terms (Nov.):
Richard E. Israel (D), *Ward 1*
Frederick M. Paone (R), *Ward 2*
Classie Gillis Hoyle. (D), *Ward 3*
Sheila M. Finlayson (D), *Ward 4*
David H. Cordle, Sr. (R), *Ward 5*
Julie Stankivic (R), *Ward 6*
Samuel Shropshire (D), *Ward 7*
Ross H. Arnett, III (D), *Ward 8*

Nearest Municipality

Mayor of Laurel
Elected by Voters to 4-year term:
Craig A. Moe, *Mayor,* 2006
8103 Sandy Spring Road
Laurel, MD 20707
Phone: 301-725-5300, ext. 124
Email: laurelmayor@laurel.md.us

Laurel City Council
Elected by Voters to 2-year terms(March):
Michael R. Leszcz, *President At Large,* 2008 *(chosen by Council in March, 1-year term)*
Janis L. Robison, *Ward 1,* 2008
Gayle W. Snyder, *Ward 1,* 2008
Donna Crary, *Ward 2,* 2008
Frederick Smalls, *Ward 2,* 2008
8103 Sandy Spring Road
Laurel, MD 20707
Phone: 301-725-5300, 410-792-9047
Fax: 301-490-5068 or 410-792-2108
TDD: 301-490-4964
Web: www.laurel.md.us/

APPENDIX C
STATE OFFICIALS

APPENDIX C. STATE OFFICIALS

Governor
Martin O'Malley
100 State Circle, State House
Annapolis, MD 21401-1925
Phone: 410-974-3901; Toll Free: 800-811-8336
TDD: 410-333-3098
MD Relay 1.800.735.2258

Maryland House of Delegates

Honorable Mary Ann Love (D)
Delegate, District 32
House Office Building, Room 165
6 Bladen St., Annapolis, MD 21401
Phone: 410-841-3511, 301-858-3511
7961 Crownsway, Glen Burnie, MD 21061
Phone: 410-761-9963; fax: 410-761-9963
E-mail: maryann.love@house.state.md.us

Honorable Pamela G. Beidle (D)
Delegate, District 32
House Office Building, Room 161
6 Bladen St., Annapolis, MD 21401
Phone: 410-841-3370, 301-858-3370
Fax: 410-841-3347, 301-858-3347
E-mail: pamela.beidle@house.state.md.us

Honorable Theodore Sophocleus (D)
Delegate, District 32
House Office Building, Room 162
6 Bladen St., Annapolis, MD 21401
Phone: 410-841-3372, 301-858-3372
Fax: 410-841-3437, 301-858-3437
E-mail: ted.sophocleus@house.state.md.us

Honorable James J. King (R)
Delegate, District 33A
House Office Building, Room 163
6 Bladen St., Annapolis, MD 21401
Phone: 410-841-3510, 301-858-3510
Fax: 410-841-3180, 301-858-3180
E-mail: james.king@house.state.md.us

Honorable Anthony McConkey (R)
Delegate, District 33A
House Office Building, Room 157
6 Bladen St., Annapolis, MD 21401
Phone: 410-841-3406, 301-858-3406
Fax: 410-841-3209, 301-858-3209
E-mail: tony.mcconkey@house.state.md.us

Honorable Robert A. Costa (R)
Delegate, District 33B
House Office Building, Room 159
6 Bladen St., Annapolis, MD 21401
Phone: 410-841-3551, 301-858-3551
Fax: 410-841-3549, 301-858-3549
E-mail: bob.costa@house.state.md.us

Maryland State Senate

Honorable James E. DeGrange Sr. (D)
Senator, District 32
James Senate Office Building, Room 101
11 Bladen St., Annapolis, MD 21401
Phone: 410-841-3593, 301-858-3593
Fax: 410-841-3589, 301-858-3589
E-mail: james.degrange@senate.state.md.us

Honorable Janet Greenip (R)
Senator, District 33
James Senate Office Building, Room 321
11 Bladen St., Annapolis, MD 21401
Phone: 410-841-3568, 301-858-3568
Fax: 410-841-3067, 301-858-3067
E-mail: janet.greenip@senate.state.md.us

APPENDIX D
FEDERAL ELECTED OFFICIALS

APPENDIX D. FEDERAL ELECTED OFFICIALS

U.S. States Representatives

Honorable C.A. Dutch Ruppersberger (D)
Congressman, District 2
(parts of Anne Arundel, Baltimore & Harford counties, & Baltimore City),
Maryland
1730 Longworth House Office Building,
Washington, DC 20515
Phone: 202-225-3061; fax: 202-225-3094
375 West Padonia Road, Suite 200
Timonium, MD 21093
Phone: 410-628-2701; fax: (410) 628-2708
Web: http://dutch.house.gov

Honorable John P. Sarbanes (D)
Congressman, District 3
(parts of Anne Arundel, Baltimore & Howard counties, & Baltimore City),
Maryland
426 Cannon House Office Building
Washington, DC 20515
600 Baltimore Ave., Suite 303
Towson, MD 21204
Phone: 202-225-4016; fax: 202-225-9219
Web: http://sarbanes.house.gov

United States Senators, Maryland

Hon. Barbara A. Mikulski (D)
Senator, U.S. Senate
503 Hart Office Building
Washington D.C., 20510
Phone: 202-224-4654
Fax: 202-224-8858
Web: http://mikulski.senate.gov/

Honorable Benjamin L. Cardin (D)
Senator, U.S. Senate
509 Hart Senate Office Building
Washington, D.C. 20510
Phone: 202-224-4524
Fax: 202-224-1651
Web: http://cardin.senate.gov/

APPENDIX E

ENVIRONMENTAL AND ACTIVE CITIZENS GROUPS

Appendix E. Environmental and Active Citizens Groups

West Anne Arundel County Chamber of Commerce
Executive Director
Address: 8379 Piney Orchard Parkway, Suite E
Odenton, MD 21113
Country: USA
Work: (410) 672-3422
Fax: (410) 672-3475

Anne Arundel County -
Land Use & Environment Office
Robert D. Miller
Arundel Center, 44 Calvert Street,
Annapolis, Maryland 21404
(410) 222-7502

Anne Arundel County-
Office of Environmental and Cultural Resources
Ginger Ellis
2664 Riva Road,
Annapolis, MD 21404
(410) 222-7441

Odenton Volunteer Fire Department
President - Louis D'Camera
Chief - Charles Rogers
1425 Annapolis Road
Odenton, Maryland, 21113
(410) 674-4444
(410) 672-0758 (fax)

Greater Odenton Improvement Association
PO Box 141
Odenton, MD 21113
(410) 551-7982
(410) 573-7345

Knights of Columbus
1381 Bechnel Avenue
Odenton, MD 21113
(410) 674-5637

Greater Crofton Chamber of Commerce
PO Box 4146
Crofton, MD 21114
(410) 721-9131

Crofton Civic Association
1576 Crofton Parkway
Crofton, MD 21114
(410) 721-2301

Odenton Heritage Society, Inc.
P.O. Box 282
Odenton, MD 21113
Contact: Donna Donaldson, President

American Legion
Laurel Post 60
Commander Chuck Lavin
2 Main Street
Laurel, Md. 20707
Phone: 301-725-2302

Piney Station at Piney Orchard Home Owners Association
Joseph Sanders, President
Lois Crozier, Vice President
Piney Station at Piney Orchard HOA
C/o Professional Community Management, Inc.
2139 Espey Court, Suite 6
Crofton, MD 21114
410-721-0777 ext. 141

Forks of the Patuxent Improvement Association
P.O. Box 477,
Odenton, MD 21113.
301-261-6972

The Vineyards Property Manager
Sheri Courtock
The Vineyards at Piney Orchard HOA
c/o American Community Management, Inc.
9160 Red Branch Road, Suite E-6
Columbia, Maryland 21045
Columbia: 410-997-7767 ext. 118
Washington: 301-596-0307
Baltimore: 410-995-1326
Toll Free: 800-463-1086
Facsimile: 410-997-8876

Piney Run Elementary School
Dr. Edwin Bokee, Principal
Susan Mosay, Assistant Principal
PTA President - Lisa L. Reichnach
2641 Strawberry Lake Way,
Odenton, Maryland 21113
410-672-7591

APPENDIX F

MEDIA CONTACTS

APPENDIX F. MEDIA CONTACTS

NEWSPAPERS

Annapolis Capital
Capital-Gazette Newspapers
2000 Capital Drive
Annapolis, MD 21401
410-268-5000

Baltimore Sun
Attn: Editor
501 N. Calvert Street
Baltimore, MD 21278
(410) 332-6000
Fax: (410) 752-6049

Baltimore Sun
Anne Arundel
60 West Street,
Annapolis, MD 21401.
443-482-3400
Fax: 410-269-4224

Columbia Flier
Attn:Paul Milton
Patuxent Publishing Co.,
10750 Little Patuxent Parkway,
Columbia, MD 21044
410-730-3620
Fax: (410)997-4564

Crofton News-Crier
6000 Laurel Bowie Road
Bowie, MD 20715
301-464-7027

Laurel Leader
Attn: Mr. Joe Murchinson
615 Main Street, Laurel, MD 20707
301-725-2000
Fax: (301) 317-8736

Soundoff!
Attn: Ms. Florence Peace
2837 Ernie Pyle Street
Fort George G. Meade, MD 20755-5025
(301)677-1388
Fax: (410) 799-5911

Washington Post
1150 15th Street, N.W.
Washington, D.C. 20071
(202) 334-6000
Fax: (202) 496-3928

The Washington Times
Attn: Mr. Ken Hanner
3600 New York Avenue, N.E.
Washington, D.C. 20002
(202)636-3000
Fax: (202) 529-2471

West County News
2000 Capital Drive
Annapolis, MD 21401
(410) 268-5000

FM Radio

88.1 FM WJHU
Johns Hopkins University National Public Radio.
2216 North Charles Street,
Baltimore, MD 21218.
410-516-9548
www.wjhu.org

88.5 FM WAMU
American University Radio,
American University/Brandywine Building,
Washington, D.C. 20016-8082.
Phone: 202-885-1200
www.wamu.org

88.9 FM WEAA
Morgan State University Radio,
Morgan State University,
1700 East Cold Spring Lane,
Baltimore, MD 21251.
443-885-3564
www.morgan.edu/geninfo/weaa.htm

90.9 FM WETA
2775 South Quincy Street,
Arlington, VA 22206.
703-998-2600
www.weta.org/weta/fm/index.html

91.5 FM WBJC
2901 Liberty Heights Avenue
Baltimore, Maryland 21215-7893.
410-462-8444
www.wbjc.com

91.9 FM WGTS
7600 Flower Avenue,
Takoma Park, MD 20912.
301-270-1800
www.wgts.org

92.3 FM WERQ
100 St. Paul Street,
Cathy Hughes Plaza,
Baltimore, MD 21202.
410-332-8200
www.92qjams.com

93.1 FM WPOC
711 West 40th Street,
Suite 200,
Baltimore, MD 21211.
1-800-321-FM93
www.wpoc.com

94.7 FM WARW
5912 Hubbard Drive,
Rockville, MD 20852.
301-984-6000
www.classicrock947.com

96.7 FM WCEI
306 Port Street,
Easton, MD 21601.
410-822-3301
www.wceiradio.com

97.1 FM WASH
1801 Rockville Pike,
6th Floor,
Rockville, MD 20852.
301-984-9710
www.washfm.com

97.5 FM WRYR-LP
P.O. Box 205,
Churchton, MD, 20733.
410-867-9677
www.wryr.org

97.9 FM WIYY
3800 Hooper Ave.,
Baltimore, MD 21211.
800-767-1098
www.98online.com

98.7 FM WMZQ.
1801 Rockville Pike,
6th Floor,
Rockville, MD 20852.
1-800-505-0098
www.wmzqfm.com

100.3 FM WBIG
1801 Rockville Pike,
6th Floor,
Rockville, MD 20852.
301-468-1800
www.oldies100.com

100.7 FM WZBA
11350 McCormick Road,
Executive Plaza III, Suite 701,
Hunt Valley, MD 21031.
410-771-8484
www.wzbathebay.com

101.1 FM WWDC
8750 Brookville Road,
Silver Spring, MD 20910-1801.
800-33-DC101
www.dc101.com

101.9 FM WLIF
600 Washington Avenue,
Suite 201,
Baltimore, MD 21204
410-296-1019
www.wliffm.com

102.7 FM WQSR
600 Washington Ave.
Suite 201,
Towson, Md. 21204
410-825-1000
www.wqsr.com

103.1 FM WRNR
112 Main Street Third Floor,
Annapolis, MD 21401.
410-626-0103
www.wrnr.com

103.5 FM WGMS
3400 Idaho Avenue, NW,
Washington, DC 20016.
202-895-5000
www.wgms.com

104.3 FM WSMJ
711 W. 40th Street,
Suite 350,
Baltimore, MD 21211
410-366-7600
www.smoothjazz1043.com

105.7 FM
600 Washington Ave
Suite 201
Baltimore, MD 21204
410.828.7722
www.live1057.com

105.9 FM WJZW
4400 Jenifer Street NW,
Washington, DC 20015.
202-686-3100
www.smoothjazz1059.com

106.5 FM WWMX
600 Washington Ave.
Towson, Maryland 21204.
410-825-1065
wwmxfm.com

106.7 FM WJFK .
10800 Main Street
Fairfax, VA 22030
(703) 691-1900

107.3 FM WRQX
Jenifer Street, NW,
Washington, DC 20015.
202-686-3100
www.mix1073fm.com

107.9 FM WFSI
918 Chesapeake Ave.,
Annapolis, MD, 21403.
410-268-6200

AM Radio

680 AM WCBM
1726 Reisterstown Road
Suite 117
Baltimore, Maryland 21208
410-922-6680
wcbm.maryland.com

1090 AM WBAL
3800 Hooper Ave.
Baltimore, MD 21211.
410-467-WBAL
www.wbal.com

1190 AM WBIS
1081 Bay Ridge Rd,
Annapolis, MD 21403
Email: businessradio@wbis1190.com
www.wbis1190.com

1430 AM WNAV.
P.O. Box 6726,
Annapolis, MD 21401.
410-263-1430
www.wnav.com

1500 AM WTOP News.
3400 Idaho Avenue, NW,
Washington, DC 20016.
202-895-5000
www.wtopnews.com

TV Stations

WMAR Channel 2 Baltimore ABC
6400 York Road,
Baltimore, MD 21212.
410-377-2222
www.insidebaltimore.com

WRC Channel 4 Washington NBC 4001
Nebraska Avenue, NW,
Washington, DC 20016-2733.
202-885-4000
www.nbc4.com

WJLA Channel 7 Washington ABC
3007 Tilden St., NW,
Washington, DC 20008.
202-364-7777
www.wjla.com

WUSA Channel 9 Washington CBS
4100 Wisconsin Avenue, NW,
Washington, DC 20016.
Email: 9news@wusatv9.com
www.wusatv9.com

WBAL Channel 11 Baltimore NBC
3800 Hooper Avenue,
Baltimore, MD 21211.
Phone: 410-467-3000
www.wbaltv.com

WJZ Channel 13 Baltimore CBS
3725 Malden Avenue
Baltimore, Maryland 21211
(410) 466-0013
www.wjz.com

WDCA Channel 20 Washington UPN
5202 River Road,
Bethesda, MD 20816.
301-986-WDCA
Email: upn20wdca@paramount.com
w*ww.upn20wdca.com*

WMPT Channel 22 Annapolis PBS
11767 Owings Mills Blvd.,
Owings Mills, MD 21117.
410-356-5600
www.mpt.org

WETA Channel 26 Washington PBS
2775 South Quincy Street,
Arlington, VA 22206.
703.998.2600
www.weta.org

WBFF Channel 45 Baltimore Fox
2000 W. 41st Street,
Baltimore, MD 21211.
410-467-4545
www.wbff45.com

APPENDIX G

MEETING LOCATIONS

Appendix G. Meeting Locations

West County Area Library
1325 Annapolis Road, Odenton 21113
410-222-6277

Directorate of Information Management
Bldg. 1978, 20th Street
Ft. George G. Meade, MD 20755-5365

APPENDIX H

REPOSITORY LOCATIONS

APPENDIX H. REPOSITORY LOCATIONS

The detailed Administrative Record can currently be examined at the following locations:
FGGM Environmental Management Office Buildings
T-239 and T-249
Fort Meade, MD 20755

West County Area Library
1325 Annapolis Road, Odenton 21113
410-222-6277

APPENDIX I

INTERVIEW SUMMARIES

I. INTERVIEW SUMMARIES

I.1 ISSUE IDENTIFICATION APPROACH

The primary purpose of collecting input from the community is to identify issues and concerns so that the Army can address them via its community outreach and involvement efforts. To obtain this information, interviewers asked participants the following questions:

1. How long have you lived in this community?

2. Does the community benefit from the proximity to the installation? How would you characterize the relationship between the community and the installation?

3. Are you familiar with what the installation is and what it does? Do you have any concerns about the installation? If so, what are they?

4. How sensitive is the local area to environmental issues on a scale of 1 to 5 (1 = not sensitive, 5 = very sensitive)?

5. What environmental problems are you concerned with in your community?

6. Are you aware of any environmental issues at the installation?

7. What do you know about the environmental issues at the installation?

8. What issues are important to you in terms of the installation environmental investigation and cleanup? Health issues? Costs? Time? Any others?

9. When did you first become aware of the environmental issues? How did you become aware?

10. How or where have you received most of your information about environmental issues at the installation? (Newspaper, TV Stations, Radio, Newsletter, Other)
    a. In your opinion, does the media in the area do an adequate job on reporting environmental news?

11. What organizations or individuals do you consider to be the most credible when it comes to environmental issues associated with the installation's restoration program? Least credible?

12. Have you had any contact with local, state, or other officials regarding the environmental restoration program?
    a. If so, what was the nature of the contact?
    b. What kind of response did you receive?

13. Do you have confidence in the Army's ability to implement environmental cleanup at the installation?
    a. If no, how can the Army's credibility be improved?

14. What do you know about the history of community involvement concerning the environmental restoration at the installation?
    a. Have you personally been involved with the installation in any way?
    b. Are you aware of any individuals or groups who have emerged as leaders on this issue?
    c. Do you feel these individuals/groups adequately represent your concerns?

15. Do you feel you have been kept adequately informed about the installation's environmental programs?

16. How can those responsible best provide information concerning restoration activities at the installation (public meetings, letters, fact sheets, workshops, open houses, service organizations, speakers)? How frequently?

17. The installation is considering forming a Restoration Advisory Board to review environmental issues and advise on cleanup activities.
    a. Have you attended a meeting?
    b. Would you like to be considered for membership?
    c. Who would you recommend?
    d. Do you feel there should be a RAB?

18. What would be the best location for community meetings? The best day of the week and time to hold a meeting?

19. Are you aware of the information repository available for public use?
    a. Would you use an information repository?
    b. What would you like to see in the repository?
    c. Are these locations convenient for you? If no, where would be convenient for you?

20. Do you know anyone else to whom we should talk in putting together the community relations program for the installation?

21. Do you have any questions you would like answered about the installation or its Environmental Restoration Program? If you have any questions or comments in the future, how would you like the installation to respond to them (in writing, by phone, in newsletters, etc.)? Do you prefer information to be sent electronically or by mail?

22. Do you have any other comments, questions, or concerns about the installation?

Local government officials were interviewed to gather not only their personal opinions but also to characterize the opinions of the constituency that they represent. Responses to the interview questions and the discussions arising from them identified the primary concerns, priorities, preferences, and perceptions of the participants are presented below.

I.2 OVERVIEW OF FINDINGS

While a sample of 15 people is not statistically significant compared to the overall area population, the interviewees' comments and insights provided valuable information to help Fort Meade design the community relations program. These findings are representative only of the individuals who participated in community interviews and should not be construed as directly representative of the larger population. Some interviewees did not choose to answer every question either based on lack of knowledge, lack of interest, or lack of applicability. Therefore, the responses to each question may not equal the total number of participants. Responses are summarized in Table I-1.

TABLE I-1 COMMUNITY INTERVIEW RESPONSES

How long have you lived in this community? 1-10 years: 6 10-29 years:6 30+ years: 3	*Does the community benefit from the proximity to the installation?* Yes: 13 No: 1 Maybe: 1 *How would you characterize the relationship between the community and the installation*? Good/Positive Economic Relationship: 9 Neutral: 1 As Good as they Want It: 1 Stereotypical Concerns about Military: 1 Chaotic: 1
Are you familiar with what the installation is and what it does? Yes: 10 No: 2 Somewhat: 3 *Do you have any concerns about the installation? If so, what are they?* Landfill Issues: 5 Traffic Issues: 2 Installation Expansion/Infrastructure: 4 Litter/Recycling: 1 None: 3	*How sensitive is the local area to environmental issues on a scale of 1-5 (1=not sensitive, 5=very sensitive)* Average: 3.70
What environmental problems are you concerned with in your community? Stream and Bay Water Quality: 7 Wetland Management: 2 Open/Green Spaces after Installation Expansion: 3 Groundwater/Drinking Water: 8 Methane from Landfill: 1	*Are you aware of any environmental issues at the installation?* Yes: 11 No: 4
What issues are important to you in terms of the installation environmental investigation and cleanup? Health issues? Costs? Time? Any others? Health Issues: 7 Cost: 3 Groundwater/Drinking Water: 2 Informing the Public: 1 Complying with the Law: 1 Up to the Installation to Assess: 1 Ensuring Economic Growth: 1 Community Assistance if Impacted: 1 Public Sector Financial Assistance: 1	*When did you first become aware of the environmental issues? How did you become aware?* Work: 7 Own Research: 2 Media: 3 Constituent Contacts: 1 RAB Meetings: 2

TABLE I-1 (continued)

How or where have you received most of your information about environmental issues at the installation? (Newspaper, TV Stations, Radio, Newsletter, Other) Newspaper: 4 Installation: 3 Own Research: 1 RAB: 4 *In your opinion, does the media in the area do an adequate job on reporting environmental news?* Adequate: 9 Inadequate: 3 No Opinion: 3	*What organizations or individuals do you consider to be the most credible when it comes to environmental issues associated with the installations restoration program?* RAB: 3 Regulators (EPA/MDE): 2 Ft. Meade EMO: 2 *Least credible?* Uniformed Organizations: 1 Old Installation Commanders: 1 Army: 1 MDE: 1
Have you had any contact with local, state, or other officials regarding the environmental restoration program? If so, what was the nature of the contact? What kind of response did you receive? No: 5 Yes: 10 (Most responses were positive in nature and were either work or RAB-related)	*Do you have confidence in the Army's ability to implement environmental cleanup at the installation?* Yes: 11 Somewhat: 2 No Comment: 1 *If no, how can the Army's credibility be improved?* Not Applicable.
What do you know about the history of community involvement concerning the environmental restoration at the installation? Nothing: 5 RAB: 4 *Have you personally been involved with the installation in any way?* Yes: 4 No: 5 *Are you aware of any individuals or groups who have emerged as leaders on this issue?* All of RAB: 3 Colonel Ives: 1 *Do you feel these individuals/groups adequately represent your concerns?* Yes: 2 No Response/No Comment: 7	*Do you feel you have been kept adequately informed about the installation's environmental programs?* Yes: 2 No: 4 Could be Better: 3

TABLE I-1 (continued)

<table>
<tr><td>

How can those responsible best provide information concerning restoration activities at the installation (public meetings, letters, fact sheets, workshops, open houses, service organizations, speakers)?

Newspaper Articles: 7
Public Meetings: 2
Community Association Newsletters: 4
Community Association/ Civic Meeting Speakers: 3
County Health Department: 2
Fact Sheets: 5
Installation Email: 2
Installation Mailings: 2

How frequently?

Lack of Interest: 1 Twice a year: 1
Quarterly: 1 Monthly: 1
As needed: 10 At major Changes: 1

</td><td>

The installation has a Restoration Advisory Board to review environmental issues and advise on cleanup activities.
Would you like to be considered for membership?

Yes: 2
Maybe: 3

Who would you recommend?

Odenton Chamber of Commerce

Do you feel there should be a RAB?

Yes: 14
No Comment: 1

</td></tr>
<tr><td>

What would be the best location for community meetings?

West County Library: 2
Off-Post Library: 2
Off-Post Community Center: 1
On Fort Meade: 1
Not on Fort Meade: 2
DOIM: 1

The best day of the week and time to hold a meeting?

Weekday Evening (7 pm): 7
Weekends: 1

</td><td>

Are you aware of the information repository available for public use?

Yes: 8
No: 7

Would you use an information repository?

Yes: 11
No: 4

What would you like to see in the repository?

Executive Summaries of Technical Documents: 10
Order forms for full documents, if needed: 8
All Documents: 3

Are these locations convenient for you? If no, where would be convenient for you?

Yes (West County Library): 15
Website: 5

</td></tr>
<tr><td>

Do you have any questions you would like answered about the installation or its Environmental Restoration Program?

No: 11
Progress of Installation Renovations: 1
Progress of Installation Cleanup Activities: 1
Guided Tour: 1

If you have any questions or comments in the future, how would you like the installation to respond to them?

Email: 8
Mailing: 4
No Comment: 3

</td><td>

Do you have any other comments, questions, or concerns about the installation?

No: 9
Installation Expansion Impacts: 1
Be a “Good Neighbor”: 2
Community Input into FFA: 1
Better On-Installation Recycling Program: 1
Fort Meade EMO does a Great Job: 1

</td></tr>
</table>

I.2.1 Community Perceptions (Questions 1 Through 5)

The people who participated in the community interviews have lived in the Fort Meade or Anne Arundel County area for an average of 10-15 years. Six participants have lived in the area for less than 10 years. This is due to the area's transient population from the proximate location to government jobs in the Fort Meade area, Annapolis, Washington DC, and Baltimore. However, three participants have lived in the area for more than 30 years. In addition to living in the community, six individuals have also held or currently hold a position as a local government official. One participant currently lives on Fort Meade, while most of the participants are local residents and officials.

A majority (10) of the participants characterized the relationship between Fort Meade and the community as "good," "very good," or "positive," while indicating that the community definitely benefits from the proximity of Fort Meade. One participant was concerned that the relationship between Fort Meade and the local community was only as convenient as Fort Meade wanted it while another participant believed that there were some stereotypical fears about the military hiding issues from the local community. Most characterized the relationship as an economic one, citing the reliance of most area families on Fort Meade and the National Security Agency (NSA) for employment. A number of interview participants pointed to the recent BRAC announcement that approximately 10,000 jobs would be created in the area. A few other participants pointed to a projected redevelopment of a commercial area adjacent to the Fort along Maryland Route 175.

Most individuals were familiar with the installation and its mission. The most prevalent concern of the community with regards to Fort Meade is the anticipated job growth as a result of the recent BRAC announcement and its associated impacts to traffic, housing, schools, and the general infrastructure to support a projected increase in population. A few participants noted environmental concerns regarding two landfills on Fort Meade.

The average of participant responses indicated that the community ranks sensitivity to environmental issues as a 3.70 on a scale of 1 to 5, with 1 being not sensitive and 5 being very sensitive. Eight of the responses indicated that drinking water, well water contamination, or clean water were the most prevalent environmental issue in the community. Seven of the responses indicated that impacts to water quality in streams and the Chesapeake Bay are of great concern. Other concerns included wetland management, open/green spaces after area growth, and methane gas in a building near a former landfill. Other responses included litter at the installation and general air pollution from Midwest power plants.

I.2.2 Installation Environmental Program Knowledge (Questions 6 Through 13)

A majority (11) of the people interviewed were aware of environmental issues at Fort Meade, with most gaining awareness through work or the local media. Two people were fully aware of the environmental program due to attendance at the RAB meetings. Three participants were aware of varying aspects of the program including groundwater and unexploded ordnance issues from contact with local residents or through their own research. Four respondents were not aware of any environmental issues at the installation. Health issues were identified seven times as the most important aspect of any program. Cost was mentioned three times as a consideration, but should not be a driver for environmental investigation or cleanup. One participant stated the compliance with the law is the most important in terms of environmental investigation or cleanup. Another participant noted that if communities are impacted by pollution from the Fort, the Army should provide financial assistance (i.e., connections to public water if groundwater is impacted) to those affected. Another participant noted that if the public sector is to financially gain from the Fort, then they should assist the Fort in its environmental cleanup program. Keeping the public informed was mentioned once.

Local officials including area councilmen and regulators indicated that they have few comments from the general public regarding environmental issues at the installation. The comments were generally regarding the potential groundwater contamination near an old landfill and associated impacts from anticipated traffic increases. A majority of people (10) indicated that they have contacted federal/state/local officials regarding the IRP, but those contacts were made as part of their employment responsibilities or from community participation during the RAB meetings.

The majority of respondents receive information regarding environmental issues through the newspaper, from direct contact with the Fort, or from the RAB meetings. A majority of people feel that the media in the area does an adequate job reporting environmental news. Most respondents did not identify a most or least credible source/organization with regards to installation environmental issues. Five participants identified credible sources of information including the RAB (three), regulators such as MDE and EPA (two), and the Fort Meade Environmental Management Office (one). Four participants identified least credible sources and mentioned uniformed organizations, previous installation commanders, MDE (for not readily passing information to the public), and the Army.

Overall, 11 people responded that they had confidence in the Army to implement environmental cleanup at the installation while two people responded that they felt that the environmental restoration program was fine but was budget driven. One person had no comment.

I.2.3 Community Involvement Activities (Questions 14 Through 19)

Generally, there is interest from the community regarding involvement activities or IRP information. However, only two people responded that they felt adequately informed about the IRP. Four people replied that there was not enough information. Three participants responded that delivery of IRP information could be better.

Five people were not aware of any community involvement activities regarding the IRP at Fort Meade. Four people mentioned the RAB meetings and one person stated that the Fort Meade RAB is the most active in the area. The RAB was identified as a community involvement leader as was former Installation Commander Colonel Ives.

Respondents did indicate a number of methods to best provide information concerning restoration activities. Newspaper articles (seven responses), public meetings (two responses), articles in community association letters (four responses), speakers at community/civic associations (three responses), fact sheets to the Anne Arundel County Health Department (two responses), and letters/fact sheets (five responses) were the predominant suggestions. Tours, mailings, and Emailed status reports were among the remainder of the recommendations.

It was noted during a couple of responses that the Anne Arundel Health Department could be used as an extension of Fort Meade in getting the information about the restoration activities across to concerned residents. It was stated that a number of residents use the Anne Arundel Health Department as the first point of contact about any environmental concerns. Fact Sheets provided to the Health Department could be beneficial to this end. One person recommended presenting a brief and/or handouts to the Maryland Government once a year during its pre-legislative meetings on the third or fourth Fridays in January to the 15 delegates and 5 senators for the area. A majority of the participants wanted information as necessary or when new milestones were reached during the restoration activities.

A majority of interviewees responding recommended an off-post location such as the West County Library as the best place to hold public meetings, with weekday evenings around 7 PM the most common suggested time. The current off-post location, the Directorate of

Information Management Building along Maryland Route 175, was adequate according to one interviewee.

Fourteen people indicated that there should a RAB, while only one had no comment or opinion. In general, the interviewees stated that the RAB is a good forum to get across information to the public and for providing feedback to Fort Meade concerning their restoration activities. Most participants would like to see the RAB meetings move off-post, as installation security can provide delays and can be intimidating to the general public. Two people stated an interest in being a RAB member and three others would consider membership.

Eight of the participants were aware and seven were unaware that there is an information repository available for public review of IRP documents. Eleven people indicated that they would use the repository while four were not interested. All 15 people felt the West County Library would be a convenient location of the repository. Five people suggested moving the administrative record to a website and electronic storage media for easier access and convenience. One person was concerned about security and suggested limiting the contents or convenience of the repository, specifically removing all maps and figures.

I.2.4 Community Comments (Questions 20 Through 22)

The majority of participants did not have any further comments or questions regarding the IRP (11) or the installation (9). Questions brought up during the interviews included:

- What is the status of the Installation Housing Renovations?
- What is the progress of the Installation Cleanup Activities?
- When could a guided tour of the Fort be provided?

Comments or concerns about the installation included:

- Impacts to the area from planned installation expansion.

- Be a “good neighbor” and reach out to the community. Invite people on the installation (possibly through youth sports) so the public can see the environmental programs at the installation first-hand.

- Will the public have a chance to comment on the Federal Facilities Agreement, which will dictate the timeline for the cleanup activities?

- Create a better on-post recycling program. Improve the litter cleanup program, especially in the area of Burba Lake.

- The Fort Meade Environmental Management Office does a great job. Two participants singled out Mr. Mick Butler for his efforts in getting information to the public.

I.3 RESPONSE TO CONCERNS

Based on the results of the interview process, the surrounding community is supportive of Fort Meade. The major concerns of the community are the impacts from future development associated with the proposed job growth from the latest round of BRAC and the groundwater impacts near the former landfill. Overall, the participants were interested in the progress of the restoration activities and would like to see some minor modifications to the existing community relations activities. A number of comments and recommendations identified valid opportunities to improve community relations that have been incorporated into the updated Community Relations Plan presented in Chapter 4.

I.4 SUMMARY OF COMMUNICATION NEEDS

Interviewees offered advice for improving communication with the public within the following categories:

- Most important **types** of information to share with the community are status updates or fact sheets in layman's terms

- Most important **sources** of community information and news are local media outlets and fact sheets

- Most important **methods** by which Fort Meade should communicate with the public is public meetings and the media

- Preferred **frequency** of communications regarding the program is as-needed

- Most important **issues** are the potential area development due to the recent BRAC and groundwater contamination near the former landfill

Types: Most people indicated an interest in environmental program knowledge and are sensitive to a wide range of environmental issues. Most participants would like to receive status updates (either in newspapers, community newsletters, or in public meetings) about the environmental restoration activities and other environmental programs at Fort Meade.

Sources: The majority of the interviewees stated that news media outlets, particularly the *West County News* and the *Baltimore Sun*, are a primary source of community information and news (Appendix F). Other sources include the following:

1. *The Soundoff*! (For on-post residents)
2. *Maryland Gazette*
3. *The Crofton Crier*
4. *The Capital*
5. Local Cable Channels (In Anne Arundel, Channel 8)
6. Local TV and Radio
7. Internet

Methods: The majority of interviewees suggested that, in the future, Fort Meade should use newspaper articles and media outlets (Appendix G) to distribute information to the community. Interviewees also recommended the following methods for receiving that information:

1. Public Meetings
2. Articles in Community Association newsletters
3. Speakers at Community/Civic Association Meetings
4. Fact Sheets
5. Hard copy mailed via the Postal Service
6. Post Email

Frequency: Of those who indicated that they wanted to receive information, most interviewees requested information on an as-needed basis or at a milestone. Fewer preferred to receive information on a yearly, biannual, or quarterly basis.

Issues: Two issues clearly represented the interviewees' priorities: protection of human health (especially around the landfills) and the environmental impacts from the planned population growth in the area due to the BRAC. Participants were generally confident in the Army's ability to implement environmental cleanup and were not concerned about potential impacts on the community.

Appendix F - Project Forms

MALCOLM PIRNIE

POTABLE WELL INFORMATION FORM

DIRECTIONS: Please complete this form by writing the answer in the space provided next to the question or by circling the most appropriate response.

1. Date: ____________________

2. What is the address and tax block/lot number of your property?

ADDRESS: ____

BLOCK #:______________________ LOT #:______________________

3. What is your name, mailing address, telephone number(s), and e-mail address?

NAME: ____

ADDRESS: ____

PHONE #: _____________________________(home)___________________________(work)

EMAIL: ____

4. Are you the owner of the property? **YES / NO**

If **NO**, what is your relationship (explain) ________________________

What is the name, address, telephone number(s), and e-mail address of the owner of the property?

NAME: ____

ADDRESS:____

PHONE #:_____________________________(home)___________________________(work)

EMAIL: ____

5. Is any of the water used at the residence supplied by a private well? **YES / NO**

What is the source of water on your property? ___________________________________

(If you answered NO to question 5 then stop here)

6. Do you use the well water for drinking? **YES / NO**

If **NO**, what is the source of your drinking water? ______________________________________

7. Do you use the well water for: bathing? **YES / NO**
washing clothes? **YES / NO**
lawn/garden? **YES / NO**

8. Has this well been tested recently? **YES / NO**
(If you answered **NO** please skip to question 9)

a. What date was it most recently tested? ______________________________________

b. Who tested the well water? ____

c. What was the test for?
Bacteria
Volatile Organics
Metals
Others (please describe)__________________________

d. Did the sampling detect any contaminants? **YES / NO**
If so, what was detected? ____
(Please enclose a copy of the results if possible.)

9. Does the well supply water for any other residences? **YES / NO**
If **YES**, how many? ______________________

10. What is the approximate depth of the well? _____________feet

Approximately what year was it installed? ____________

Where is the well located? ____

Do you have a Well Installation Record? **YES / NO**
If **YES**, can you provide us with a copy? **YES / NO**

11. Are you willing to let us test your well water? **YES / NO**

12. Do you have a treatment system on the well? **YES / NO**

If **NO**,

Is there an outside spigot from which we can take a sample? **YES / NO**
Where is it located?____

If **YES**,

a. What type of water treatment system(s) do you have?
(circle those which apply)
1. Softener
2. Iron Removal
3. Turbidity Removal
4. pH Adjustment
5. Disinfection
6. Chlorinators
7. Acid Neutralizer
8. Other (please specify)____________________________

b. Can the treatment system be bypassed? **YES / NO / DON'T KNOW**
(circle those which apply)
1. Outside spigot bypasses treatment
2. Faucet in basement?
3. Faucet on holding tank?
4. Treatment system can be shut off.

13. If we cannot take an untreated sample from the outside spigot, would it be possible to schedule to meet someone at this location between 8 AM and 4 PM on a weekday to collect a water sample? **YES / NO**

14. Is there any other information that you feel would be helpful for us to know about your well?

____

____

15. Describe current, planned, and future anticipated property use(s):

____

____

SOURCE OF SURVEY INFORMATION: ____

SURVEY CONDUCTED BY: ____________________________ DATE: _____________________

Analytical Laboratory Services, Inc.
Environmental • Industrial Hygiene • Field Services
34 Dogwood Lane • Middletown, PA 17057 • 717.944.5541 • Fax: 717.944.1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.

Page ___ of ___
Courier:
Tracking #:
COC#

Co. Name:
Contact (Report to): Phone:
Address:

Bill to (if different than Report to): PO#:

Project Name/#: ALSI Quote #:

TAT: ☐ Normal-Standard TAT is 10-12 business days. ☐ Rush-Subject to ALSI approval and surcharges.
Date Required:
Approved By:

Email? ☐ -Y
Fax? ☐ -Y No.:

				***Container Type												
				***Container Size												
				*** Preservative												
				ANALYSES/METHOD REQUESTED												
Sample Description/Location (as it will appear on the lab report)	COC Comments	Sample Date	Military Time	*G or C	**Matrix	Enter Number of Containers Per Analysis										
1																
2																
3																
4																
5																
6																
7																
8																

Receipt Information (completed by Sample Receiving)

Performed by: INITIAL HERE
Cooler Temp:
Therm. ID:
No. of Coolers:
Notes:

Circle appropriate Y or N.

	Y	N
Correct containers?	Y	N
Correct sample volume?	Y	N
Correct preservation?	Y	N
Headspace/Volatiles?	Y	N
Custody seals Present?	Y	N
(if present) Seals intact?	Y	N
Received on ice?	Y	N
COC/Labels complete/accurate?	Y	N
Container in good condition?	Y	N

SAMPLED BY (Please Print):

LOGGED BY(signature): DATE: TIME:
REVIEWED BY(signature): DATE: TIME:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1			2		
3			4		
5			6		
7			8		
9			10		

Data Deliverables: ☐ Standard ☐ CLP-like ☐ NJ-Reduced ☐ NJ-Full (other) ☐

EDDs Required? ☐ If yes, format type:

SDWA Forms? yes ☐ yes ☐ yes ☐ yes ☐

State Samples Collected In? MD ☐ NJ ☐ NY ☐ PA ☐

Other
PWSID

DOD Criteria Required?

ALSI FIELD SERVICES
☐ Pickup
☐ Labor
☐ Composite Sampling
☐ Rental Equipment
☐ Other:

* G=Grab; C=Composite **Matrix: Al=Air; DW=Drinking Water; GW=Groundwater; Ol=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater

Copies: WHITE - ORIGINAL CANARY - CUSTOMER COPY ***Container Type: AG-Amber Glass; CG-Clear Glass, PL-Plastic. Container Size: 250ml, 500ml, 1L, 8oz., etc. Preservative: HCl, HNO3, NaOH, etc.

Rev 08-2008

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

Appendix G - Project Team Qualifications & Resumes

MALCOLM PIRNIE

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

G-1: Malcolm Pirnie

2118151 / BAL

MALCOLM PIRNIE

Malcolm Pirnie, Inc., is a nationally recognized, full-service environmental engineering firm with 60 regional and field offices located throughout the United States. Our staff currently numbers over 1,700 engineers, scientists, technicians, and designers. Our corporate headquarters is located in White Plains, NY, and over 900 members of our professional staff are located along the East Coast between Virginia and Maine; we have worked in every NAD state for a variety of federal, state, and municipal clients. Malcolm Pirnie has extensive USACE experience spanning the past 16 years and is currently providing investigative, design, and oversight services at numerous sites located throughout the NAD. Our in-house resources include all the engineering and scientific disciplines required to complete any assignment under this contract. Details of our qualifications, including similar projects are highlighted below and in the attached resumes.

1) Investigation of Groundwater Contamination & Coordination with Private Well Owners: Confidential Client

Following reports that volatile organic compounds (VOCs) had been detected in some residential wells in the vicinity of the Thorndale plant where our client produces fluoropolymers, Malcolm Pirnie conducted a hydrological investigation to identify the vertical and horizontal extent of groundwater contamination. We supervised the installation and development of monitoring wells, conducted a search for existing private wells, collected groundwater samples, and evaluated the analytical data. We identified those residences and commercial properties in the vicinity of the site that receive their water supply from a private well rather than the township's water supply and collected samples of tap water. We provided support in a number of cases, based on the results of the sampling:

- distributed bottled water,
- monitored private wells,
- installed carbon filtration on wells, and
- also coordinated with the local water utility to install a water main and hook up residents whose wells were affected.

2) Characterization and Remedial Action Plan, Newhall Street Neighborhood

The State of Connecticut ordered Olin Corporation to investigate and remediate the Newhall Street neighborhood of Hamden where, between 1917 and 1940, lowlands were filled with coal ash, other waste, and soil. The area was subsequently developed into 303 private properties, mostly residences. During the multiyear, multiphase project, Malcolm Pirnie assisted Olin with a variety of tasks:

- Technical support and background/historical review to help contest the state order.
- Preparation of a voluntary initial investigation work plan.
- Implementation of the initial investigation, which involved reconnaissance and environmental characterization of the fill/soil and groundwater on a portion of the residential area.
- Observation of the U.S. EPA's interim fill removal remedies at certain private properties.
- Preparation of a supplemental investigation work plan following issuance of the final consent order and expansion of the study area.
- Implementation of the supplemental investigation, which involved securing access agreements from property owners, comprehensive environmental characterization of the fill/soil and groundwater, and preparation of a remedial action plan.
- Presentations at public meetings.
- Preparation of individual property data reports.

3) Wyeth Site Investigation

Malcolm Pirnie conducted an environmental investigation and cleanup at a former chemical manufacturing facility. The investigation was conducted in compliance with Pennsylvania's Land Recycling Program (Act 2) to determine the nature and extent of soil and groundwater contamination at the site. Activities included the development of a site investigation plan, coordination of subcontractors, fieldwork, reporting of investigation results, evaluation of remedial alternatives, bench- and pilot-scale testing, and implementation of full-scale remediation. The remedial technologies implemented at the site consist of in-situ chemical oxidation of on-site soil and groundwater and bioaugmentation in the off-site groundwater. Project activities also included sampling of residential wells and the design and installation of water mains to serve residents whose wells have been affected. The work requires close coordination with the Pennsylvania DEP, the county health department, and the township manager and commissioners. We have also made presentations at public meetings.

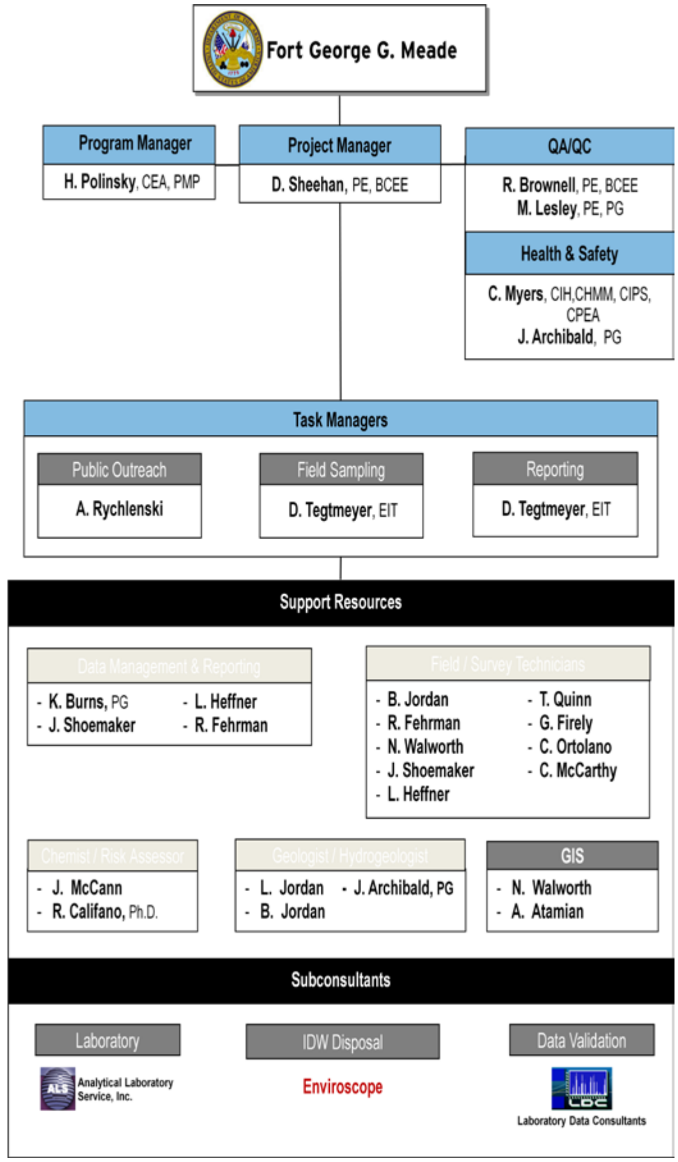
4) Welsbach

Welsbach/GGM Site, a multi-million dollar remediation project focusing on radioactive wastes, for over 12 years. Comprised of six large study areas covering several square miles in two urban municipalities, the Welsbach/GGM Site represents one of the largest Superfund projects ongoing in the US today. These study areas, which are located along the busy Delaware River waterfront, include over 900 properties including residential properties, parks, vacant land, waterways, and large industrial areas. Consequently, the project deals directly with multiple public health issues which demand that the project team not only be responsive to the community and other government agencies, but also progress in a manner that assists important urban renewal projects taking place under other state and federal statutes.

- Data Management System - An innovative, award-winning, web-based GIS/Database management system was created that brought together numerous state-of-the-art technologies to create a secure information system that allows team members to create, edit, approve, track, and report real-time data. Major features of the system include: a laptop field application replacing traditional field logbooks; automated generation and tracking of access letters; database storage of all field data and laboratory data; automated generation of tracking of data summary packages; GIS interface to generate real time dynamic maps, and tools to track the progress of the investigations.
- Community Relations - Community relations constitute a major component of this project and Malcolm Pirnie has demonstrated the ability to work with residents, local government officials, and community leaders in Camden and Gloucester City, NJ. Facets of the community relations activities have included obtaining site access, conveying the results of the field investigations to property owners and the public, and participating in public meetings. The top priority has been to be sensitive and responsive – an outlook that has earned praise from many community leaders.

The KC USACE noted “The hard work of the team in support of the project objectives and professionalism has been outstanding. Your team has enabled the Corps and EPA to complete investigations of over 300 properties in less than one year’s time, an accomplishment unmatched in recent times in this District.” The project was recognized with a 2003 Gold Engineering Excellence Award by the New York Association of Consulting Engineers for using innovative technologies to speed up a Superfund cleanup.

Identification and Qualifications of Key Personnel



Key Management Personnel

Program management at Malcolm Pirnie starts with the selection of the right program and project managers. For this program, we have selected individuals who have worked effectively and productively with Fort Meade, the Baltimore District, EPA Region III and MDE.

As shown on the Team Organization Chart above, the *Program Manager for this task order will be Ms. Heather Polinsky, PMP, CEA.* She will be the primary point of contact for all administrative, contractual, management, and quality control issues. She will be responsible for direction of the teams, working to ensure all of the work performed meets the scope of work; ensuring QA/QC is applied and corrective actions are taken; reporting status of billing, accounts receivable, and the overall contract; and working with project personnel and Malcolm Pirnie staff to ensure lessons learned and procedures are applied consistently. Furthermore, she has full corporate authority to ensure that qualified resources are made available for each task assignment. He is qualified for this important role, having served in this role for the last nine years.

QA/QC Team

Mr. Dick Brownell (PE) will serve as project QA/QC officer. Mr. Brownell is an expert in HTRW remediation, including engineering services during construction and O&M of remediation systems, with over 34 years of experience. He is well versed in all aspects of HTRW projects from site investigation through site closure. He will continue his role as QA/QC officer for all HTRW projects for the Baltimore District. He has performed QA/QC reviews of over 500 documents prepared for the Baltimore District over the last 14 years.

Health & Safety

Mr. Charles Myers (CIH) is Malcolm Pirnie's Corporate Health & Safety Officer. He will oversee the Health and Safety program under this contract. Mr. Myers has over 30 years of experience, which includes intrusive sampling, remediation and construction management on sties with a wide variety of contaminants (explosives, metals, volatiles, radiological waste, and MEC). For the Baltimore District, he has performed health and safety reviews of our ongoing task orders, made site visits to support health and safety plans and participated in oversight of field activities. Mr. Myers will ensure our projects meet or exceed OSHA, DOD, DA and USACE requirements.

Project Manager

Mr. Dan Sheehan (PE) has extensive technical and managerial experience in the environmental field, including the disciplines of hazardous waste investigation and remediation, water and wastewater treatment, and public involvement. As a Project Manager, he has been responsible for managing multiple private well surveys and investigations. Dan has worked with all of the staff supporting this task order and managed projects at Fort Meade, including the private well survey and investigation at Phoenix Military Reservation.

Support Disciplines

As illustrated by the supporting disciplines below and the associated resumes (Attachment XXX), we have all the necessary staff, including engineers, scientists, and other specialties, with the appropriate qualifications to perform assignments under this project. The supporting discipline table illustrates the disciplines (and depth of each) that may be required to meet the objectives of the project. While Malcolm Pirnie places emphasis on professional registrations and licensing, in the event a staff member without a professional registration or license is supporting this task order, they will work under the direction and review of a registered licensed staff member identified in the organization chart.

Discipline	Total Staff
ENVIRONMENTAL ENGINEER: Environmental engineering is a core discipline at Malcolm Pirnie. For USACE, we have performed (or are performing) environmental planning and engineering services at over 200 military installations throughout CONUS and OCONUS.	432
GEOLOGIST: The Malcolm Pirnie team experts in geology are experienced in performing site reconnaissance and evaluations at various stages of projects, ranging from investigations through remedial design. They are experienced in evaluating soil and rock conditions for potential contamination and their potential for reuse during site rehabilitation.	74
HYDROGEOLOGIST/MODELER: Malcolm Pirnie's expertise in hydrogeology includes test drilling, geophysical studies, development of monitoring systems, conducting pump tests, groundwater modeling, and design and installation of groundwater recovery and treatment systems. Our groundwater modeling capabilities include modeling groundwater flow regimes and contaminant transport. Our staff is also experienced in the conceptual design and evaluation of both physical and hydraulic barriers for groundwater and contaminant movements.	67
CHEMIST: Our staff chemists frequently are involved with investigations at HTRW sites, studying soil, groundwater, surface water, and air. Team chemists will provide technical support services, formulate QAPPs in accordance with USACE and USEPA protocol (including recently adopted UFP requirements), supervise data validation, develop QCSRs, assist with QA / data interpretation, interface with laboratories, and assist in determining remediation and treatment alternatives.	29
RISK ASSESSMENTS / TOXICOLOGY: Malcolm Pirnie has conducted numerous hazard evaluations and risk assessments with remedial investigations to determine the extent to which chemical contamination may endanger public health, welfare, or the environment. The risk assessment is composed of hazard identification, toxicity and exposure assessments, and risk characterization.	8
PUBLIC AFFAIRS: Our staff has extensive experience in preparing plans, reports, fact sheets, and papers for publication in a variety of media, including magazines, newspapers, television, radio, and the internet. Our public affairs staff specializes in developing effective community relations strategies.	13
GIS/CADD: Malcolm Pirnie has employed computer-aided design and drafting (CADD) since 1983 on thousands of projects. We employ a variety of different systems and are fully compatible with Microstation and AutoCAD and the facility and site design tools offered with each of these packages. We view GIS as a tool to enhance productivity and the quality of our work. GIS can be used as a data "hub" to manage all spatial information within a study area and can also provide a quick method of combining and viewing select data sets.	280
CIVIL ENGINEER: Malcolm Pirnie's professionals are experts in various aspects of civil engineering, such as hydraulics, soil excavation, dredging, erosion control, structural design, construction administration, preparation of design drawings, design analysis, and preparation of technical	180

Discipline	Total Staff
specifications.	
COST ESTIMATORS: During the course of our design and construction management work, we frequently are called upon to develop cost estimates for a wide variety of facility types. Both Qualified Estimators and project team members who are specialists in disciplines that are specific to the project at hand perform these estimates.	11
SPECIFICATION WRITERS: Malcolm Pirnie's specifications specialists are responsible for the development of specifications and plans for our environmental projects and facilities. Malcolm Pirnie routinely uses USACE's standard specifications on our Corps assignments, customizing them, as needed, to our designs.	140

Heather L. Polinsky

Project Role:

Program Manager

Title/Firm:

Vice President

Malcolm Pirnie, Inc.

Years of Experience

14

Education

BS Environmental Science College of William and Mary 1995

MS Engineering Management University of Maryland 1998

Licenses and Certifications

Certified Environmental Auditor

Special Recognition

Assistant Chief of Staff for Installation Management (ACSIM) special recognition: Commended for exceptional project management, cost elimination and communication skills.

ACSIM special recognition: Recognized for project development and management of unexploded ordnance studies in Panama.

USAEC special recognition: Praised for outstanding representation of USAEC to Congressman

Barrett, Nebraska and Senator Kerry, Nebraska.

Employment History

Malcolm Pirnie, Inc. 1999 to present

U.S. Army Environmental Center 1995 to 1999

Soldier Chemical Biological Defense Command 1994 to 1994

Ms. Polinsky has been responsible for environmental restoration and base closure programs at U.S. Army installations throughout the U.S., conducting complex ordnance and remedial investigations and actions, negotiating and partnering with federal and state regulatory agencies on Records of Decision and Memoranda of Agreement, preparing scopes of work, developing budgets and cost estimates, and negotiating final contracts totaling more than $20 million dollars. As member of a strategic management team of the U.S. Army Environmental Center, Ms. Polinsky identified new missions and created a reorganization plan.

Detailed Experience

- **U.S. Army Corps of Engineers, Baltimore District: Site Investigation at Fort Meade / Fort Meade MD.** Performed site inspection for transfer of site to the Architect of the Capitol, including sampling of groundwater, surface water, surface and subsurface soil, and sediment for volatile and semi volatile organic compounds and metals.
- **U.S. Army Corps of Engineers, Baltimore District: US Army Environmental Center: MMRP Cost Estimating / Baltimore MD.** As Program Manager, Ms. Polinsky has lead the development of cost estimating strategies for estimating the Army's fiscal liability for remediating closed, transferred and transferring (CTT) ranges. Her cost estimating work started with development of the Regulatory Impact Analysis for the Range Rule. That was followed by the development of the Army's fiscal liability for CTT ranges in FY01 using the RACER cost estimating model. She also estimated the fiscal liability cost in FY02, as well as the cost of remediation for all of the Army's over 7,000 active/inactive ranges. Her detailed knowledge and use of the RACER model has resulted in the identification of a number of enhancements that were required and are underway on the RACER ordnance and explosive estimating modules. In FY03 she is again leading the effort to prepare RACER 2003 Munitions Response Program estimates and load that cost data into AEDB-R. She is also working with AEC to develop an approach to estimating the fiscal liability associated with addressing sites with chemical warfare materials. As part of her support activities she is also assisting AEC in responding to audits of FY02 estimates by the DoD Inspector General and the General Accounting office.
- **NAVFAC, Engineering Field Activity Northeast: Preliminary Assessments of U.S. Navy CTT Ranges / Lester PA.** As Deputy Program Manager, responsible for technical review, coordinating projects, managing budgets/schedules, and ensuring compliance with MMRP guidelines for over 25 Navy Installations nationwide. This support included Navy-wide training for remedial project managers to prepare them for the implementation of MMRP SIs. Aspects of this program include historical records reviews, regulatory involvement, development of conceptual site models (CSMs), and the Munitions Response Site Prioritization Protocol (MRSPP).
- **U.S. Army Corps of Engineers, Baltimore District: MMRP Preliminary Assessments/Range Inventory.** As Program Manager, responsible for support to the USAEC and Baltimore District for the Army range inventory which

included over 120 installations throughout the NAD and SAD. Management of this program included coordinating with installations such as USAEC, USACE, IMAS, and various offices within the installation.

- **U.S. Army Corps of Engineers, Baltimore District: MMRP Site Inspections.** As Program Manager, responsible for conducting 11 separate SIs for over 20 separate MMRP sites, totaling more than 3,000 acres. Responsibilities include day-to-day management of this program, including 8 project managers and over 30 staff to ensure quality delivery of services during this phase of the MMRP and to ensure the right staff supports the program. This management also includes contraction with 4 subcontractors for geophysics, survey and laboratory. Ms. Polinsky applies her in-depth understanding of technical, programmatic, political and stakeholder issues relating to MEC and MC under the MMRP. Aspects of this program include HRR, field investigations, regulatory and stakeholder involvement, development of CSMs, and the MRSPP.
- **U.S. Army Environmental Center: Military Munitions Response Program (MMRP)/Range Rule Support / Edgewood MD.** Providing support for development of the Range Rule and associated tasks. The Range Rule identifies a process for evaluating response actions that address safety, human health, and the environment on closed, transferring, and transferred military ranges. Support includes rule preparation, scheduling, strategic planning, regulatory impact analysis, presentations to high level DOD officials, and programmatic guidance development.
- **U.S. Marine Corps: Headquarters Support for the MMRP.** Key Technical Leader supporting the USMC HQ in development and implementation of MMRP for USMC nationwide. Furthermore, she is active in supporting OEESCM meetings and other policy and programmatic level efforts. She has played a key role in assisting the USMC in completing their inventory process and scoping their Site Inspection program, this information is based on lessons learned from Navy/USMC MMRP PA/SIs and the Army's MMRP SIs.
- **Cornhusker AAP Burning Grounds and Pistol Range / Cornhusker AAP NE.** Project Manager for all restoration activities necessary to transfer property. Completed investigations, EE/CAs, and response actions across installation. Former Burning Ground contained gravel mines and bulk explosives, conducted investigation of area and implemented a time-critical response action followed up by intrusive ordnance removals.
- Investigated evaluated risk and conducted response actions for explosives residuals which had impacted groundwater and soil. Negotiated innovative approach to design, saving approximately $6M.
- **Milan Army Ammunition Plant / Milan TN.** Managed the investigations of OE on OB/OD areas', testing ranges, and near load assembly and pack facilities. Activities included development of scopes of work, task order negotiations, and oversight of archive searches, intrusive investigations, and removal actions. Negotiated RODs for ten sites, including five No Further Action determinations.
- **OSD-Environmental: Massachusetts Military Reservation / Cape Cod MA.** Represented DOD in establishing Joint Program Office at Massachusetts Military Reservation/ Camp Edwards. As the Environmental Engineer, coordinated Range and OE investigations, compliance with U.S. EPA order, effects of munitions use on air quality, use of 'green bullets,' master planning, and public participation initiatives. Presented project status at numerous public hearings/meetings on behalf of DOD.

Mr. Sheehan, Manager of Malcolm Pirnie's Environmental Restoration Group in our Philadelphia, PA and Wilmington, DE offices, directs and conducts environmental projects involving federal and state-regulated hazardous waste investigations and remediations, feasibility studies, environmental site assessments, industrial wastewater treatment, air emission permitting, and underground storage tank compliance. He has provided technical services and regulatory support to various industrial clients including chemical, pharmaceutical, plastic, building product and food product manufacturers, railroad and aircraft maintenance facilities, hazardous waste treatment disposal facilities, and transportation terminals, as well as to federal agencies including the U.S. EPA, the U.S. Army Corps of Engineers, and the U.S. Navy.

Dan Sheehan

Project Role:

Project Manager

Title/Firm:

Senior Associate

Malcolm Pirnie, Inc.

Years of Experience

25

Education

BES Civil Engineering Johns Hopkins University 1981

Licenses and Certifications

Professional Engineer

Board Certified Environmental Engineer

Professional Training

PA DEP Land Recycling Program - Client Workshop

Special Recognition

Honor Award for NY/NJ Harbor Sediment Decontamination Study - Consulting Engineers Council of New Jersey

Engineering Design Achievement Award - Westinghouse Electric Corporation

Societies

American Society of Civil Engineers, Member

Society of American Military Engineers, Member

Tau Beta Pi - The Engineering Honor Society, Member

Employment History

Malcolm Pirnie, Inc. 1991 to present

BCM Engineers, Inc. 1988 to 1991

Westinghouse Electric Corporation 1983 to 1988

Detailed Experience

- **U.S. Environmental Protection Agency: Oversight of Superfund Projects in Regions 2 and 3 / PA.** Project Manager and Technical Manager for: oversight of the investigation and remediation activities at the Chemical Leaman Tank Lines Superfund Site (NJ), and preparation of the feasibility study for the Franklin Burns Superfund Site and the Shriver's Corner Superfund Site. These projects involved the investigation and/or cleanup of soil, groundwater, surface water, and sediment contaminated with various organic and inorganic constituents. Performed technical review of PRP reports and work plans, managed field oversight activities performed by project staff, assisted in the negotiation of project issues, and provided technical recommendations to U.S. EPA managers. Managed the design review for a groundwater recovery and treatment system designed to remove volatile organic compounds and metals. Currently managing oversight of remediation.
- **Confidential Client: Environmental Site Investigation, Remedial Design and Implementation / West Chester PA.** Managing the environmental investigation and cleanup of a former chemical manufacturing facility in eastern Pennsylvania. Investigation conducted in compliance with Pennsylvania's Land Recycling Program (Act 2) to determine the nature and extent of soil and groundwater contamination at the former industrial site. Activities included the development of the site investigation plan, coordination of subcontractors, direction of field activities, reporting of investigation results, evaluation of remedial alternatives, development and oversight of bench- and pilot-scale testing plans and management of full scale remediation activities. The remedial technologies implemented at the site consisted of in-situ chemical oxidation of soil and groundwater at the site and bioaugmentation in the off-site groundwater Project activities also included sampling of residential wells, coordination of activities with PADEP, the county health department, and the township manager and commissioners. Prepared and made presentations at township public meetings. Designed and coordinated the installation of public water mains to provide public water to impacted residents. Serves as the primary regulatory contact and provides community relations support.
- **Confidential Client: Environmental Assessment and Investigation of former Nitroglycerin Manufacturing Plant / PA.** Managed the investigation of a former industrial facility in western Pennsylvania that had been historically used for the manufacture of dynamite (including nitroglycerin production) and for the storage and testing of ordinance.

Activities included managing the investigation of soil and groundwater in locations with no explosive potential and coordination of an investigation of the portion of the property historically used for the manufacture of nitroglycerin to evaluate if there is was residual contamination what would pose an explosive hazard. The investigation activities included evaluation of potential risks associated with the investigation, a 3 day Hazard Study, developing and implementing an investigation strategy, and overseeing field operations including a remote investigation using video to observe remote sampling.

- **U.S. Army Corps of Engineers, New York District: Innovative Treatment of Contaminated Sediments.** Managed an award-winning project involving the evaluation of commercially available and innovative treatment technologies for contaminated sediments from the New York/New Jersey Harbor. Activities included: review and assessment of existing New York/New Jersey Harbor sediment data; identification and screening of over 400 soil, sediment, and groundwater treatment technologies; detailed evaluation of 15 potentially effective technologies capable of treating sediments with an extensive array of contaminants; identification and review of beneficial reuse alternatives for treated sediments; development of a conceptual plan for bench-scale testing and a pilot-scale treatment demonstration project; and preliminary screening of potential sites for pilot-scale demonstration and long-term, full-scale treatment options. This project won the Honor Award given by the Consulting Engineers Council of New Jersey.
- **Confidential Client: Soil and Groundwater Investigation and Cleanup / SOUTH AMBOY NJ.** Managed the NJDEP-regulated investigation and cleanup of a former sulfuric acid manufacturing plant in New Jersey with petroleum hydrocarbon; and heavy-metals-contaminated soils and highly acidic groundwater. Project activities included the evaluation of remedial alternatives, coordination of bench-scale testing activities, preparation of the sampling and cleanup plans including a Remedial Investigation/ Feasibility Study (RI/FS) report, design of remedial methods, direction of field, investigation and cleanup activities, and negotiating the cleanup requirements with the regulatory agency. Served as an expert witness on several issues in the litigation between potentially responsible parties, including the identification of likely sources of the various contaminants in the soil and groundwater at the site.
- **Pennsylvania Department of Environmental Protection: Program Management - General Technical Assistance Contract / Jermyn PA.** Served as Program Manager for Pennsylvania's statewide General Technical Assistance Contract (GTAC), which entailed providing a wide range of environmental services to PADEP through completion of projects in the Hazardous Waste Cleanup Act (HSCA) Program, Storage Tank and Spill Prevention Act (Storage Tank) Program, and the Land Recycling and Environmental Standards Act (Land Recycling Program - Act 2) Programs. Program management responsibilities included facilitation of communications between project team members and PADEP staff, providing overall technical and administrative direction on projects, developing work plans and cost estimates, staffing of project teams, and the implementation of quality assurance and quality control procedures. Served as the point of contact for PADEP's Program Manager and Contract Manager.
- **ECRA Technical Support / NJ.** Provided technical support on a New Jersey Environmental Cleanup Responsibility Act (ECRA) project that involves the regulated cleanup of PCBs: petroleum hydrocarbon- and heavy-metals-contaminated soil and groundwater. Activities include the evaluation of remedial alternatives, coordination of bench scale testing activities, preparation of the sampling and cleanup plans, potentiometric surface mapping, preparation of a remedial investigation feasibility study (RI/FS) report, direction of field activities, and negotiating the cleanup requirements with the NJDEP.
- **RCRA Groundwater Monitoring Program Development/Permit Renewal / OH.** Developed a revised groundwater monitoring program for a hazardous waste landfill facility in Ohio. Performed a comprehensive evaluation of effective indicator parameters for the quarterly sampling of 117 facility monitoring wells. Successfully eliminated several parameters from the facility's permit-required sampling list, thereby significantly reducing the facility's annual compliance costs, as well as reducing the post closure reserve. Assisted in the 5-year renewal of the facility's operating permit.

Mr. Brownell serves as the senior quality assurance, quality control manager for all environmental restoration projects that are conducted company wide. Mr. Brownell was responsible for development and implementation of our corporate quality control, quality assurance program. He has also developed and implemented contract specific quality control, quality assurance programs for the U.S. Army Corps of Engineers, including, the Baltimore, New York, Kansas City, Fort Worth, Tulsa, Omaha, and Philadelphia districts, just to name a few. Mr. Brownell has developed remedial measures for numerous Superfund and hazardous waste sites nationwide, and has supervised more than 500 hazardous waste site investigations and cleanups.

Richard P. Brownell

Project Role:

QA / QC

Title/Firm:

Vice President

Malcolm Pirnie, Inc.

Years of Experience

42

Education

BS Civil Engineering Rensselaer Polytechnic Institute 1966

MS Civil Engineering Stanford University 1967

MBA Management New York University 1976

Licenses and Certifications

Professional Engineer

Board Certified Environmental Engineer

Special Recognition

INFORM, Inc., Board of Directors

New York League of Conservation Voters, Education Fund, Board of Directors

Department of Civil and Environmental Engineering, Rensselaer Polytechnic Institute, Member Advisory Committee

Employment History

Malcolm Pirnie, Inc. 1969 to present

U.S. Army Corps of Engineers 1967 to 1969

Detailed Experience

- **U.S. Army Corps of Engineers, Baltimore District: Indefinite Delivery Contract, Hazardous / Toxic / Radioactive Waste Engineering Services / PA.** QA/QC Officer for all hazardous waste projects conducted under this $75M - 5 year HTRW contract.
- **U.S. Army Corps of Engineers, Forth Worth District: IQC for Hazardous Waste Projects / TX.** QA/QC officer for all hazardous waste projects, including delivery orders at Fort Bliss, Fort Wingate, Fort Polk, Dyess Air Force Base, and Lone Star Army Ammunition Plant.
- **U.S. Army Corps of Engineers, Huntsville: Contamination Evaluation at Navajo Army Depot / Bellemont AZ.** Technical director of investigations of contamination from explosives deactivation furnace and a TNT lagoon.
- **U.S. Army Corps of Engineers, Kansas City District: Indefinite Delivery Assignments / KS.** Technical director for site investigations at the former Olathe Naval Air Station, and remedial design investigations at the former Jayhawk Ordnance Works.
- **U.S. Army Corps of Engineers, Kansas City District: Marathon Battery Superfund Site / Cold Spring NY.** Technical director responsible for the hazardous waste aspects of the remedial design.
- **U.S. Army Corps of Engineers, Kansas City District: Plattsburgh Air Force Base / Plattsburgh NY.** Technical director responsible for PA, SI, RI/FS, and RD activities.
- **U.S. Army Corps of Engineers, Kansas City District: Vineland Chemical Company Superfund Site / Vineland NJ.** Technical director responsible for HTRW and geotechnical investigations and design being performed in conjunction with the U.S. EPA.
- **U.S. Army Corps of Engineers, New York District: Harbor Sediment Decontamination / New York/New Jersey Harbor.** Project officer for the evaluation of innovative and fast-track decontamination technologies for the harbor sediments.
- **U.S. Army Corps of Engineers, New York District: Harbor Sediment Management / New York NY.** Using a multioffice, multidisciplinary site, identified and assessed innovative technologies which could provide a solution to managing New York / New Jersey Harbor sediments. Also, involved commercially available or fast-track technologies for possible short-term problems.

- **U.S. Army Corps of Engineers, New York District: Technology Review / New York/New Jersey Harbor NY.** Project Officer for a comprehensive technology review of established and emerging processes to treat contaminated dredge spoils from the NY/NJ Harbor Area.
- **U.S. Army Corps of Engineers, Omaha District: Millcreek Superfund Site Investigation and Remediation / Erie County PA.** Technical director responsible for remedial design/construction activities.
- **U.S. Army Corps of Engineers, Philadelphia District: Fort Dix Army Base / Fort Dix NJ.** Responsible for QA/QC for remedial design/construction activities.
- **U.S. Army Corps of Engineers: Post Engineer.** As Lieutenant: Served as Deputy Post Engineer for 1,500-man organization; responsible for all facility planning; involved in small project design and planning.
- **U.S. Army Corps of Engineers: Technical Oversight for Various Projects.** Provided key input on the Marathon Battery National Priority List (NPL) site (NY) relative to rail transport and solidification, the Watervliet Arsenal (NY) relative to a reactive iron wall, the Mill Creek (PA) NPL site on the use of a waffle board-type cap which involved a Record-of-Decision change, a private client in New Jersey which involved the first U.S.A. use of pneumatic fracturing for in-situ soil contamination, a private client involving the first New York use of explosive fracturing for in-situ rock contamination, and a private client involving the first mass spectroscopy use of direct injection of bacteria to attach chlorinated aliphatics in groundwater.

Matt Lesley

Project Role:

QA/QC

Title/Firm:

Sr. Project Engineer

Malcolm Pirnie, Inc.

Years of Experience

22

Education

BS Geology University of Delaware 1993

MAS Environmental Engineering University of Delaware 2002

Licenses and Certifications

Professional Engineer

Professional Geologist

Certified Geoprobe TM Operator

Professional Training

National Groundwater Association (NGWA) 2004 Fractured Rock Conference (Presenter - From Low-Flow Sa

PA Chamber of Business and Industry 2003 In-Depth Environmental Compliance Conference

PA Land Recycling Program 2004 Client Workshop

Princeton Groundwater Remediation Course - 12/4-12/8/2000.

Stratigraphy and Aquifer Architecture of the Mid-Cretaceous Potomac Formation, Northern Delaware - U

Tighe and Bond/Lyondell Chemical - MTBE Remediation Seminar (September 2002, Baltimore, MD)

Special Recognition

1995 Governor's Award for Excellence in State Service

1995 DNREC Division of Air & Waste Management Technical Employee of the Year

Mr. Lesley is an experienced project manager who has worked on a variety of underground storage tank, hazardous waste and solid waste projects regulated by state and federal agencies. Prior to joining Malcolm Pirnie, Mr. Lesley spent almost seven years with the State of Delaware Department of Natural Resources and Environmental Control (DNREC). He has evaluated and approved over 200 hydrogeologic investigations and engineered soil and groundwater remediation work plans for leaking underground storage tank, HSCA, and Delaware Voluntary Cleanup (VCP) sites and has designed, installed, and operated two integrated soil vapor extraction, air sparging, and biofiltration systems for the State of Delaware. He has also gained valuable experience in the use of groundwater fate and transport models for determining risk-based cleanup goals and has considerable experience in the removal and abandonment of underground storage tanks. He has planned and executed numerous soil and groundwater investigations and geotechnical investigations and is a certified Geoprobe TM operator skilled in the collection of soil, groundwater, and soil gas samples, the installation of groundwater monitoring wells, and the installation of soil and groundwater remediation wells. In addition, he has broad public speaking experience including conducting public meetings and presenting technical papers at regional and national environmental conferences.

Detailed Experience

- **State of Delaware DNREC, Underground Storage Tank Branch: Delaware's Risk-Based Corrective Action Program (DERBCAP) for Leaking Underground Storage Tank Sites / DE.** DERBCAP team member. The team, a core group of technical environmental professionals in Delaware's UST program, was responsible for the development and implementation of the risk-based corrective action program known as DERBCAP. Utilized the ASTM Risk Based Corrective Action (RBCA) model for the calculation of Tier 0 action levels and Tier 1 risk-based screening levels (RBSLs) for the regulated soil and groundwater contaminants typically encountered at leaking underground storage tank sites. Developed remediation scenarios for the Tier 1 level of DERBCAP. The scenarios allow one to accurately estimate the degree to which a contaminant plume must be remediated in order to decrease the level of risk posed to human health and/or the environment. Co-developed guidance for the use of various fate and transport models for the calculation of site-specific target levels (SSTLs) for different contaminants of concern.
- **U.S. Environmental Protection Agency, Region 2: Chemical Leaman Tank Lines Operable Units #1, #2 and #3 / Bridgeport NJ.** Operable Units 1 and 2 - Provided technical oversight of the proposed alternative method for the remediation of chlorinated-solvent-contaminated soil and groundwater. The proposed alternative remedy involves the use of Fenton's Reagent chemistry to facilitate the in-situ oxidation of contaminants in the on-site constituent source areas, the use of enhanced bioremediation/reductive dechlorination technologies to remove constituents beyond the source areas, and

the use of a boundary pump and treat system for plume control/stability. Provided guidance for the collection of samples for bench-scale treatability testing, the design of a pilot-scale chemical oxidation test, and the installation of groundwater monitoring wells for monitoring remediation performance. Reviewed and provided technical comments for the redesigned groundwater treatment plant for the OU-1 pump and treat system. Operable Unit 3 - Provided technical oversight of the delineation of COCs and the development of a wetland remediation strategy for the impacted wetlands adjacent to the site.

- **Federal RCRA Consent Order / Sellersville PA.** Currently serve as the Deputy Project Manager for this extensive Federal RCRA Consent Order project that includes: 1) an ongoing groundwater remedial investigation and development of a comprehensive site conceptual model(i.e., aquifer/bedrock structure and constituent distribution), 2) geophysical logging of site monitoring wells and implementation of a passive diffusion bag sampling study, 3) operation, maintenance and expansion of an active groundwater pump and treat system, 4) performance of and electrical imaging survey in a known Site constituent source area, 5) performance of a residential drinking water sampling program, 6) performance of biannual dry lagoon area sampling per the requirements of the PADEP RCRA program, and 7) various non-consent order Site environmental projects (e.g., wastewater issues (i.e. odor control), SMOP air permitting, DRBC allocation docket renewal activities, revision of the Site's SPCC plan, and Site NPDES renewal and amendment activities.)
- **City of Philadelphia Department of Commerce: Warren Street Site Investigation / Philadelphia PA.** Conducted a remedial investigation through the installation of soil borings and groundwater monitoring wells, the collection and analysis of representative soil and groundwater samples and the analysis of said samples for identified constituents of concern and comparison to applicable PA Act 2 standards.
- **Redevelopment Authority of Montgomery County: Ambler Asbestos Materials Waste Pile Investigation / Ambler PA.** Provided technical oversight of the performance of geophysical techniques for the investigation of the extent of a vegetated stockpile of asbestos-containing materials/wastes. Evaluated the results of the geophysical investigation and subsequent results of a soil and asbestos-containing materials sampling event. Evaluated sampling results in the context of the PA Act 2 requirements regarding asbestos-containing materials/wastes.
- **Shore Stop #57/Richardson Circle: Responsible Party (RP) Lead-Leaking Underground Storage Tank Site -- MtBE Plume and Supply Well Impact / Wyoming DE.** Project manager responsible for the regulatory oversight of all investigation, remediation, and public outreach activities. Examples include: review and approval of all plume delineation and aquifer characterization work plans, coordination of carbon filtration system installation and maintenance events (at impacted residences), oversight of all domestic well replacement and monitoring well installation activities, and review and approval of groundwater remediation work plans. Conducted public meetings. Maintained an open dialog between the residents of Richardson Circle, the RP, and the Department regarding site investigation, remediation, and health and safety issues. Coordinated all neighborhood domestic well water sampling activities between the DNREC, the Division of Public Health, and the RP's consultant. Codeveloped and calibrated a site-specific model of the MtBE plume of groundwater contamination using Visual Modflow. Used model output to evaluate plume stability and cleanup goals.

Matt Lesley

Continued -

Societies

Delaware Mineralogical Society, Member

National Groundwater Association, Member

Society of American Military Engineers, Member

Employment History

Malcolm Pirnie, Inc. 2000 to present

State of Delaware Department of Natural Resources and Environmental Control, Site Investigation and Restoration Branch 2000 to 2000

State of Delaware DNREC, Underground Storage Tank Branch 1993 to 2000

University of Delaware Center for Archeological Research (UDCAR) 1987 to 1993

Mr. Myers has specific knowledge of environmental health and safety (EH&S) issues with a variety of projects and an extensive background in integrating EH&S programs with environmental remediation and construction project management. Mr. Myers sets guidance policies and is responsible for all aspects of a comprehensive health and safety programs, including oversight of subcontractor health and safety performance. Duties include: developing and maintaining an integrated safety management system that satisfies requirements of numerous public and private entities; mentoring and managing decentralized health and safety staff assigned to geographical regions and individual project sites; monitoring, auditing, and providing oversight of site practices to verify health and safety performance; establishing programs designed to ensure that all individuals are adequately trained to perform assigned tasks and comply with all OSHA, EPA, and DOT requirements; administering and managing the Workers Compensation program; and contracting and maintaining a national medical surveillance program.

Detailed Experience

- **U.S. Army Corps of Engineers, Baltimore District: IDC AE Environmental Support / Baltimore MD.** Certified Industrial Health services on many projects ranging from $10K to over $4M, including HTRW and MEC projects. Mr. Myers' has reviewed Health and Safety Plans, risk evaluations, projects reviews, After Action Reports and field inspections.
- **Department of Defense: Emergency Response Plan / Fort Drum NY.** Implemented an emergency response plan that addressed toxic, explosive, and physical hazards for remedial investigations, design, and remedial action at Fort Drum.
- **U.S. Army Corps of Engineers, Kansas City District: Cornell-Dubilier Electronics Superfund Site / South Plainfield NJ.** As Project Health and Safety Officer and Project H&S Manager, responsible for health and safety-related remedial investigations, feasibility studies, remedial designs, and remedial actions.
- **U.S. Army Corps of Engineers, Kansas City District: Hudson River PCB Superfund Site / Troy NY.** Performed a risk analysis of the activities related to munitions and explosives of concern (MEC) discovered during construction of a materials receiving facility for contaminated river sediments. The analysis included technical reviews of all work documents associated with the MEC work, as well as a geotechnical investigation for an alternative water supply system being designed under another task order.
- **U.S. Army Corps of Engineers, Kansas City District: Welsbach/General Gas Mantle Superfund Site / Camden/Gloucester City NJ.** As Health and Safety Manager, responsible for remedial investigations, feasibility studies, remedial designs, and remedial actions at the site.

Charles J. Myers

Project Role:

Health & Safety

Title/Firm:

Senior Associate

Malcolm Pirnie, Inc.

Years of Experience

33

Education

BS Biology University of Pittsburgh 1974

MS Industrial Hygiene University of Pittsburgh 1975

Licenses and Certifications

Certified Hazardous Materials Manager

Certified Industrial Hygienist

Certified Infrastructure Preparedness Specialist (CIPS)

Certified Mold Remediation Contractor

Certified Professional Environmental Auditor (Health and Safety)

Professional Training

ASSE (American Society of Safety Engineers) Symposium "Excellence in Safety Leadership" (2006)

ASSE Executive Program of Safety Management - Program Graduate (2006)

ASSE Symposium, "Solutions in Safety through Technology," (2006)

Course, "Delivering a High Performance Safety Management System" (16 PDHs 2006)

Course, "Managing the Business Aspects of a Safety Program" (24 PDHs, 2006)

Course, "Reducing Losses from Occupational Health Risks and Environmental Exposures (16 PDHs, 2006)

Course, "Risk Management for the Safety Professional" (24 PDHs, 2006)

Incident Command systems (ICS) 100 & 200 course completions

- **U.S. Army Corps of Engineers: Project Health and Safety Manager / Wide Beach NY.** Served as project health and safety and community liaison manager for the dechlorination of more than 40K tons of PCB-contaminated asphalt and debris at Wide Beach. The contaminated materials were excavated and transported to a central processing area where they were detoxified and then transported back for replacement. More than 70% of this $27M project was subcontracted to union and nonunion contractors.
- **U.S. Department of Defense: ESA at Massachusetts Military Reservation / MA.** Served as Health and Safety Manager for a site investigation at Massachusetts Military Reservation under a Hazardous Waste Remedial Action Program (HAZWRAP) contract. Developed, implemented, and performed periodic assessments of a health and safety program for safe performance of monitoring well installation, groundwater sampling, and related activities.

Charles J. Myers

Continued -

Societies

American Conference of Governmental Industrial Hygienists

American Industrial Hygiene Association

American Society of Safety Engineers

Board of Environmental, Health and Safety Auditor Certifications (BEAC)

Institute of Hazardous Materials Management

Employment History

Malcolm Pirnie, Inc. 2007 to present

CDM Federal Programs Corporation, Gainesville VA 1992 to 2007

Thermo Cor Kimmins, Inc., Niagara Falls NY 1989 to 1992

ENSCO Environmental Services, Inc., Tonawanda NY 1986 to 1989

CECOS Environmental Services, Inc., Buffalo NY 1982 to 1986

General Electric Company, Schenectady NY 1980 to 1982

General Electric Company, Gainesville FL 1977 to 1980

PPG Industries 1976 to 1977

Ann Rychlenski's 20 year career in public outreach and communication spans the private, public, and congressional arenas. A veteran of over 200 public forums, she is especially familiar with the communities and interest groups in New York's Hudson Valley. As the Community Involvement Specialist for the Hudson River PCBs Project, Ms. Rychlenski provided public, political and media outreach in the Hudson Valley for over a decade. Her design and implementation of the project's Community Interaction Program, which served hundreds of communities along the 200 mile length of the Hudson River, won her the EPA Gold Medal and recognition as EPA's National Community Involvement Coordinator of the Year in 2001. An accomplished public speaker, presenter, and spokesperson, she excels in "translating" technical and scientific information into everyday language; and specializes in building partnerships between constituencies and governmental agencies. She has worked with a variety of "publics" on water-related issues in the Hudson Valley, including drinking water from the Hudson River, and the efficacy of fish advisories. While working for a member of Congress, she acted as the Member's liaison to the City of New York, including the New York City Department of Environmental Protection, where she represented the Member on a number of advisory committees dealing with drinking water and wastewater treatment issues. She has hosted numerous press conferences and special events, and is at home with the news media, having been trained as a media spokesperson by David Horowitz of CNN.

Detailed Experience

- **U.S. Army Corps of Engineers: Public Outreach for Osborne Pond Site / Cape Cod MA.** Recently completed a Public Involvement Plan and provided outreach support at this hazardous waste site located in the Massachusetts Military Reservation on Cape Cod. Issues include possible unexploded military munitions in proximity to an elementary school and US Coast Guard Housing, and concerns about local drinking water.
- **U.S. Marine Corps: USMC Range Environmental Vulnerability Assessment (REVA) Outreach / Nationwide.** Recently conducted a day-long workshop on public outreach for the U.S. Marine Corps' REVA Program, an unregulated, voluntary program of environmental stewardship at operational USMC bases across the US and in the South Pacific. Support services included planning, design and facilitation of workshop and workshop materials. Production of a workshop summary with "common threads" analysis and recommendations for future outreach tools and techniques.

Ann C. Rychlenski

Project Role:

Public Outreach

Title/Firm:

Public Relations Coordinator

Malcolm Pirnie, Inc.

Years of Experience

22

Education

Professional Training

Conflict Across Cultures, USDA Graduate School, 1996

Constructive Conflict Resolution, USDA Graduate School, 1992

Electoral and Legislative Processes, George Washington University, DC, 1987

Managing and Administering Federal Grants, USDA Graduate School, 1995

Meeting Facilitation and Risk Communication Workshop, USDA Grad. School, 1992

Public Speaking, USDA Graduate School, 1990

Special Recognition

U.S. EPA - Gold Medal, Hudson River PCBs Superfund site, 2001.

U.S. EPA - National Achievement in Superfund Award, Hudson River PCBs Superfund site, 2001.

U.S. EPA - National Community Involvement Coordinator of the Year, 2001.

U.S. EPA - Bronze Medal, National Environmental Justice Policy Work Group, 1994.

U.S. EPA - Bronze Medal, 20th Anniversary of Earth Day Special Events Production, 1990.

Employment History

Malcolm Pirnie, Inc. 2004 to present

Earth Tech, Inc. 2001 to 2004

U.S. Environmental Protection Agency, Region 2 2001 to present

U.S. Environmental Protection Agency, Region 2 1989 to 2001

Congressman Floyd H. Flake 1986 to 1989

- **U.S. Army: Picatinny Arsenal MMRP / Dover Township NJ.** Supports public outreach efforts for this environmental project that involves the investigation of unexploded ordnance and their components as part of the Army's Military Munitions Response Program (MMRP). Support includes writing, design and editing of public fact sheets and brochures as well as a fact sheet done specifically for a member of Congress; and notification letters for local residents.
- **U.S. Environmental Protection Agency, Region 2: Hudson River PCB Reassessment / Hudson River NY.** For more than 10 years, acted as Community Involvement Coordinator for this, the nation's largest Superfund site, extending 200 river miles across multiple counties and town, and encompassing diverse and often divergent, constituencies. Extensive interface with federal, state, county, and local elected officials, including Westchester County. On more than one occasion, personally briefed the Westchester County Executive, the Westchester County Board of Supervisors, the mayors of key towns in Westchester County, and representatives of various Westchester county agencies with an interest in the project. Also briefed and met with Congressional and state legislative representatives from Westchester County, as well as members of a variety of environmental and civic organizations from the area. Designed the ground-breaking "Community Interaction Program" for the site, functioned as the Chairperson of the program's steering committee, wrote informational fact sheets and a project newsletter, composed statements for governmental hearings, wrote press releases and conducted press conferences, and acted as agency media spokesperson as well as intergovernmental liaison to federal, state, and local elected officials. The EPA acknowledged these efforts on the high-profile site with its highest award, the Gold Medal, as well as with two other national awards, including Community Involvement Coordinator of the Year.
- **U.S. Environmental Protection Agency, Region 2: Passaic River Restoration and Newark Bay Projects / NJ.** Coordinates all aspects of public activities on the Passaic River restoration and Newark Bay projects with the U.S. EPA, as well as the other partner agencies involved in this effort, including the U.S. Army Corps of Engineers, New Jersey Department of Transportation, New Jersey Department of Environmental Protection Agency, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration. Responsible for coordinating such outreach efforts as community interviews, public meetings and availability sessions, composition and editing of fact sheets, web site articles, flyers and newspaper ads, researching the community, and establishing a "project presence" within the community. Recently provided support to composition and production of the project Community Involvement Plan, an effort that encompassed coordination and input from six federal and state agencies. In addition, advises the partner agencies on the best ways to conduct outreach to the various constituencies that make up the project area, including environmental organizations, media, business groups, environmental justice groups, and grassroots community leaders.
- **U.S. Environmental Protection Agency, Region 2: Senior Public Involvement Coordinator for Superfund / States of NY, NJ, and Commonwealth of PR.** Designed, implemented, and coordinated public involvement strategies and activities for over 40 Superfund sites in New York, New Jersey, and Puerto Rico. Worked on such highly visible hazardous waste projects as the Hudson River PCB reassessment, GM Massena, Radium Chemical, and the south Bronx Asthma Study Outreach, among others. Often functioned as an agency spokesperson to the media and elected officials to explain technical and policy aspects of projects and to answer inquiries from the community, local agencies, and elected officials. High level of interaction with all aspects of the public through a variety of communication techniques and venues, from formal public meetings, to press briefings, informal availability sessions, and focus groups with local organizations. Pioneered the use of toll-free call-in information sessions to provide expert information to the public across a wide geographic area.
- **Bureau of Indian Affairs: EIS for Fee to Trust Land Application by Oneida Indian Nation / Oneida and Madison Counties NY.** Provides community outreach support and advice along with public meeting support and coordination. Provides interface with local elected officials, members of Oneida Indian Nation, and community resources. Recently coordinated all aspects of two high-profile public meetings attended by capacity audiences in Oneida and Madison Counties. Provided physical support and coordination of meeting venues and educational materials, as well as meeting procedures, coordination and hosting of public comment aspects, and interface with local police and municipal officials to provide safety and security at capacity meetings.

Denise Tegtmeyer

Project Role:

Task Manager - Field Sampling & Reporting

Title/Firm:

Project Engineer

Malcolm Pirnie, Inc.

Years of Experience

10

Education

BS Environmental Engineering University of Delaware 1999

MEng Environmental Engineering University of Maryland 2002

Licenses and Certifications

Engineer in Training

Special Recognition

SAME Baltimore Post Young Engineer of the Year - 2004

Engineering Society of Baltimore, Young Engineer of the Year - 2007

Societies

Project Management Institute

Society of American Military Engineers, Baltimore - Board Member

Employment History

Malcolm Pirnie, Inc. 2000 to present

Gannett Fleming, Inc. 1999 to 2000

Pennsylvania Department of Environmental Protection 1998 to 1998

Pennsylvania Department of Transportation 1997 to 1997

Pennsylvania Department of Transportation 1996 to 1996

Ms. Tegtmeyer has led and provided technical support for projects for both federal and industrial clients. Her experience includes numerous munitions related projects, as well as hazardous waste site investigation and remediation projects. Ms. Tegtmeyer's experience includes federal range inventory work for the Army, Navy, and USMC; CERCLA PA/SI activities; remedial investigations; and multi-media sampling.

Detailed Experience

- **U.S. Army Corps of Engineers, Baltimore District: Remedial Investigation/Site Remediation / Fort George G. Meade and Jacksonville MD.** Deputy project manager for investigations at Fort Meade and the Phoenix Military Reservation. Conducted field investigations for remedial investigations and soil background studies. Responsible for data collection, data analysis, and report preparation. Also responsible for coordinating with other Malcolm Pirnie offices and performing project management tasks.
- **Baltimore District, USACE: FGGM Mortar Range RI / Fort Meade MD.** Project Manager (PM) for the Army Remedial Investigation (RI) at a former Mortar Range at Fort George G. Meade, Maryland. The RI is a follow-up to the Army Military Munitions Response Program (MMRP) Site Inspections and the Army's Range Inventory completed. Project includes a geophysical surveying and sampling at the identified range; coordinating and conducting the Technical Project Planning (TPP) sessions; coordinating with Stakeholders, U.S. Army Corps of Engineers (USACE), the Army Environmental Center (AEC), Maryland Department of Environment, U.S. Environmental Protection Agency, and installation; preparation of Draft, Draft Final, and Final RI Work Plans and Reports; and assisting in briefing the Restoration Advisory Board (RAB).
- **Army National Guard: ARNG NDNODS Inventor / Baltimore MD.** Team Leader responsible for leading and coordinating project activities in Maryland, Pennsylvania, Kentucky, Vermont, and Puerto Rico including research, site visits, and deliverables. Activities include archives, internet, and data repository research to obtain information regarding sites identified by the National Guard Bureau and to identify additional sites; obtaining rights-of-entry; conducting an in-brief and site visit; and submittal of a Read-Ahead Package, Trip Report, Draft and Final NDNODS Inventory Reports.
- **Baltimore District, USACE: ORAP NW / Baltimore MD.** Team Leader responsible for executing and managing Phase I Qualitative Assessments that evaluate the potential for Munitions Constituents of Concern (MCOC) to migrate outside the boundaries of active ranges and impact human and/or ecological receptors. The assessment involves analyzing existing data on the potential sources of MCOC, the possible pathways off the range and the receptors that could interact with the possible pathways. The analysis results in a qualitative category assignment of either "unlikely," "potential," or "referred."
- **EFA Northeast, NAVFAC: PRA Crane T.O. 0007 / Crane IN.** Deputy Project Manager for a Military Munitions Response Program (MRP) Preliminary Assessment of other than operational ranges. Duties included coordinating and conducting a site visit to review historical records of the installation, preparation of deliverables including Conceptual

Site Model, Draft and Final PA Reports, RACER Cost Estimate, Munitions Response Site Prioritization, and correspondence with Navy Restoration Project Manager (RPM) and installation point of contact.

- **EFA Northeast, NAVFAC: PRA Lowry AFB / Lowry CO.** Project Manager for a Military Munitions Response Program (MRP) Preliminary Assessment of other than operational ranges. Duties included coordinating and conducting a site visit to review historical records of the installation, preparation of deliverables including Conceptual Site Model, Draft and Final PA Reports, RACER Cost Estimate, Munitions Response Site Prioritization, and correspondence with Navy Restoration Project Manager (RPM) and installation point of contact.
- **Industrial Clients: Project Engineer / Baltimore MD.** Performed research and analysis for innovative treatment technologies for chromium-containing contaminated soil and industrial wastewater. Assisted with site assessments, field investigations, and public relations for petroleum-impacted sites. Conducted field sampling, data evaluation, and compliance analysis for wastewater treatment plants and industrial effluent.
- **U.S. Army Corps of Engineers, Baltimore District: CTT Range Inventory / Baltimore MD.** Team member for range inventory of Closed Transferring and Transferred (CTT) ranges for all states east of the Mississippi. Responsible for site visits, data collection, data analysis, archive searches, and report preparation. Involved in managing the Army Range Inventory Database (ARID) and assisting with the management of the Malcolm Pirnie project website. Also responsible for the preparation of work plans, guidance documents, and templates for all CTT range inventory efforts.
- **U.S. Army Corps of Engineers, Baltimore District: Military Munitions Response Program / Site Inspections / Baltimore MD.** Task manager, field team member, and deputy project manager on several Army MMRP Site Inspections (SI) at 5 installations. Project responsibilities include preparation of Historical Records Reports (HRR); sampling at the identified ranges; coordinating and conducting the Technical Project Planning (TPP) session; coordinating with Stakeholders, USACE, the Army Environmental Center (AEC), and installation POC; preparation of Draft and Final Work plans; preparation of Draft and Final SI Reports; and assisting in presentations to the Restoration Advisory Board (RAB). Responsibilities also included preparation of deliverables including a CSM and Munitions Response Site Prioritization Protocol.
- **U.S. Army Corps of Engineers, Baltimore District: Remedial Investigation / Geophysical Investigation / Fort Foote MD.** Deputy project manager for Site Inspection at Fort Foote FUDS. The SI is being conducted to determine the presence or absence of munitions and explosives of concern (MEC) and munitions constituents (MC). Responsible for preparation of a Geophysical Prove Out (GPO) Plan, work plan, and Public Involvement Plan. Field team leader responsible for oversight of geophysical investigation, evaluation, intrusive investigation, and environmental sampling. Responsible for coordinating public outreach and stakeholder involvement.
- **U.S. Army Environmental Center: Closed Range Liability Cost Estimate / Nationwide MD.** Leader for the development of a cost estimate for investigation and remediation of the Army's closed ranges to support DoD's financial liability analysis. Required extensive use of RACER to calculate costs based on preliminary range inventory data. Evaluated impact of various assumptions on overall program costs and cost drivers. Prepared report documenting costs for each phase of the range response process, using both high- and low-cost assumptions.
- **U.S. Environmental Protection Agency: Superfund Sites / Baltimore MD.** Project Engineer for U.S. EPA Superfund sites. Sites included: Avtex Fibers (Front Royal VA), Berkley products (Denver PA) and Tybouts Corner (New Castle County DE). Field Operations Leader for sampling 22 groundwater monitoring wells. Collected organic and inorganic samples for analysis using Westbay multiport system and low-flow technique. Completed electronic chain-of-custody reports, tags, and sample shipping logs. Treated purge water using activated carbon treatment system. Responsible for field oversight and review of contractor submittals. Duties included data evaluation and preparation of groundwater analysis reports.

Mr. Burns manages and performs soil, sediment surface water and groundwater investigations. He is experienced in geophysics, aquifer testing /analysis, geostatistics, groundwater/fate-and-transport modeling and the preparation of work plans, technical reports, and the collection and evaluation of data in support of remedial investigations, feasibility studies, and remedial designs. He has performed extensive site assessments of both nonaqueous phase liquids and dissolved-phase contaminants for Federal and State agencies. Mr. Burns has coordinated corrective measures assessments and interim remedial measures involving a variety of contaminants in soil, groundwater, soil vapor, indoor air and sediment. He uses his groundwater modeling experience to simulate the fate and transport of contaminants in groundwater, optimize active and passive remediation systems

Kevin M. Burns

Project Role:

Data Management & Reporting – Geologist / Hydrogeologist

Title/Firm:

Project Geologist

Malcolm Pirnie, Inc.

Years of Experience

11

Education

BS Geology University of Delaware 1997

Licenses and Certifications

Professional Geologist

Professional Training

Aquifer Test Analysis Using AQTESOL V® for Windows, presented by HydroSolve, Inc., May 21-22, 2001

CPR and First Aid Training, 2001

Review of Geology for the Practicing Geologist; Pennsylvania Council of Professional Geologists 2002

The Groundwater Pollution and Hydrology Course; Princeton Groundwater, Inc, March 2007

Societies

National Ground Water Association

Employment History

Malcolm Pirnie, Inc. 2004 to present

Advanced GeoServices Corporation 2001 to 2004

Groundwater & Environmental Services, Inc. 2000 to 2001

Roy F. Weston, Inc. 1997 to 2000

Detailed Experience

- **U.S. Environmental Protection Agency, Region III: Environmental Site Assessments / PA.** As Associate Scientist, performed ASTM Phase I and II ESAs throughout northeastern Pennsylvania on commercial, residential, and municipal properties. Maintained close interaction with client and subcontractors. Supervised the drilling and sampling activities. Responsible for all aspects of project from initial project costing to report production.
- **U.S. Environmental Protection Agency, Region III: Construction Monitoring / PA.** As Staff Scientist, directed and coordinated with subcontractors throughout all aspects of commercial and municipal contaminated-soil and groundwater remediation projects. As Project Geologist, performed oversight of subcontractors for commercial and municipal contaminated-soil and groundwater remediation projects during the installation of various soil/groundwater remediation systems. Ensured that the subcontractors installed systems according to the specifications outlined in the remedial design package and followed all applicable health and safety protocols. As Project Geologist, performed on-site supervision of underground storage tank removal activities. Prepared the underground storage tank completion reports.
- **Baltimore District, USACE: FGGM AOC FS / Baltimore MD.** The U.S. Army Corps of Engineers (USACE), Baltimore District contracted Malcolm Pirnie, Inc. to conduct a Feasibility Study (FS) for the Architect of the Capitol Site at Fort Meade, Maryland. Malcolm Pirnie completed a Remedial Investigation (RI) Report for the Site in July 2006. The work was conducted under the requirements of the Department of Defense (DOD) Installation Restoration Program (IRP), which are consistent with the U.S. Environmental Protection Agency (EPA) and Maryland Department of Environmental Quality (MDE) guidelines. The conclusions presented in the RI Report indicated that a Feasibility Study (FS) was required, based on the results of the risk assessment. Mr. Burns initiated the FS in accordance with the U.S. Environmental Protection Agency (USEPA) guidelines contained in "Guidance on Remedial Investigations and Feasibility Studies under CERCLA", EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9335.3-01, dated March 1988 and the contents of 40 CFR 300, National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan, NCP).

- **USEPA Region III: RCRA Investigation / Roanoke VA.** The RCRA unit was a former electroplating factory. Mr. Burns' responsibilities included determining the conditions of the existing clay cap and to determine if any impacted soil migrated from the clay cap. Mr. Burns utilized surface geophysical methods to determine the boundaries of the clay cap. In particular, EM-31 was used to delineate the extent of the clay cap. A geoprobe was utilized to confirm the boundaries of the clay capped based on the findings from the EM-31 survey and to collect samples to determine if impacted soil has migrated off-site. All soil borings were classified according to the USCS classification. All activities and findings were compiled into a RCRA Investigation Report and submitted to the USEPA Region III.
- **U.S. Environmental Protection Agency, Region III: Wetland Restoration Study / PA.** As Associate Scientist, implemented and supervised the geotechnical drilling of wetland soil and sediment. Responsible for gathering geotechnical information (logging) and sample collection, including shelby tubes, for design purposes. Responsible for geochemical interpretation of analytical results that identified zones of fresh, brackish, and salt water at the site. Interpreted the geochemical results and compared them to the downhole geophysical conductivity logging.
- **USEPA REGION III: CERCLA-Extended Site Investigation / Wilmington DE.** Mr. Burns' responsibilities included the installation of over one hundred soil borings via geoprobe to delineate potential off-site PCB and lead impacted soil. All soil borings were classified according the USCS classification. A grid was placed over the site and I installed a series of test pits along the grid. All test pits were classified according to the USCS classification and were used to delineate the on-site PCB and lead impacted soil. Mr. Burns used these soil borings and test pits to construct a 3-dimmensional model of the site. The site lies along Brandywine Creek, so as part of the investigation a creek bank profile was initiated. Mr. Burns installed a series of borings parallel to the creek and perpendicular to the creek via a manual probe rod driver. All borings were classified according to the USCS classification. Soil samples were collected for the borings to delineate any PCB or lead impact to the creek bank. Mr. Burns created a series of cross-sections both perpendicular to the creek and parallel to the creek. Mr. Burns took the data collected from the creek bank profile investigation and incorporated into the 3-dimensional model of the site. Mr. Burns utilized the 3-Dimensional model to determine various remedial options for the site.
- **USEPA Region III: CERCLA-Groundwater Model Technical Review / Tranguch PA.** Mr. Burns' responsibilities included geologic and hydrogeologic review of groundwater models that were prepared by the USACOE. Mr. Burns attended technical meetings with personnel form the USEPA concerning the site and future remedial options. Mr. Burns' main responsibility was to provide support to the USEPA on any geological issues that needed to be explained or discussed during various internal and external meetings.
- **Smurfit-Stone Container Corporation: Sauer Dump RAP / Baltimore MD.** As Project Hydrogeologist, Mr. Burns assisted in the development of the Response Action Plan and was the Field Team Leader for all Remedial Investigation activities. The site is located in Baltimore County, Maryland. The Site is a USEPA Region III CERCLA (Superfund) Site. Mr. Burns has direct interaction with the Client Team and the USEPA Remedial Project Manager. Mr. Burns assisted in the development of the Remedial Action Plan. Mr. Burns was responsible for reviewing all existing data, developing the Site Conceptual Model (CSM), identify data gaps and develop the methodology to fill the data gaps. In addition, Mr. Burns developed the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP).
- **Various Clients: Permit Compliance Reviews and Remediation.** As Staff Scientist, conducted permit compliance review (water use, waste storage, air quality, groundwater discharge, and storm water discharge) for numerous sites in Pennsylvania, New Jersey, North Carolina, and Ohio during remedial investigation and remedial design activities.
- **Various Clients: Permitting / PA.** As Staff Scientist, conducted permit compliance review (water use, waste storage, air quality, groundwater discharge, and storm water discharge) for numerous LUST sites in Pennsylvania during remedial investigation and remedial design activities.

Mr. Shoemaker has experience in a wide variety of field and office work. His work has included construction/demolition oversight, monitoring well installation, CADD drafting, Phase 1 ESA composition, and numerous soil/groundwater sampling events. He is experienced in communicating with client representatives and managing field operations.

Jeruid Shoemaker

Project Role:

Data Management & Reporting - Field / Survey Technician

Title/Firm:

Environmental Scientist
Malcolm Pirnie, Inc.

Years of Experience

3

Education

Program completed in BS Biology West Chester University 2006

Employment History

Malcolm Pirnie, Inc. 2006 to present

Detailed Experience

- **Wyeth: Wyeth-Marietta Site / Marietta PA.** In a Field Support role, participated in multiple groundwater sampling events and provided oversight of contaminated waste removal on site.
- **OFA - Kansas City District: ECC Kaufmann & Minter / Springfield NJ.** In a Field Support role, participated in a site-wide groundwater sampling event. Additional involvement included CADD drafting of multiple figures to be used to illustrate site investigations and findings.
- **Confidential Client: AIG - Plymouth Mtg / Plymouth Meeting PA.** In a Field Support role, provided oversight of a fast-paced full spill cleanup oversight project. Was responsible for making decisions in the field according to developments on-site. Duties included regular communications with the client, representatives of the property owner, the trucking company (Royal Petroleum), and the subcontractors. The Site is a residential property adjacent to the PA Turnpike that received impacts to soils by diesel fuel after a spill caused by an accident on the Turnpike.
- **Confidential Client: Due Diligence Services / Atlantic City NJ.** As an Environmental Scientist, performed site visits for two properties and composed Phase 1 ESA reports for both. Additional duties included coordinating with multiple subcontractors, communications with client representatives, and organization of the report assembly.
- **Confidential Client: Atlas Point Groundwater / New Castle DE.** As a Field Activities Manager, organized and participated in multiple groundwater sampling events and provided oversight for monitoring well installations. Additional duties included regular communications and coordination with client representatives, equipment suppliers, and laboratory representatives.
- **Confidential Client: ICI Sayer / NL Oversight / Sayerville NJ.** In a support role, performed a file review of the associated property and composed a summary report of the findings.
- **Confidential Client: US Pipe Landfill Ins / Burlington NJ.** As an Environmental Scientist, participated in the semi-annual soil gas monitoring and quarterly post-closure inspection conducted at the industrial waste landfill located at the U.S. Pipe and Foundry Company facility in Burlington, NJ.
- **Confidential Client: Cooper Farm 2 Phase / Lambertville NJ.** As an Environmental Scientist, performed site visit and composed a Phase 1 ESA report.
- **Confidential Client: Wyeth WC Act 2 / West Chester PA.** As an Environmental Scientist and Field Manager, organized and participated in multiple groundwater sampling events, provided oversight of foundation demolition, and participated in multiple soil sampling events at the facility. Additional duties included drafting multiple CADD figures representing on-site developments, coordinating waste disposal, and conducting regular communications with client representatives, lab personnel, and equipment suppliers.

Mrs. Heffner is an experienced engineer who has worked on hazardous and solid waste projects for both federal and industrial clients. Mrs. Heffner has provided management for a variety of groundwater and soil sampling projects including cost estimation, sampling team management, and reporting. She has also worked extensively with federal clients on preliminary assessments, site investigations, and remedial investigations. Mrs. Heffner has received training in CPR, first aid, and is HAZWOPER 40-hour certified.

Lisa Heffner

Project Role:

Data Management & Reporting - Field / Survey Technician

Title/Firm:

Project Engineer

Malcolm Pirnie, Inc.

Years of Experience

5

Education

BCE Environmental Civil Engineering Rice University 2003

Licenses and Certifications

Fundamentals of Engineering

Professional Training

ASTM Phase I and Phase II Environmental Site Assessments with updates on "All Appropriate Inquiry" (

Princeton Groundwater and Hydrology Course (July 2004)

Employment History

Malcolm Pirnie, Inc. 2003 to present

Detailed Experience

- **EFA Northeast, NAVFAC: NRL Washington, DC - / Washington DC.** Have been involved at every stage of the Preliminary Assessment process for this site including conducting the site visit, analyzing archival information, writing the PA report, and responding to client comments. Spearheaded the task of creating an interactive CD for the Anacostia Draft Final PA. This CD includes interactive maps linked to site photographs, the report body with PDF book marks, and an interactive reference section linked to PDF versions of various reference documents. The task consisted of compiling the necessary Word documents, site photographs, maps, and PDF versions of reference documents and then posting them to the server.
- **City of Philadelphia Commerce Department: American & Somerset / Philadelphia PA.** In January 2004, I acted as field team leader for groundwater sampling at the PIDC-Somerset site in Philadelphia. I coordinated all aspects of mobilization including contacting the laboratory for sample bottles, purchasing supplies, and ordering field sampling equipment. All of the sampling was successfully completed in one day; on time and within the budget. After sampling was completed, tabulated the groundwater data and created a groundwater contour map using Surfer.
- **EFA Northeast, NAVFAC: Washington #12 / Anacostia DC.** Have been involved with many aspects of the Preliminary Assessment (PA) process for the Washington Navy Yard. As Deputy Project Manager have provided assistance with research, technical editing, response to client comments, and assembly of reports. Throughout the past 2 years have worked with Rhonda Stone and Bob Helkowski preparing the Draft, Draft Final, and Final versions of the Washington Navy Yard report.
- **Kansas City District, USACE: PRE Additional RI/FS / Newark NJ.** Aided in the collection of historical data by processing sediment core samples as part of the initial phase of an RI/FS of a river where pesticides, dioxin, PCBs, metals, and other hazardous substances have been found in the sediments.
- **Ametek Inc.: US Gauge Sell / Sellersville PA.** Have been involved in many aspects of the groundwater monitoring program at the Ametek Sellersville site. Have filled the role of team leader on several groundwater sampling events and provided oversight for electrical imaging surveys of the area. Have also provided support for this project by writing the semi-annual progress reports, writing bimonthly O&M reports, creating and editing CADD figures, and creating data tables.
- **Mack Trucks, Inc.: Allentown Site Dives / Allentown PA.** Coordinated and completed the well development for the Mack Truck site in Allentown, PA. Oversaw the installation of four monitoring wells at the Mack Truck site. During this field job, was required to interface with the client, and gained valuable experience in air rotary well drilling/construction methods.

- **Olin Corporation: Hamden Supp Inv / Hamden CT.** Beginning in January 2005, spent four weeks in Hamden, CT providing both field and office support. As a member of the soil sampling team, helped collect hundreds soil samples using DPT. For this project, was able to use and improve/expand my Microsoft Access skills and streamlined the entire extensive soil sampling database. This database integrated data collected by the State dating back to 1980 with data collected by Malcolm Pirnie. Using this database, our project team was able to quickly, easily, and accurately create informative tables and figures for use in the final report.

Ms. Fehrman has provided technical support on multiple munitions-related projects for federal clients, including site inspections and remedial investigations. Ms. Fehrman's experience includes work for the Army's Military Munitions Response Program, as well as support on the National Guard Non-DoD Owned Non-Operational Defense Sites Inventory.

Rosemarie L. Fehrman

Project Role:

Field / Survey Technician

Title/Firm:

Engineer

Malcolm Pirnie, Inc.

Years of Experience

2

Education

Program completed in BS Biological and Environmental Engineering Cornell University 2006

Program completed in M.Eng. Biological and Environmental Engineering Cornell University 2007

Licenses and Certifications

Fundamentals of Engineering

Employment History

Malcolm Pirnie, Inc. 2007 to present

Malcolm Pirnie, Inc. 2006 to 2006

Detailed Experience

- **Baltimore District, USACE: Fort George G. Meade Mortar Range Remedial Investigation / Fort Meade MD.** Team member for the Army Remedial Investigation (RI) at a former Mortar Range at Fort George G. Meade, Maryland. The RI is a follow-up to the Army Military Munitions Response Program (MMRP) Site Inspections and the Army's Range Inventory completed. Involved in the preparation of cost estimate, Accident Prevention Plan, Health and Safety Plan, Work Plan, Quality Assurance Project Plan, and Field Sampling Plan.
- **Army National Guard: Army National Guard Non-DoD Owned Non-Operational Defense Sites Inventory / Washington, DC.** Team Member involved in supporting project activities for the Tennessee, Mississippi, Ohio, Maine, Arkansas, and the Virgin Islands including research, site visits, and deliverables. Activities include archives, internet, and data repository research to obtain information regarding sites identified by the National Guard Bureau and to identify additional sites; obtaining rights-of-entry; conducting an in-brief and site visit; and submittal of a Read-Ahead Package, Trip Report, Draft and Final NDNODS Inventory Reports.
- **Baltimore District, USACE: Fort Foote Site Inspection / Prince George's County, MD.** Team member for the Army Site Inspection (SI) at the Fort Foote Formerly Used Defense Site. Responsibilities included revision of Ft. Foote SI report for the USACE.
- **U.S. Army Environmental Command, USAEC: Blossom Point Engineering Evaluation / Cost Analysis / Blossom Point, MD.** Team member for the Blossom Point Engineering Evaluation / Cost Analysis (EE/CA). Responsibilities included revising the Work Plan, coordination with field teams, and writing the EE/CA report.
- **Department of the Army, Fort Belvoir: Fort Belvoir Operational Historical Records Review / Fort Belvoir, VA.** Team member for the Fort Belvoir Operational Historical Records Review. Responsibilities included conducting a site visit to review historical records of the installation, preparation of deliverables including Conceptual Site Model and the HRR Report.

Mr. Jordan has provided technical and field support for several federal projects. His experience stems from projects in the Range Environmental Vulnerability Assessment (REVA), Operational Range Assessment Program (ORAP), Military Munitions Response Program (MMRP), Installation Response Program (IRP), and Base Realignment and Closure (BRAC) programs.

Detailed Experience

- **U.S. Army ARDEC: RCI Housing Project / Picatinny Arsenal NJ.** Provided field oversight of subcontractors during geophysical investigation of an MMRP site. Used MS Access in support of the QC process of unexploded ordnance (UXO) dig results.
- **U.S. Army Environmental Command, USAEC: Blossom Point EE/CA / Blossom Point MD.** Provided ESRI ArcGIS support in the production of Explosives Safety Submission and Work Plan maps.
- **U.S. Army Environmental Command, USAEC: IAP/CTC Year 2 / Aberdeen MD.** Bechtel-S Installation Support Team (IST) member. Assisted Army installations with the preparation of their yearly Installation Action Plan (IAP) and Cost-to-Complete (CTC) estimates of Compliance-related Cleanup (CC), Installation Restoration Program (IRP), Military Munitions Response Program (MMRP), and Base Realignment and Closure (BRAC) funded environmental sites. Support included updating Army reporting databases (AEDB-R & AEDB-CC) and the IAP tool, using RACER to complete cost estimates and writing Memorandums for Record.
- **U.S. Marine Corps (HQMC): FY08Quantico Inv / Quantico VA.** Assisted as staff geologist for REVA investigation of MCB Quantico. Prepared site and geological maps using ESRI ArcGIS software, assisted in the production of the work plan and health & safety plan. Field activities included oversight of subcontractors in the drilling of eleven monitoring wells, collecting and describing rock cuttings, and preparing field reports. Assisted further to organize two well sampling events and geophysical analysis of the boreholes.

Brian Jordan

Project Role:

Field / Survey Technician - Geologist / Hydrogeologist

Title/Firm:

Geologist

Malcolm Pirnie, Inc.

Years of Experience

0

Education

Program completed in BS Geology/Hydrogeology University of Wisconsin, Eau Claire 2008

Professional Training

AEDB-CC Training (9/08)

AEDB-R Training (10/08)

DoD Information Assurance Awareness Training (9/08)

Environmental Liabilities Training (9/08)

IAP Tool (9/08)

MS Office Access 2007 (9/08)

OSHA HAZWOPER 40-hr Training (8/08)

Quality Considerations for Munitions Response Programs Seminar (1/09)

RACER 2008 Training (9/08)

Unexploded Ordnance Safety Training (1/09)

Employment History

Malcolm Pirnie, Inc. 2008 to present

US Geological Survey, Wisconsin Water Science Center 2007 to 2007

Nicole U. Walworth

Project Role:

Field / Survey Technician - GIS

Title/Firm:

Environmental Scientist

Malcolm Pirnie, Inc.

Years of Experience

4

Education

Program completed in BS Earth and Environmental Science University of Maryland 2006

Professional Training

FIER Presentation - "Range Design for Military Weapons"

Societies

Society of American Military Engineers

Employment History

Using ESRI software, created, combined and updated maps for the Military Munitions Response Program, Operational Range Assessment Program, the Navy Preliminary Assessments, and other various projects.
She is responsible for the coordination, scheduling, and maintenance of the office Trimble GPS unit and has executed data verification for data that has been collected with the Trimble unit. She also developed a RI/FS Guidance document for the Army Military Munitions Response Program and developed environmental reports for the Operational Range Assessment Program.

Detailed Experience

- **U.S. Army Environmental Command, USAEC: FGGM MRP SI / Fort Meade MD.** Using ESRI software, I created and updated maps for the Site Inspection. This was my first set of maps for the MMRP program, so I was briefed prior to the beginning of making the maps. I was expected to organize, correct and export the data that was collected with the GPS unit so it would be useful in the mapping software.
- **Canadian Department of National Defence: CFAD Bedford UXO Opt / Halifax NS Canada.** I was responsible for the maps for this report; I used ESRI software to create the maps. I also had to locate geographic data so the maps would be accurate and easy for the eye to view.
- **EFA Northeast, NAVFAC: PRA NAB Little Creek / Little Creek VA.** I was responsible for the Preliminary Assessment maps that were inserted into the report; I used ESRI software to create the maps. This was the first maps I had completed for the Navy PAs, so I had to be briefed on the standards for the Navy prior to the beginning of the maps. I was also responsible for obtaining the raw data from the GPS unit, correcting the data and exporting the data so it would be useful in the mapping software.
- **Kansas City District, USACE: Tyson Valley HRR / Kansas City MO.** I was responsible for the maps for the site; I used ESRI software to create the maps. I also assisted with research at the Technical Information Center in Aberdeen, MD, at Picatinny, NJ and at the particular location.
- **U.S. Army Environmental Command, USAEC: MMRP SI Fort Belvoir / Fort Belvoir VA.** I assisted with the Prioritization Protocol for the many sites located within Ft. Belvoir. I also researched the T-16 range in an effort to locate more information to put into the report.
- **U.S. Army Environmental Command, USAEC: ORAP FY06 NW IMA / Baltimore MD.** Using ESRI software, I created maps for all of the 11 Idaho National Guard Sites. I will also be responsible for writing the report for Buhl Training Area. I also assisted with the organization of the data that was collected from the installation.
- **U.S. Army Environmental Command, USAEC: RI/FS Guidance / Edgewood, MD.** This project is huge in it and will require a lot of effort. I have completed research for RI/FS that have been done in the past, as well as current guidance that is already available. I also attended the kick-off meeting and conducted interviews with people who have experience in RI/FS. I will be assisting in the writing of the Guidance.

Tom Quinn

Project Role:

Field / Survey Technician

Title/Firm:

Engineer

Malcolm Pirnie, Inc.

Years of Experience

3

Education

Program completed in Bacc. Environmental Engineering Pennsylvania State University 2007

Licenses and Certifications

OSHA Occupational Safety and Health Training

Professional Training

Malcolm Pirnie's CSI Construction Document Technologist Program

Pirnie CADD

RAD Worker Training - Molycorp, Washington PA

Special Recognition

Boy Scouts of America - Eagle Award

Societies

Tau Kappa Epsilon, National Member

Employment History

Malcolm Pirnie, Inc. 2007 to present

Valley Forge Laboratories 2006 to 2007

David Blackmore and Associates 2005 to 2005

Industrial wastewater (WW) engineer for a US Nuclear Regulatory Commission (NRC) regulated Contact Water Treatment Plant (CWTP) treating contact water for a former molybdenum production and manufactured gas plant (MGP) site contaminated with radioactive slag wastes and MGP tar wastes; CWTP operations involved National Pollutant Discharge Elimination System (NPDES) stream and system sampling, plant operator scheduling and billing, construction management, system optimization and jar testing for: metals precipitation, solids removal, and treating for Volatile Organic Compounds (VOCs) through carbon filtration; Also involved with radioactive materials handling, sampling with Trimble GPS system and software, decontamination and shipping via railcar to a certified disposal facility; filed for an online Final Report Summary (FRS) to PADEP under Act 2 reporting; Monthly NPDES Operation and Maintenance (O&M) reporting for RCRA Interim Remedial Measure (IRM) hydraulic control groundwater treatment system; USACE/EPA Superfund soil boring and monitoring well installation oversight, soil core logging using USDS and standard USCS classification systems, soil screening and sampling, coordinated disposal of investigative derived waste (IDW), groundwater sampling; assisted project engineer in preparation of NJPDES Underground Injection Control (UIC) permit application and contractor bidding for a source area In-Situ Chemical Oxidation (ISCO) operation. Actively participated in ISCO drilling, injection of chemical oxidant, calculated contaminant mass within source area and oxidant concentration calculations.

Detailed Experience

- **OFA - Kansas City District: ECC Kaufmann & Minter / Springfield NJ.** USACE/EPA Superfund soil boring installation oversight, soil core logging using USDS and Malcolm Pirnie standard USCS classification systems, soil screening and sampling, groundwater sampling. Performed engineering calculations to determine dosing procedures, contaminant mass and chemical strength of oxidant for In-Situ Chemical Oxidation (ISCO). Acted alone as Malcolm Pirnie's representative while providing oversight for subcontractor's drilling and injection activities, collected daily equipment safety checks, hosted daily safety tailgate meetings and provided safety orientation, job scope, and site walks for MPI's clients from the EPA and USACE.
- **Ametek Inc.: Ametek US Gauge Sell / Sellersville PA.** Monthly NPDES O&M reporting for RCRA Interim Remedial Measure (IRM) hydraulic control groundwater treatment system. Aided Project Manager and treatment system operators specify replacement equipment.
- **Croda Uniqema Inc.: NON HSCA Consulting / New Castle DE.** Collected quarterly water samples at an active special metals production plant, coordinated with laboratory for collection and analysis of samples. Collected soil samples from stockpiles to be analyzed for contaminants and possible reuse onsite. Completed site contractor safety orientation.
- **Kinderhook Industries, LLC: Kinderhook CVCC Audi / Berwyn MD.** Aided Project Engineer with Site visit to Maryland to assess a private property for a Phase I Environmental Assessment (EA). Helped prepare the ESA report

by filing a Freedom of Information Act (FOIA) request, analyzing an EDR report and reporting concerns encountered while on the Site visit.

- **Confidential Client: Contact Water Treatment / Washington PA.** Industrial wastewater (WW) engineer for a US Nuclear Regulatory Commission (NRC) regulated Contact Water Treatment Plant (CWTP) treating contact water for a former molybdenum production and manufactured gas plant (MGP) site contaminated with radioactive slag wastes and MGP tar wastes; CWTP operations involved National Pollutant Discharge Elimination System (NPDES) stream and system sampling, plant operator scheduling and billing, construction management, system optimization and jar testing for: metals precipitation, solids removal, and treating for Volatile Organic Compounds (VOCs) through carbon filtration.
- **Shell Oil Products U.S.: Shell Thorndale, PA / Thorndale PA.** Collected water samples and aided project geologist with filing an online Final Report Summary for site closure under ACT 2 reporting.

Mr. Firely received his Bachelors of Science in Environmental Science, specializing in Ecology from Drexel University, Philadelphia. He has experience in all aspects of wetland identification and delineation, as well as hydrophytic vegetation and wetland replacement monitoring. His project experience includes various Department of Transportation (DOT) projects, both as a field scientist and report writer for Categorical Exclusion Evaluations and Environmental Site Assessments. Mr. Firely received his wetland certification from The Institute for Wetland and Environmental Education & Research which concentrated on the identification and delineation of wetlands according to the Army Corps of Engineers Wetland Manual. This training was performed in Rancocas, NJ with a section specializing on the unique ecosystem found in the New Jersey Pinelands

Greg Firely

Project Role:

Field / Survey Technician

Title/Firm:

Project Environmental Scientist

Malcolm Pirnie, Inc.

Years of Experience

8

Education

Program completed in BAS Earth and Environmental Science Drexel University 2000

Licenses and Certifications

Wetland Delineator Certification Program

Professional Training

REVA/ORAP Training

US EPA "Financial Assistance for Communities for Brownfield Revitalization"

Societies

National Brownfield Association

Employment History

Malcolm Pirnie, Inc. 2005 to present

McCormick Taylor, Inc 2000 to 2004

Detailed Experience

- **EFA Northeast, NAVFAC: NRL Washington, DC - / Washington DC.** Mr. Firely was part of a team which prepared a Preliminary Assessment for the Naval Research Laboratory (NRL) Washington DC. The Department of Defense has established the Military Munitions Response Program under the Defense Environmental Restoration Program to address munitions and explosives of concern and discarded military munitions and munitions constituents at other than operational military ranges and other sites. Closed, transferred, and transferring military ranges and sites not located on an operational range are considered other than operational.
- **Kansas City District, USACE: PRE Addl RI/FS / Newark NJ.** Mr. Firely was part of the team which collected cores for erosion experiments and radionuclide analysis for the Lower Passaic River Restoration Project, a joint study being conducted by the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE) and New Jersey Department of Transportation. The major emphasis of this program was the determination of Gust microcosm erosion rates using the exact approach used in Dr. Larry Sanford's research laboratory at the University of Maryland Center for Environmental Science (Sanford and May 2001). In addition, we collected cores for Malcolm Pirnie for the analysis of surficial (0.0-0.5 cm) radionuclides, as well as cores for the USACE "Sedflume" experiments (Borrowman et al. 2005). Water column properties consisted of Conductivity-Temperature-Depth (CTD) profiles and Laser InSitu Scattering Transmissiometer (LISST) suspended sediment profiles.
- **Chalfont Borough: Chalfont Grant / Chalfont PA.** Lead application process for grant applications at the Federal and State level. Utilized contacts within the USEPA and PADEP to pursue accurate grant funding. Responsible for community support organization and public comment collection and public meetings.
- **Conectiv Energy: Conectiv - Construction / Wilmington DE.** Conectiv, Inc.: Conectiv Linear Perm / Newark DE. – Mr. Firely performed weekly site inspections of 30 miles of wetlands along this linear transmission line project. He was responsible for the delineation of wetland boundaries and a complete oversight during the construction phase to maintain permit compliance with the USACE.

Related wetland experience

- Deputy Project Manager Exton Bypass Wetland Replacement Monitoring: assisted soils, hydrologic, and vegetation monitoring tasks associated with 38 acres of replacement wetlands constructed as part of the Exton Bypass, Chester County, Pennsylvania. Compile data in report form for review by the USACOE and PADEP over 5 years.
- Project Manager Route 352 at the Pennsylvania State University. Project entailed the widening of Route 352 to accommodate a dedicated turning lane for the entrance to the Pennsylvania State University Delaware County Campus, Delaware County, Pennsylvania. Coordinated field studies including wetland identification and delineation with GPS equipment in accordance with the USACOE Manual. Led preparation and writing of Categorical Exclusion Evaluation for PENNDOT.
- Project Manager for Environmental Documentation Evaluation for the Bridge Replacement of Valley Willow Road over the West Branch White Clay Creek Chester County, Pennsylvania. Coordinated field studies including wetland identification and delineation with GPS equipment in accordance with the USACOE Manual. Led preparation and writing of Categorical Exclusion Evaluation for PENNDOT.
- Deputy Project Manager Environmental Site Assessment for Shantz Road Roadway Widening and Bridge Replacement, Lehigh County, Pennsylvania. Coordinated field studies including wetland identification and delineation with GPS equipment in accordance with the USACOE Manual as well as potential mitigation for identified wetlands.
- Deputy Project Manager Environmental Site Assessment for Schuylkill River Trail Chester and Berks Counties, Pennsylvania. Led identification of wetlands along 12 mile corridor of the proposed extension of the Schuylkill River Trail.
- Assisted in Delaware Route 54 proposed widening project. Responsible for assisting in the identification of wetlands along the project corridor.

Christopher R. Ortolano

Project Role:

Field / Survey Technician

Title/Firm:

Sr. Field Technician

Malcolm Pirnie, Inc.

Years of Experience

10

Education

BS Environmental Science West Chester University 1995

Employment History

Malcolm Pirnie, Inc. 2007 to present

SECOR International Inc. 2006 to 2006

URS Corporation 2002 to 2006

Handex Environmental 2000 to 2002

Groundwater and Environmental Services 1999 to 2000

Clean Harbors Environmental Services 1998 to 1999

E.I. DuPont de Nemours & Co, Inc. 1995 to 1995

Mr. Ortolano is an environmental scientist with experience in a variety of projects, including large-scale hazardous waste remediation. He has specialized in the remediation of soils contaminated with oil and gas, oversight and removal of underground storage tanks, sampling well installation, groundwater testing, application of groundwater treatment systems, and operation of physical and biological wastewater treatment systems. His projects require organizational skills, team collaboration, and a detail-oriented approach.

Detailed Experience

- **Clean Harbors Environmental Services: Field Technician / PA.**
  - Participated in long-term cleanup of Bethlehem Steel properties.
  - Performed Level B tank cleanups.
  - Member of dedicated PECO energy maintenance crew.

- **Groundwater and Environmental Services: Field Technician / PA.**
  - Conducted daily groundwater sampling.
  - Performed light operation and maintenance on groundwater treatment systems.
  - Involved in long-term soil remediation project.

- **Handex Environmental: Senior Technician / PA.**
  - Performed well installations at various retail gas stations.
  - Conducted oversight activities for underground storage tank removals at retail gas stations in Pennsylvania.
  - Conducted groundwater and permitting sampling at several Superfund and NPDES sites in New York and New Jersey.

- **Senior Field Technician/Environmental Scientist.** Responsible for various elements of site remediation including:
  - Operation and maintenance of in-situ and subsurface remediation systems using pump-and-treat, soil vapor extraction (SVE), two-phase extraction, carbon adsorption, and catalytic oxidizers.
  - Oversight of multiple underground storage tank(s) removal and subsurface and post-excavation sampling.
  - Oversight of emergency response cleanup for a confidential client.
  - Third-party oversight of a vendor performing at a radiological and chemical remediation site in Hicksville, New York. Responsible for overseeing excavation activities, soil sampling, and drilling operations. Worked directly with radiological technicians and health physicists.
  - Participated in a Phase II Soil Investigation through the ACT II Site Closure report.
  - Performed Phase II Site Investigations for Soil and Groundwater
  - Oversight of sub-slab mitigation systems in Long Island NY
  - Oversight of Conepenetrometer and hydropunch sampling
  - Oversight of well drilling programs in which Sonic drilling was utilized.

Ms. McCarthy's field experiences include logging soil borings, soil and groundwater sampling, MIP work, oversight, stream discharge gauging, and working on radioactive sites. Ms. McCarthy also has worked on projects requiring data manipulation along with organization. She is familiar with Word, Excel and gINT.

Detailed Experience

- **Kansas City District, USACE: Welsbach / GGM / Camden & Gloucester City NJ.** Logging soil and collecting soil samples on an EPA radioactive superfund site, scanning residential and commercial properties with meters (2X2, 1/2X1, and pancake) to detect elevated readings. Field data that was collected was then uploaded onto a Web/GIS-Based Data Management System which has won the Gold Award in 2003 from the New York Association of Consulting Engineers.
- **Kansas City District, USACE: CLTL OU3 Oversight / Bridgeport NJ.** Oversight, groundwater sampling (low flow), soil sampling, and data management for a superfund site.
- **Brandywine Realty Trust: BRT Data Mgmt / Plymouth Meeting PA.** Data organization of environmental reports and uploaded electronic files to a website developed for a commercial real estate investment trust client.
- **Shell Oil Products U.S.: Shell Shreveport / Shreveport LA.** Groundwater Sampling and sample management performed at a refinery.
- **Lehigh County Authority: LCA Pump Station Remediation / Allentown PA.** Groundwater sampling and water and product elevation measurements at a UST site being investigated under PA ACT II
- **Nestle Waters North America Mid-Atlantic: Nestle NY State Search / Syracuse NY.** Stream gauging to assess groundwater discharge as part of a spring sighting study.
- **Confidential Client: Passaic River / Newark NJ.** Analyzed sediment data for a superfund site investigation.
- **Temple University Health System: Quality Assurance Mo / Philadelphia PA.** Management of noise and dust data. UST removal oversight.
- **Wyeth: Wyeth WC Act 2 / West Chester PA.** Work included oversight of MIP (Membrane Interface Probe) work, logging soil borings then entering data into gINT, and sampling soil, groundwater, and gas, using SUMMA canisters.
- **Ametek Inc.: John Evans / Lansdale PA.** Groundwater sampling and provided field direction for packer testing.

Christine P. McCarthy

Project Role:
Field / Survey Technician

Title/Firm:
Geologist

Malcolm Pirnie, Inc.

Years of Experience
5

Education
Program completed in BA Geology
University of Delaware 2006

Program completed in BA Philosophy
University of Delaware 2006

Professional Training
The Princeton Groundwater Pollution and Hydrology Course

Societies
National Ground Water Association

Employment History
Malcolm Pirnie, Inc. 2006 to present

Delaware Geological Survey 2004 to 2006

PADEP 2003 to 2003

James M. McCann

Project Role:

Chemist

Title/Firm:

Project Environmental Scientist

Malcolm Pirnie, Inc.

Years of Experience

43

Education

BS Chemistry St. John's University 1964

MA Chemistry State University of New York at New Paltz 1974

Societies

American Chemical Soc.

American Society for Quality

American Society for Testing and Materials

Employment History

Malcolm Pirnie, Inc. 2004 to present

Entergy Nuclear Northeast/Con Edison - Indian Point Energy Center 1999 to 2003

Independent Consultant in Analytical Chemistry 1998 to 1999

Mr. McCann is a senior chemist with a strong background in analytical chemistry; environmental analyses, method development, laboratory quality assurance/quality control (QA/QC), as well as project planning following the systematic planning process. He is also a key technical resource for developing project data quality objectives (DQOs) and then selecting analytical methods and sampling procedures that support the DQOs. Jim is an experienced analytical chemist who served for many years as the Analytical Chemistry R&D Group Leader and Chairman on the ASTM D-2 Subcommittee 4 on Hydrocarbon Analysis. As such, he is recognized for his expertise in hydrocarbon analysis, petroleum product testing, chromatography methods and analytical test method development. While serving as the chemistry Technical Director and QA Officer at the Indian Point Energy Center, he prepared the laboratory's QA manual and supervised the laboratory's QC program. Under his direction, the laboratory obtained National Environmental Laboratory Accreditation Program (NELAP) certification through the New York State Department of Environmental Conservation (NYSDEC) and implemented an improved laboratory QC program. He also has extensive experience in project planning requirements and the preparation of quality assurance project plans (QAPPs). Since joining Malcolm Pirnie, he has served as the QA Officer for various large Federal Superfund projects and in January 2006, he attended U.S. Environmental Protection Agency (EPA) sponsored training on the preparation of QAPPs using the Uniform Federal Policy (UFP). Since that time, Jim has prepared numerous UFP-QAPPs, and has provided guidance to other staff responsible for preparing UFP-QAPPs. Mr. McCann is well organized and has strong technical and communication skills.

Detailed Experience

- **Baltimore District, U.S. Army Corps of Engineers (USACE): Munitions/Explosives Project Support.** Currently provides chemistry and QA/QC support to various USACE munitions and explosives projects conducted by Malcolm Pirnie, Inc. This support includes assisting project team members with planning document preparation using UFP-QAPP requirements, as well as evaluating and selecting appropriate sampling and analytical methodologies for samples containing explosives.
- **Kansas City District, USACE: Cornell-Dubilier Electronics Superfund Site / South Plainfield NJ.** Lead project chemist on a comprehensive assessment and remediation programs at the former Cornell-Dubilier Electronics facility. This site is contaminated with PCBs, along with other chemicals. Prepared multiple UFP-QAPPs for projects associated with the site including the operable unit (OU-2) Soil Remedial Design Investigation Program, OU-2 Capacitor Disposal Area Soils Split Sample Analyses, OU-1 Property Soil and Indoor-Dust Sampling and the OU-3 Groundwater Sampling and Analyses Program. Also developed the OU-2 Building Material Investigation QAPP. As Project Quality Officer for the Cornell-Dubilier investigations has been responsible for the quality assessments of field sampling activities and analytical data.
- **Kansas City District, USACE: Lower Passaic River Remedial Investigation/Feasibility Study (RI/FS) / Newark NJ.** Serves as Site QA Officer and lead chemist responsible for data validation and all analytical data management associated with environmental sampling and ecosystem restoration program conducted for USACE. Developed

project specific QAPPs and (Including UFP-QAPPs for the Passaic River Empirical Mass Balance Project and Passaic River Oversight Split Sampling). Responsible for the selection of the laboratory analytical procedures and QA/QC requirements for the sediment and water column sampling programs, while maintaining close interface with EPA chemists. Investigated and resolved laboratory quality issues associated with the laboratory analytical programs.

- **Kansas City District, USACE: Newark Bay Oversight / Newark NJ.** As Site QA Officer, drafted the QAPP for the Newark Bay Study Area Oversight Programs following the UFP-QAPP format. Provided technical support to client by reviewing numerous planning and technical documents and participating in technical discussions regarding analytical methods and reporting limits.
- **Kansas City District, USACE: PRE Addl RI/FS / Newark NJ.** Serve as Site Quality Assurance Officer. Selected analytical and testing methodologies and developed Project Quality Assurance Plan. Interfaced with laboratories. Coordinate quality assurance audits and data review. Contributed to the development/implementation of field sample plans.
- **U.S. Army Corps of Engineers: Range Inventory / Baltimore MD.** Assisted the project team by working with laboratory and ACE to resolve problems with analytical methodology being used by the lab for explosives analyses.
- **Kansas City District, USACE: Dover Municipal Well No. 4 Superfund Site / Dover NJ.** Chemist for groundwater design investigation at a former dry cleaning facility. Prepared the UFP- QAPP for soil and groundwater sampling and analysis program. Responsible for assessments of field sampling activities and the quality of laboratory data.
- **Kansas City District, USACE: Hudson Design Support / Ft. Edward NY.** Coordinated efforts with the laboratory and EPA chemists/staff to troubleshoot and optimize the analytical methodology used for polychlorinated biphenyl (PCB) congener analyses for environmental samples used in the Hudson Baseline Monitoring program. Supported the Project's QA Coordinator and the client by providing technical input and review regarding chemistry/QA issues. Prepared multiple project specific QAPPs and QAPP amendments including those in the UFP-QAPP format. Prepared revisions to the Project Quality Assurance Plan.

Dr. Califano manages the firm's Toxicology and Risk Assessment Group. In this capacity, he conducts or directs projects involving risk assessment or risk-based solutions for public and private sector clients across the country. His experience encompasses all aspects of federal and state Superfund and RCRA corrective action processes, as well as state voluntary cleanup, petroleum spill, and brownfields processes. He routinely uses this experience in establishing risk-based remedial objectives and numerical cleanup goals.

Richard J. Califano

Project Role: Risk Assessor

Title/Firm:

Associate

Malcolm Pirnie, Inc.

Years of Experience

35

Education

BS Biology Manhattan College 1973

MS Biology New York University 1979

PhD Biology/Environmental Health Science New York University 1981

Societies

Society for Risk Analysis

Employment History

Malcolm Pirnie, Inc. 1986 to present

NUS Corporation 1984 to 1986

New Jersey Department of Environmental Protection, Division of Water Resources 1981 to 1984

New York University Medical Center Institute of Environmental Studies 1975 to 1981

Lawler, Matusky & Skelly Engineers 1973 to 1975

Detailed Experience

- **U.S. Army Corps of Engineers, Kansas City District: Human Health Risk Assessments.** For the RI of the groundwater operable unit at the FUSRAP Maywood Superfund Site in Maywood NJ, directing a baseline risk assessment addressing potential human and ecological health risks from exposure to radionuclides and chemicals in groundwater. Also supporting the remedial design for the soil operable unit by developing risk-based action levels for lithium in groundwater. As part of the remedial design for the Welsbach / General Gas Mantle Superfund Site in Camden NJ, directed a sediment sampling / ecological risk assessment project evaluating possible radionuclide and chemical releases to Newton Creek, Martin's Lake, and the Delaware River. Directed the human health risk assessment at Plattsburgh (NY) Air Force Base (AFB), concerned with soil and groundwater contamination at a number of areas of concern on both the secure and open portions of the base. Derived human health risk-based cleanup levels for chromium in soil and groundwater for use at the Jayhawk Industrial Site, KS. Supported Corrective Measures Studies for a number of solid waste management units at the Sunflower Army Ammunition Plant, KS by summarizing risk assessments conducted by another contractor and, based on the risk assessments, establishing risk-based corrective measures and cleanup goals for soil and groundwater.
- **U.S. Army Corps of Engineers, Omaha District: Human Health Risk Assessments.** Directed screening-level and baseline human health risk assessments under RCRA Corrective Action for a number of areas of concern (AOCs) at both Glasgow Air Force Base (AFB), MN and Minot AFB, ND, and a screening-level health risk assessment for a number of AOCs at Lloyd AFB, IL.
- **U.S. Army Corps of Engineers, Tulsa District: Human Health and Ecological Risk Assessments.** Provided overall technical direction to and review of human health and ecological risk assessments, including the responses to regulatory agency comments, for projects at the former Ardmore Air Force Base and various Atlas Missile sites.
- **USEPA Region 2: Dover Municipal Well No. 4 / Dover NJ.** Evaluated the potential for vapor intrusion into a number of residences and commercial/industrial buildings in the vicinity of an active dry cleaning establishment responsible for subsurface soil and groundwater contamination with chlorinated solvents. Three seasons of data collected by the USEPA Region 2 Emergency Response Team were reviewed and interpreted, including: An initial comprehensive round of soil gas, sub-slab vapor, indoor air, and outdoor air sampling; two follow-up rounds of indoor and outdoor air sampling. The indoor air samples were collected from basement (occupied and unoccupied) and first floor locations. The results of an ambient air study conducted by the USEPA Region 2 using their TAGA mobile unit were also evaluated. It was concluded that, while some vapor intrusion was likely occurring in some of the buildings, outdoor sources were the greater contributor to indoor air quality in the buildings.

- **U.S. Environmental Protection Agency: Field Investigations at Superfund Sites.** Managed a multidisciplinary, 60-member field investigation team investigating uncontrolled hazardous waste sites under the Superfund Program. Directed public health assessments for remedial investigation / feasibility studies as well as the review, interpretation and reporting of analytical data. Managed or assisted numerous remedial investigation / feasibility studies and multimedia field investigations.
- **U.S. Environmental Protection Agency, Region 2: ARCS/RAC II Superfund Contract.** Directed/authored health risk assessments for RI/FS projects in New York and New Jersey including the Action Anodizing Plating & Polishing, Preferred Plating Corporation, Sidney Landfill, York Oil Company OU2, and Li Tungsten / Captain's Cove sites in New York; and the Higgins Farm, Higgins Disposal, U.S. Radium, Franklin Burn, Welsbach / General Gas Mantle, Dover Well Field OU2, and White Chemical Corporation sites in New Jersey. For three of these sites, where mixed waste was the issue, radiological risks were completed using both the USEPA RAGS methodology and RESRAD computer codes. For the Federal Facilities Branch, provided technical review of health risk assessments conducted at the Seneca Army Depot NY and Picatinny Arsenal NJ, and managed a technical oversight team critiquing planning documents for RI/FS activities at Brookhaven National Laboratory, a U.S. Department of Energy facility on Long Island NY.
- **U.S. Army: Fort Dix Resource Recovery Facility / Fort Dix NJ.** Conducted a health risk assessment for potential exposure to mercury in stack emissions from the facility in response to NJDEP concerns over violations of the permitted allowable mercury emission rate. The assessment included a detailed evaluation of chronic health effects from mercury exposure, atmospheric dispersion and deposition modeling, a multi-pathway exposure assessment, and derivation of appropriate health effects guidelines for mercury exposure. Participated in presentations and discussions with the NJDEP regarding proposed revisions to the permit limit.
- **U.S. Army Corps of Engineers, Kansas City District: Health Risk Assessments at the Former Schilling Air Force Base / Salina KS.** Directing health risk assessments for three large operable units (OUs) at the former base. Most of the site is now being operated as a municipal airport, while the remaining areas support a variety of commercial and educational uses. At OU2 the primary concern is a number of large TCE plumes that are migrating off the site toward a neighboring community.
- **U.S. Army Corps of Engineers, Baltimore District: Watervliet Arsenal / Watervliet NY.** As part of a Corrective Measures Study exposure assessment, used vapor transport modeling to derive site-specific, risk-based concentrations for volatile chemicals in groundwater that are protective of indoor air quality in various buildings on the arsenal. The modeling was conducted in conformance with a work plan approved by the USEPA, Region 2 and the New York State Department DEC. Evaluated subsurface soil gas and indoor air data collected in a dirt floor basement area of Building 40 in the context of potential worker exposure.
- **U.S. Army Corps of Engineers, Fort Worth District: Human Health and Ecological Risk Assessments.** Provided overall technical direction to and review of human health and ecological risk assessments, including the responses to regulatory agency comments, for projects at the Lone Star Army Ammunition Plant and Fort Bliss.
- **U.S. Army Corps of Engineers, Baltimore District: Defense Supply Center - Philadelphia (DSCP) Risk Assessment / Philadelphia PA.** Conducted draft risk assessments that addressed potential human health risks associated with a nonaqueous phase liquid (NAPL) plume underlying the DSCP and the surrounding residential community. The study was focused on the potential for human exposure to toxic volatile chemicals released from the NAPL, soil smear zone, and groundwater. Five scenarios were evaluated, including release / transport to indoor air in residences and commercial / industrial buildings through soil vadose zone transport, to indoor air in residences through release to a combined sewer and transport through faulty sanitary sewer traps, to ambient air through release to a combined sewer and transport through untrapped storm water catch basins, and to ambient air through releases from the excavation of a utility trench. Worked cooperatively with a number of stakeholders, including other parties to a consent order, a technical advisory group representing the community, and municipal and regulatory agencies.

Larry S. Jordan

Project Role:

Geologist /Hydrogeologist

Title/Firm:

Project Geologist

Malcolm Pirnie, Inc.

Years of Experience

12

Education

BA Geology and Environmental Science
State University of New York at Buffalo
1996

Employment History

Malcolm Pirnie, Inc. 2000 to present

University of Michigan 1998 to 2000

Barron & Associates P.C. 1996 to 1998

Mr. Jordan's experience includes environmental projects for municipal, industrial, and federal clients as well as water supply projects. He has also worked on numerous munitions related projects as part of the Military Munitions Response and Operational Range Assessment Programs for the Army. His work has involved many project aspects including project management, proposal and budget preparation, work plan development, coordination with federal, state and local officials, subcontracting, field investigations, research and data evaluation, and report preparation. Mr. Jordan has been involved with many aspects of field investigations including test pitting, and oversight of hollow-stem auger, mud rotary, Rotosonic™, earth probe drilling, and well installation. In addition, Mr. Jordan has collected groundwater data and is knowledgeable in many aspects of groundwater and soil sample collection. He is also proficient in various computer programs used in the analysis of data and preparation of reports.

Detailed Experience

- **Baltimore District, USACE: APG - MMRP SI / Aberdeen MD.** Project Manager for an MMRP combined HRR/SI.
- **Baltimore District, USACE: ORAP FY07 NW / Baltimore MD.** Technical Lead for Hydrogeologic portion of the project. Responsibilities included oversight of a team of geologists and hydrogeologists responsible for collecting and analyzing data for all Army installations within the Southeast and Northwest portions of the United States. Attended Quarterly meetings with other Contractors, the Client, and Army representatives to discuss program progress and technical issues.
- **Baltimore District, USACE: TCRA at Picatinny / Picatinny Arsenal NJ.** Deputy Project Manager on Time Critical Removal Action.
- **U.S. Army Environmental Center, USAEC: MMRP SI Rucker / Ft Rucker AL.** Assisted with field component of MMRP Site Inspection including soil sampling and magnetometer and GPS assisted site reconnaissance walk. Prepared Site Inspection Report other project related documents and presentations.
- **U.S. Army Environmental Center, USAEC: MMRP SI Volkstone / Baltimore MD.** Assisted in the completion of a Historical Records Review for Fort Belvoir, Virginia. Assisted in compiling data and writing sections of the report.
- **U.S. Army Environmental Command, USAEC: Blossom Point EE/CA / blossom Point MD.** Project Manager for an EE/CA at two MMRP sites. Sites are contaminated with MEC. Investigation removed MEC hazard and assessed erosion control alternatives as a mode of stopping additional deposition of additional MEC on an eroding shoreline. A landfill containing MEC is present on the bluff above the shoreline and is the source for MEC.
- **U.S. Army Environmental Command, USAEC: Blossom Point MMRP S / blossom Point MD.** Deputy Project Manager on MMRP SI for Blossom Point. Completed a Historical Records Review and Site Inspection for Other Than Operational Range areas on the installation. Responsibilities included report preparation, GIS services, field activities, client and regulator interaction, and project management.
- **U.S. Army Environmental Command, USAEC: Picatinny Arsenal / Dover NJ.** Deputy Project Manager on MMRP SI for Picatinny Arsenal. Completed a Historical Records Review and Site Inspection for Other Than Operational Range areas on the installation. Responsibilities included report preparation, GIS services, field activities, client and regulator interaction, and project management.

- **U.S. Army Garrison Fort Benning: FY05 Closed Landfill / Fort Benning GA.** Project Manager for an investigation of former landfills. Due to BRAC, Fort Benning requested Malcolm Pirnie to investigate property conditions and evaluate costs to remediate underutilized former landfill sites prior to redevelopment. Investigation consisted of conducting a geophysical investigation of four parcels to delineate the limits of the former landfills followed by advancing soil borings to determine thickness of the waste. Team then used GIS to accurately calculate waste and fill volumes to provide detailed costs for water removal and backfill placement.
- **U.S. Army Garrison Fort Benning: OWS Management Plan / Fort Benning GA.** Deputy Project Manager on an illegal dumping project for Fort Benning. Responsible for all aspects of the project including developing the technical approach, collection of GPS and qualitative data, managing field and office work, creating GIS maps, developing costs to cleanup dump sites across the installation, and developing an Orphan Waste Site Management Plan to detail the response to existing dump sites and layout a plan to prevent/respond to future dumping.

Amy L. Atamian

Project Role:
GIS

Title/Firm:
Associate
Malcolm Pirnie, Inc.

Years of Experience
28

Education
BFA Liberal Arts Pratt Institute 1978
Cert. Cartography and Remote Sensing Pace University 1979
MS Information Systems Engineering Polytechnic University 1992

Employment History
Malcolm Pirnie, Inc. 1997 to present
Malcolm Pirnie, Inc. 1983 to 1996
Vernon Graphics, Inc. 1979 to 1983

Ms. Atamian is largely responsible for establishing Malcolm Pirnie's GIS and CADD programs, and expanding the use of these tools firm wide. She manages GIS delivery for a variety of environmental projects including watershed management, water, wastewater and storm water utility mapping, assessment of military munitions response sites, NEPA environmental impact assessment, river sediment and site remediation. A focus of her work includes designing GIS applications for environmental decision support. She designed a watershed screening tool to evaluate and track potential risk to water quality from development within the New York City Croton Watershed. Other models included utility infrastructure criticality assessment, facility siting selection, encroachment on military training facilities, and environmental site assessment. Ms. Atamian has managed Malcolm Pirnie's GIS Knowledge Team, a group of professionals from multiple disciplines who provide technical expertise on GIS projects nationwide, and serves as a firm wide resource for GIS. Ms. Atamian has assisted management in identifying and implementing strategic technologies, developed custom software applications, analyzed and improved process workflow, conducted training programs, and provided guidance for GIS database design and cartographic presentation.

Detailed Experience

- **Baltimore District, USACE: Operational Range Assessment Program, Nationwide / Baltimore MD.** As GIS Quality Leader, supported assessment of operational military ranges for potential human and ecological risk from off-range migration of ordnance-related contaminants. Established mapping standards and guidelines and provided quality review of report maps to ensure consistency across the program. Developed GIS data collection guidelines to support different aspects of the program: Analysis of hydrology and topography to determine surface water and groundwater pathways and receptor zones; locations of public supply and other wells; presence of threatened and endangered species. Developed a range reporting tool based on DoD GIS data, RFMSS munitions usage reports, and summary findings. The Microsoft Access Range Report Tool is used to create summary reports regarding munitions usage and ORAP team conclusions.
- **Engineering Field Activity Northeast (NAVFAC): Support for Preliminary Range Assessment Program / Nationwide PA.** As GIS/CADD Task Leader, coordinating field-based GPS and GIS data compilation and QA/QC activities for the nationwide program. Managing GIS/GPS standards and guideline development for conducting preliminary assessments of Closed, Transferred, or Transferring Naval ranges. Investigations include nonintrusive field surveys of former ranges, and the interpretation and analysis of historical reference mapping and aerial photography to determine the potential risk from unexploded ordnance and munitions constituents. Developed standards and procedures to be used by multiple investigative teams for collecting, managing, and presenting spatial data. Procedures developed include GPS field data collection protocols, methods to resolve differences in multiple data sources, range acreage statistics, performance of QA/QC review, and production of report graphics and electronic deliverables.
- **U.S. Army Corps of Engineers, Baltimore District: CTT Range Inventory / Baltimore MD.** Managed GIS standards development for a nationwide Closed, Transferred, or Transferring (CTT) range inventory, and managed GIS data development and QA/QC efforts for inventories conducted at bases in the eastern portion of the United States. Developed standards and procedures to be used by multiple investigative teams for collecting, managing, and presenting spatial data. Procedures developed included methods to resolve differences in multiple data sources,

assign acreage to ranges where multiple ranges overlap, develop range acreage statistics, perform QA/QC review, and produce report graphics and electronic deliverables.

- **U.S. Army Corps of Engineers, Kansas City District: Ecosystem Restoration of the Passaic River / Essex and Bergen Counties NJ.** As GIS Quality Consultant, managed the development of a project GIS to support the investigation and remediation of the lower 17 mile reach of the Passaic River. Conducted a GIS needs assessment and developed a GIS report which included: an assessment of GIS program requirements, quality and suitability review of available GIS data, and the development of standard GIS data sets, report templates, and usage guidelines for the various components of the project. Guided the development of a web-based mapping component of the PREmis project and our Passaic.org public websites. Managed the development of a comprehensive GIS of the river, including the linear referencing system to link data collected and spatial analyses to the river centerline. Guided the presentation of historical analytical sample data for various chemical constituents found in the river sediment, supervised GIS data conversion of historical bathymetric data from hard copy, and managed the comparison of bathymetric surfaces from various time periods.
- **U.S. Army Corps of Engineers, Kansas City District: Vineland Chemical Company Superfund Site / Vineland NJ.** Task leader for GIS development of potential flooding scenarios for a stream remediation at a former chemical facility in Southern New Jersey. Used GIS in conjunction with a HEC 2 hydrologic model to evaluate different rerouting and construction phasing scenarios. Using HEC 2 to model peak flows under different routing scenarios, piscioGIS was used to map model results and select the alternative that would minimize environmental or property damage.
- **U.S. Army Corps of Engineers, New York District: Ordnance Assessment at Former Raritan Arsenal / Edison NJ.** Developed the GIS conceptual design and system prototype to manage hazardous waste investigations at former Army arsenal. One unique aspect of this design is that it enables the user to manage historical site documents so that changes through time can be analyzed. This feature is used to highlight areas where site changes, such as demolition and reconstruction, may mean a higher potential for contamination.
- **U.S. Army Corps of Engineers, New York District: Sediment Management GIS Design / New York Harbor NY.** Developed a general specification for a GIS to manage sediment data in support of harbor dredging activities. This system was designed to organize historical, current, and future data of disparate formats into a cohesive set of information related by geographic location. It includes statistical functions to reduce the time needed to evaluate data and provide a higher confidence level and more reliable technical documentation of site assessments. Access to the GIS was planned for non-GIS specialists, so that engineers and other users could quickly select and view data on maps of the harbor, and in relation to other data stored in the system. In conjunction with the general specification, a scope of work and cost estimate for system implementation was prepared.
- **U.S. Environmental Protection Agency, Region 2, ARCS Contract: RI/FS at the Welsbach/General Gas Mantle Superfund Site: GIS/Data Management System / Camden/Gloucester City NJ.** Designed and implemented a GIS/data management system to manage scheduling and information collected during remedial investigation and design of six radiologically contaminated areas in southern New Jersey. The GIS/data management system serves as the repository for sample results collected during the current investigation and future remediation stages, contact tracking data, and project status data. The application includes serving maps of the investigation status over an 'extranet' for use by the project team; GIS applications for the field team to identify sample locations and log meter results, photographs, and chain of custody; and functions to upload and retrieve data from the data repository.
- **U.S. Marine Corps: White Space Support / Washington DC.** Managing the development of a prototype geographic information system (GIS)-based model to help identify the intersection between civilian activities and assets and the military mission. This will become a tool to evaluate the impact of civilian or USMC activities on areas that, because of this intersection, are designated as White Space. The model will also facilitate analysis of multiple data layers, incorporate priorities identified by the Marine Corps, and integrate current mission conditions with proposed training scenarios to improve future USMC mission planning. The demonstration tool will focus on southern California to leverage readily available GIS datasets. These data will serve as the foundation for the decision support application designed to evaluate a variety of spatial indicators relative to proposed military or civilian actions. Ultimately, this will provide an interactive tool for USMC planners to evaluate alternate White Space use and future development scenarios. Products of the tool will be maps and tables illustrating the effects of alternate scenarios that will foster deeper understanding and more effective communications with stakeholders.

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

G-2: ALSI

2118151 / BAL

MALCOLM PIRNIE

Certifications and Accreditations
for Analytical Laboratory Services, Inc.

Certification/ Accreditation	*Issuing Agency*	*Cert. Number*	*Contact Name and Number*	*Scope of Certification*	*Expiration*
State of Connecticut	Department of Public Health	PH-0224	Dermot Jones (860)509-7389	Drinking Water, Wastewater, Sewage/Effluent, Soil - inorganic and organic Also Misc. Phase II and V SOCs	12/31/2009
State of Delaware	Division of Public Health and DNREC	ID 11	Brenda Haire (302)741-8630	Approved by the Department to perform analytical work at sites being investigated under HSCA, the VCP, or the Brownfield Program	1/31/2009
State of Georgia	Department of Natural Resources	914	Loretta Lambert (404)651-5164	Drinking Water - Inorganics, Organics	1/31/2009
State of Louisiana	Department of Environmental Quality	4162	Dr. David Boucher (225) 219-9898	Nonpotable Water - Metals by 200.7, TOX	6/30/2009
State of Maryland	Department of Health and Mental Hygiene Laboratories Administration	128	Mary E.T. Stancovage (410)537-3738	Drinking Water - Microbiology, Inorganics, Organics	3/31/2009
National Environmental Laboratory Accreditation Program	New Jersey Department of Environmental Protection and Energy; Office of Quality Assurance	PA010	Debra Waller (609)984-7732	Drinking Water, Wastewater, and Solid/Haz Waste - Chemistry, Metals, Organics	6/30/2009
National Environmental Laboratory Accreditation Program	New York State Department of Health	11759	Dan Dickenson (518)-485-5570	Environmental Analyses Potable Water Environmental Analyses Solid and Hazardous Waste Environmental Analyses Air	4/1/2009
National Environmental Laboratory Accreditation Program	Pennsylvania Department of Environmental Protection; Office of Management and Technical Services; Bureau of Laboratories	22-293	Bethany Piper (717)346-8214	Drinking Water - Microbiology, Inorganics, Organics Wastewater - Microbiology, Inorganics, Organics Solid & Hazardous Waste - Microbiology, Inorganics, Organics	1/31/2009
State of Tennessee	Department of Health	2847	Craig LaFever (615) 532-0181	Drinking Water - Inorganics, Organics	1/31/2009
Commonwealth of Virginia	Department of General Services; Division of Consolidated Laboratory Services	421	Tracey Hunter (804)786-3411	Drinking Water - Microbiology, Inorganics, Organics	6/30/2009
West Virginia Department of Environmental Protection	Division of Water and Waste Management	343	David Wolfe (304)472-5124	Limited Chemistry, Metals, Organics	7/31/2009
Environmental Lead Proficiency Analytical Testing Program (ELPAT)	American Association for Laboratory Accreditation	0818.01	Randy Querry (301) 644-3248	Environmental Lead (Pb) Testing Laboratory Accreditation Program	4/30/2009
USEPA	UCMR 2 PROGRAM	PA00102	Daniel Hautman	EPA Methods 529, 527, 525.2	N/A
USEPA Region 8	Wyoming & Region 8 Tribal Systems	8TMS-Q	Jim Gindelberger (303) 312-6984	Drinking Water -- Microbiology, Inorganics, Organics	2/7/2009
USDA	USDA Animal and Plant Health Inspection Service	S-62749	Don Albright (717) 782-3419	Permit to ship soils from foreign sources, including Guam, Hawaii, Puerto Rico, and US Virgin Islands for laboratory analysis	11/24/2011
DoD/NAVSEA*	Department of the Navy; Navy Facilities Engineering Service Center	NFESC 413	Pati Moreno (805) 982-1659	Certification based on DoD QSM, Version 3 for Water and Soil - VOCs by 8260, SVOCs by 8270, PCBs by 8082, Herbicides by 8141/8151, TAL Metals, Anions by 300/9056, Pesticides by 8081, GRO/DRO by 8015, Cyanide by 9012/9014, Explosives by 8330, Halogenated/Aromatic VOCs by 8021, and Perchlorate by 314; Oil - PCBs by 8082; Air-TO-13 and TO-15	11/29/2009

NA: Not Applicable

**The USACE program was replaced by the laboratory's compliance with the DOD QSM Version 3 and NELAC programs.*

Rev. 12/8/2008

MDE

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

7/16/2008

Helen MacMinn
ANALYTICAL LABORATORY SERVICES INC.
34 Dogwood Lane
Middletown, PA 17057

RE: **CURRENT MARYLAND WATER QUALITY CERTIFICATE**
ANALYTICAL LABORATORY SERVICES INC. 128

Dear Ms. MacMinn

Enclosed please find your current certificate for drinking water laboratory certification in the State of Maryland. The certification is good for a period of three (3) years. The certificate and fees are renewable annually.

If you have any changes in methods, personnel, major equipment, ownership, name change, or location, during the year, you are required to advise this office within 30 days.

If you have any questions, please do not hesitate to call me at 410-537-3712.

Sincerely,

Linda Ames

Linda Ames
Laboratory Certification Officer
Water Supply Program

Enclosure (certificate)

MARYLAND

FOUNDED 1634

DEPARTMENT OF THE ENVIRONMENT
WATER SUPPLY PROGRAM

Certifies That

ANALYTICAL LABORATORY SERVICES, INC.
34 Dogwood Lane, Middletown, PA 17057

Having duly met the requirements of the
Regulations Governing Laboratory Certification
And Standards of Performance In Accordance With
The Annotated Code of Maryland,
is hereby approved as a

State Certified Water Quality Laboratory

To perform the analyses indicated on the Annual Certified Parameter List,
which must accompany this certificate.

Certification # 128

Date Issued July 16, 2008

Expiration Date March 31, 2009
(Not Transferable)

Administrator, Water Supply Program

This certification is subject to unannounced laboratory inspections

CONSPICUOUSLY DISPLAY IN THE LABORATORY WITH THE ANNUAL CERTIFIED PARAMETER LIST.

MDE00318

MDE
MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

SDWA ANNUAL CERTIFIED PARAMETER LIST

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Anna Milliken
Certificate # 128
EPA ID # PA00102

ANALYTE	METHOD	STATUS
1,1,1-Trichloroethane	EPA 502.2	Certified
1,1,1-Trichloroethane	EPA 524.2	Certified
1,1,2-Trichloroethane	EPA 502.2	Certified
1,1,2-Trichloroethane	EPA 524.2	Certified
1,1-Dichloroethylene	EPA 502.2	Certified
1,1-Dichloroethylene	EPA 524.2	Certified
1,2,4-Trichlorobenzene	EPA 502.2	Certified
1,2,4-Trichlorobenzene	EPA 524.2	Certified
1,2-Dichlorobenzene	EPA 502.2	Certified
1,2-Dichlorobenzene	EPA 524.2	Certified
1,2-Dichloroethane	EPA 502.2	Certified
1,2-Dichloroethane	EPA 524.2	Certified
1,2-Dichloropropane	EPA 502.2	Certified
1,2-Dichloropropane	EPA 524.2	Certified
1,4-Dichlorobenzene	EPA 502.2	Certified
1,4-Dichlorobenzene	EPA 524.2	Certified
2,4,5-TP (Silvex)	EPA 515.3	Certified
2,4-D	EPA 515.3	Certified
Alachlor	EPA 507	Certified
Alachlor	EPA 525.2	Certified
Aldicarb	EPA 531.1	Certified
Aldicarb Sulfone	EPA 531.1	Certified
Aldicarb Sulfoxide	EPA 531.1	Certified
Antimony	EPA 200.8	Certified

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Anna Milliken
Certificate # 128
EPA ID # PA00102

ANALYTE	METHOD	STATUS
Arsenic	EPA 200.8	Certified
Atrazine	EPA 507	Certified
Atrazine	EPA 525.2	Certified
Barium	EPA 200.7	Certified
Barium	EPA 200.8	Certified
Benzene	EPA 502.2	Certified
Benzene	EPA 524.2	Certified
Benzo(a)pyrene	EPA 525.2	Certified
Beryllium	EPA 200.7	Certified
Beryllium	EPA 200.8	Certified
Bromodichloromethane	EPA 502.2	Certified
Bromodichloromethane	EPA 524.2	Certified
Bromoform	EPA 502.2	Certified
Bromoform	EPA 524.2	Certified
Cadmium	EPA 200.7	Certified
Cadmium	EPA 200.8	Certified
Carbofuran	EPA 531.1	Certified
Carbon Tetrachloride	EPA 502.2	Certified
Carbon Tetrachloride	EPA 524.2	Certified
Chlordane	EPA 505	Certified
Chlorobenzene	EPA 502.2	Certified
Chlorobenzene	EPA 524.2	Certified
Chlorodibromomethane	EPA 502.2	Certified

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Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Anna Milliken
Certificate # 128
EPA ID # PA00102

ANALYTE	METHOD	STATUS
Chlorodibromomethane	EPA 524.2	Certified
Chloroform	EPA 502.2	Certified
Chloroform	EPA 524.2	Certified
Chromium	EPA 200.7	Certified
Chromium	EPA 200.8	Certified
cis-1,2-Dichloroethene	EPA 502.2	Certified
cis-1,2-Dichloroethene	EPA 524.2	Certified
Copper	EPA 200.7	Certified
Copper	EPA 200.8	Certified
Cyanide	EPA 335.4	Certified
Dalapon	EPA 515.3	Certified
Di(2-ethylhexyl)adipate	EPA 525.2	Certified
Di(2-ethylhexyl)phthalate	EPA 525.2	Certified
Dibromoacetic Acid	EPA 552.2	Certified
Dibromochloropropane (DBCP)	EPA 504.1	Certified
Dichloroacetic Acid	EPA 552.2	Certified
Dichloromethane	EPA 502.2	Certified
Dichloromethane	EPA 524.2	Certified
Dinoseb	EPA 515.3	Certified
Diquat	EPA 549.2	Certified
E. coli	SM 9223	Certified
E. coli (enumeration)	SM 9223	Certified
Endothall	EPA 548.1	Certified
Endrin	EPA 505	Certified

MARYLAND DEPARTMENT OF THE ENVIRONMENT
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Martin O'Malley
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Deputy Secretary

SDWA ANNUAL CERTIFIED PARAMETER LIST

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Anna Milliken
Certificate # 128
EPA ID # PA00102

ANALYTE	METHOD	STATUS
Endrin	EPA 525.2	Certified
Ethylbenzene	EPA 502.2	Certified
Ethylbenzene	EPA 524.2	Certified
Ethylene Dibromide (EDB)	EPA 504.1	Certified
Fluoride	EPA 300.0	Certified
Fluoride	SM 4500 F - C	Certified
Glyphosate	EPA 547	Certified
Heptachlor	EPA 505	Certified
Heptachlor	EPA 525.2	Certified
Heptachlor Epoxide	EPA 505	Certified
Heptachlor Epoxide	EPA 525.2	Certified
Heterotrophic Plate Count	SM9215B	Certified
Hexachlorobenzene	EPA 505	Certified
Hexachlorobenzene	EPA 525.2	Certified
Hexachlorocyclopentadiene	EPA 505	Certified
Hexachlorocyclopentadiene	EPA 525.2	Certified
Lead	EPA 200.8	Certified
Lindane	EPA 505	Certified
Lindane	EPA 525.2	Certified
Mercury	EPA 200.8	Certified
Mercury	EPA 245.1	Certified
Methoxychlor	EPA 505	Certified
Methoxychlor	EPA 525.2	Certified
Monobromoacetic Acid	EPA 552.2	Certified

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Analytical Laboratory Services, Inc.
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Middletown, PA 17057

Anna Milliken
Certificate # 128
EPA ID # PA00102

ANALYTE	METHOD	STATUS
Monochloroacetic Acid	EPA 552.2	Certified
Nitrate	EPA 300.0	Certified
Nitrate	EPA 353.2	Certified
Nitrite	EPA 300.0	Certified
Nitrite	SM 4500 NO_2 – B	Certified
Oxamyl (Vydate)	EPA 531.1	Certified
PCBs	EPA 508	Certified
PCBs	EPA 508A	Certified
Pentachlorophenol	EPA 515.3	Certified
Picloram	EPA 515.3	Certified
Selenium	EPA 200.8	Certified
Simazine	EPA 507	Certified
Simazine	EPA 525.2	Certified
Styrene	EPA 502.2	Certified
Styrene	EPA 524.2	Certified
Tetrachloroethylene	EPA 502.2	Certified
Tetrachloroethylene	EPA 524.2	Certified
Thallium	EPA 200.8	Certified
Toluene	EPA 502.2	Certified
Toluene	EPA 524.2	Certified
Total Coliforms	SM 9223	Certified
Total Trihalomethanes	EPA 502.2	Certified
Total Trihalomethanes	EPA 524.2	Certified
Toxaphene	EPA 505	Certified

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Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Anna Milliken
Certificate # 128
EPA ID # PA00102

ANALYTE	METHOD	STATUS
trans-1,2-Dichloroethene	EPA 502.2	Certified
trans-1,2-Dichloroethene	EPA 524.2	Certified
Trichloroacetic Acid	EPA 552.2	Certified
Trichloroethylene	EPA 502.2	Certified
Trichloroethylene	EPA 524.2	Certified
Vinyl Chloride	EPA 502.2	Certified
Vinyl Chloride	EPA 524.2	Certified
(total) Xylenes	EPA 502.2	Certified
(total) Xylenes	EPA 524.2	Certified

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

OFFICE OF FIELD OPERATIONS
BUREAU OF LABORATORIES

Certifies that

22-00293
ANALYTICAL LABORATORY SERVICES, INC.
34 DOGWOOD LANE
MIDDLETOWN, PA 17057

Having duly met the requirement of
The Act of June 29, 2002 (P.L. 596, No. 90)
dealing with Environmental Laboratory Accreditation
(27 Pa. C.S. §§4101-4113) and the
National Environmental Laboratory Accreditation Conference Standard

is hereby approved as an

Accredited Laboratory

As more fully described in the attached Scope of Accreditation

Expiration Date: **1/31/2010**
Certificate Number: **007**

Continued accreditation status depends on successful ongoing participation in the Program

Certificate not transferable Surrender upon revocation
To Be Conspicuously Displayed at the Laboratory
Not valid unless accompanied by a valid Scope of Accreditation
Shall not be used to imply endorsement by the Commonwealth of Pennsylvania
Customers are urged to verify the laboratory's current accreditation status
PA DEP is a NELAP recognized accrediting authority

Aaren Alger

Aaren S. Alger, Chief
Laboratory Accreditation Program
Bureau of Laboratories

1500-FM-LAB0016 Rev. 10/2007

Pennsylvania Department of Environmental Protection

P. O. Box 1467
Harrisburg, PA 17105-1467
January 22, 2009

Bureau of Laboratories

Phone: 717-346-7200
Fax: 717-346-8590

Anna Milliken
Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Re: Lab ID No. 22-00293

Dear Laboratory Director:

Enclosed is your new Certificate of Accreditation to operate as a Pennsylvania Accredited Laboratory. This Certificate of Accreditation expires **1/31/2010** unless suspended or revoked earlier.

Your laboratory identification number is 22-00293. Please use this number on all correspondence with the PA Department of Environmental Protection (Department).

Your laboratory is accredited to perform only the analyses by the methods listed on the Scope of Accreditation that accompanies the Certificate of Accreditation. The Certificate of Accreditation remains the property of the Department and must be displayed in the laboratory.

Please note this certification must be renewed annually. Renewal applications must be submitted to the Department *no later than 60 days prior to the expiration of the certification.* Failure to submit a renewal application within this time period may result in a lapse of the laboratory's accreditation. Should this occur, the laboratory may not conduct any further analyses for which accreditation is required and, if the laboratory is accredited to perform analyses on drinking water, the laboratory must notify the public water suppliers served by the laboratory of the laboratory's failure to renew its certificate of accreditation. Copies of the renewal application may be found on the Department's web site (www.depweb.state.pa.us/labs).

If you have any questions concerning your certificate, you may contact the Laboratory Accreditation Program at the address, phone number or fax number listed above.

Sincerely,

Aaren Alger

Aaren S. Alger, Chief
Laboratory Accreditation Program

Enclosure

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Drinking Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 150.1	pH	NELAP	PA	1/24/2001
EPA 200.7	Aluminum	NELAP	PA	1/19/2005
EPA 200.7	Barium	NELAP	PA	1/24/2001
EPA 200.7	Beryllium	NELAP	PA	1/24/2001
EPA 200.7	Boron	NELAP	PA	12/1/2006
EPA 200.7	Cadmium	NELAP	PA	1/24/2001
EPA 200.7	Calcium	NELAP	PA	2/15/2005
EPA 200.7	Chromium	NELAP	PA	1/24/2001
EPA 200.7	Cobalt	NELAP	PA	12/1/2006
EPA 200.7	Copper	NELAP	PA	1/24/2001
EPA 200.7	Iron	NELAP	PA	1/19/2005
EPA 200.7	Magnesium	NELAP	PA	1/19/2005
EPA 200.7	Manganese	NELAP	PA	1/19/2005
EPA 200.7	Molybdenum	NELAP	PA	12/1/2006
EPA 200.7	Nickel	NELAP	PA	1/24/2001
EPA 200.7	Potassium	NELAP	PA	5/18/2006
EPA 200.7	Silicon	NELAP	PA	11/2/2005
EPA 200.7	Silver	NELAP	PA	1/24/2001
EPA 200.7	Sodium	NELAP	PA	1/24/2001
EPA 200.7	Tin	NELAP	PA	12/1/2006
EPA 200.7	Titanium	NELAP	PA	12/1/2006
EPA 200.7	Vanadium	NELAP	PA	12/1/2006
EPA 200.7	Zinc	NELAP	PA	1/19/2005
EPA 200.7	Calcium hardness as CaCO3	NELAP	PA	5/13/2008
EPA 200.7	Total hardness as CaCO3	NELAP	PA	12/1/2006
EPA 200.8	Aluminum	NELAP	PA	4/5/2006
EPA 200.8	Antimony	NELAP	PA	12/19/2002
EPA 200.8	Arsenic	NELAP	PA	1/24/2001
EPA 200.8	Barium	NELAP	PA	1/24/2001
EPA 200.8	Beryllium	NELAP	PA	1/24/2001
EPA 200.8	Cadmium	NELAP	PA	1/24/2001
EPA 200.8	Chromium	NELAP	PA	1/24/2001
EPA 200.8	Copper	NELAP	PA	10/31/2002
EPA 200.8	Lead	NELAP	PA	10/31/2002
EPA 200.8	Manganese	NELAP	PA	1/19/2005
EPA 200.8	Mercury	NELAP	PA	4/19/2007

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Drinking Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 200.8	Molybdenum	NELAP	PA	12/1/2006
EPA 200.8	Nickel	NELAP	PA	1/24/2001
EPA 200.8	Selenium	NELAP	PA	1/24/2001
EPA 200.8	Silver	NELAP	PA	1/24/2001
EPA 200.8	Thallium	NELAP	PA	1/24/2001
EPA 200.8	Vanadium	NELAP	PA	12/1/2006
EPA 200.8	Zinc	NELAP	PA	1/19/2005
EPA 245.1	Mercury	NELAP	PA	1/24/2001
EPA 300.0	Bromide	NELAP	PA	10/2/2003
EPA 300.0	Chloride	NELAP	PA	10/2/2003
EPA 300.0	Fluoride	NELAP	PA	1/24/2001
EPA 300.0	Nitrate	NELAP	PA	1/24/2001
EPA 300.0	Nitrite	NELAP	PA	1/24/2001
EPA 300.0	Sulfate	NELAP	PA	1/24/2001
EPA 300.1	Bromate	NELAP	PA	10/31/2002
EPA 300.1	Bromide	NELAP	PA	5/13/2008
EPA 300.1	Chlorite	NELAP	PA	10/31/2002
EPA 314.0	Perchlorate	NELAP	PA	11/2/2005
EPA 335.1	Amenable cyanide	NELAP	PA	3/9/2007
EPA 335.4	Cyanide	NELAP	PA	1/24/2001
EPA 353.2	Nitrate as N	NELAP	PA	5/13/2008
EPA 353.2	Total nitrate-nitrite	NELAP	PA	12/1/2006
EPA 376.1	Sulfide	NELAP	PA	10/10/2006
EPA 502.2	1 1 1 2-Tetrachloroethane	NELAP	PA	1/24/2001
EPA 502.2	1 1 1-Trichloroethane	NELAP	PA	1/24/2001
EPA 502.2	1 1 2 2-Tetrachloroethane	NELAP	PA	1/24/2001
EPA 502.2	1 1 2-Trichloroethane	NELAP	PA	1/24/2001
EPA 502.2	1 1-Dichloroethane	NELAP	PA	1/24/2001
EPA 502.2	1 1-Dichloroethene (1 1-Dichloroethylene)	NELAP	PA	1/24/2001
EPA 502.2	1 1-Dichloropropene	NELAP	PA	1/24/2001
EPA 502.2	1 2 3-Trichlorobenzene	NELAP	PA	1/19/2005
EPA 502.2	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	1/24/2001
EPA 502.2	1 2 4-Trichlorobenzene	NELAP	PA	1/24/2001
EPA 502.2	1 2 4-Trimethylbenzene	NELAP	PA	1/5/2006
EPA 502.2	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	1/24/2001
EPA 502.2	1 2-Dichloroethane	NELAP	PA	1/24/2001

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Drinking Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 502.2	1 2-Dichloropropane	NELAP	PA	1/24/2001
EPA 502.2	1 3 5-Trimethylbenzene	NELAP	PA	1/5/2006
EPA 502.2	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	1/24/2001
EPA 502.2	1 3-Dichloropropane	NELAP	PA	1/24/2001
EPA 502.2	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	1/24/2001
EPA 502.2	2 2-Dichloropropane	NELAP	PA	1/24/2001
EPA 502.2	2-Chlorotoluene	NELAP	PA	1/24/2001
EPA 502.2	4-Chlorotoluene	NELAP	PA	1/24/2001
EPA 502.2	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	1/5/2006
EPA 502.2	Benzene	NELAP	PA	1/24/2001
EPA 502.2	Bromobenzene	NELAP	PA	1/24/2001
EPA 502.2	Bromochloromethane	NELAP	PA	1/19/2005
EPA 502.2	Carbon tetrachloride	NELAP	PA	1/24/2001
EPA 502.2	Chlorobenzene	NELAP	PA	1/24/2001
EPA 502.2	Chloroethane	NELAP	PA	1/24/2001
EPA 502.2	Dibromomethane	NELAP	PA	1/24/2001
EPA 502.2	Dichlorodifluoromethane (Freon-12)	NELAP	PA	1/19/2005
EPA 502.2	Dichloromethane (DCM Methylene chloride)	NELAP	PA	1/24/2001
EPA 502.2	Ethylbenzene	NELAP	PA	1/24/2001
EPA 502.2	Hexachlorobutadiene	NELAP	PA	1/19/2005
EPA 502.2	Isopropylbenzene	NELAP	PA	1/19/2005
EPA 502.2	Methyl bromide (Bromomethane)	NELAP	PA	1/24/2001
EPA 502.2	Methyl chloride (Chloromethane)	NELAP	PA	1/24/2001
EPA 502.2	Methyl tert-butyl ether (MTBE)	NELAP	PA	1/19/2005
EPA 502.2	Naphthalene	NELAP	PA	1/19/2005
EPA 502.2	Styrene	NELAP	PA	1/24/2001
EPA 502.2	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	1/24/2001
EPA 502.2	Toluene	NELAP	PA	1/24/2001
EPA 502.2	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	1/24/2001
EPA 502.2	Trichlorofluoromethane (Freon-11)	NELAP	PA	2/15/2005
EPA 502.2	Trichlorotrifluoroethane (Freon-113)	NELAP	PA	1/5/2006
EPA 502.2	Vinyl chloride	NELAP	PA	1/24/2001
EPA 502.2	Xylene (total)	NELAP	PA	1/24/2001
EPA 502.2	cis-1 2-Dichloroethene	NELAP	PA	1/24/2001
EPA 502.2	cis-1 3-Dichloropropene	NELAP	PA	1/24/2001
EPA 502.2	m+p-Xylene	NELAP	PA	12/1/2006

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Drinking Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 502.2	n-Butylbenzene	NELAP	PA	1/19/2005
EPA 502.2	n-Propylbenzene	NELAP	PA	1/19/2005
EPA 502.2	o-Xylene	NELAP	PA	12/1/2006
EPA 502.2	sec-Butylbenzene	NELAP	PA	2/15/2005
EPA 502.2	tert-Butylbenzene	NELAP	PA	2/15/2005
EPA 502.2	trans-1 2-Dichloroethene	NELAP	PA	1/24/2001
EPA 502.2	trans-1 3-Dichloropropene	NELAP	PA	1/19/2005
EPA 504.1	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	1/19/2005
EPA 504.1	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	1/24/2001
EPA 504.1	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	1/24/2001
EPA 505	Hexachlorobenzene	NELAP	PA	1/24/2001
EPA 505	Hexachlorocyclopentadiene	NELAP	PA	1/24/2001
EPA 505	Aldrin (HHDN)	NELAP	PA	1/24/2001
EPA 505	Chlordane (tech.)	NELAP	PA	1/24/2001
EPA 505	Dieldrin	NELAP	PA	1/24/2001
EPA 505	Endrin	NELAP	PA	1/24/2001
EPA 505	Heptachlor	NELAP	PA	1/24/2001
EPA 505	Heptachlor epoxide	NELAP	PA	1/24/2001
EPA 505	Methoxychlor	NELAP	PA	1/24/2001
EPA 505	Toxaphene (Chlorinated camphene)	NELAP	PA	1/24/2001
EPA 505	alpha-Chlordane	NELAP	PA	12/1/2006
EPA 505	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	1/24/2001
EPA 505	gamma-Chlordane	NELAP	PA	12/1/2006
EPA 507	Alachlor (Lasso)	NELAP	PA	1/24/2001
EPA 507	Atrazine	NELAP	PA	1/24/2001
EPA 507	Bromacil	NELAP	PA	11/2/2005
EPA 507	Butachlor	NELAP	PA	10/10/2003
EPA 507	Metolachlor	NELAP	PA	10/10/2003
EPA 507	Metribuzin	NELAP	PA	10/10/2003
EPA 507	Molinate	NELAP	PA	1/19/2005
EPA 507	Prometon (Pramitol)	NELAP	PA	11/2/2005
EPA 507	Simazine	NELAP	PA	1/24/2001
EPA 507	Acetochlor	NELAP	PA	1/19/2005
EPA 507-Extended	Chloropyrofos (Lorsban)	NELAP	PA	11/2/2005
EPA 507-Extended	Cyanazine (Bladex)	NELAP	PA	11/2/2005
EPA 507-Extended	Pendimethalin (Penoxalin)	NELAP	PA	11/2/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Drinking Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 507-Extended	Propachlor (Ramrod)	NELAP	PA	12/1/2006
EPA 508	Aroclor-1016 (PCB-1016)	NELAP	PA	12/1/2006
EPA 508	Aroclor-1221 (PCB-1221)	NELAP	PA	12/1/2006
EPA 508	Aroclor-1232 (PCB-1232)	NELAP	PA	12/1/2006
EPA 508	Aroclor-1242 (PCB-1242)	NELAP	PA	12/1/2006
EPA 508	Aroclor-1248 (PCB-1248)	NELAP	PA	12/1/2006
EPA 508	Aroclor-1254 (PCB-1254)	NELAP	PA	12/1/2006
EPA 508	Aroclor-1260 (PCB-1260)	NELAP	PA	12/1/2006
EPA 508	PCBs total as decachlorobiphenyl	NELAP	PA	11/2/2005
EPA 508A	Decachlorobiphenyl	NELAP	PA	1/24/2001
EPA 515.3	Pentachlorophenol (PCP)	NELAP	PA	9/21/2001
EPA 515.3	2 4 5-T	NELAP	PA	4/5/2006
EPA 515.3	2 4 5-TP (Silvex)	NELAP	PA	9/21/2001
EPA 515.3	2 4-D	NELAP	PA	9/21/2001
EPA 515.3	2 4-DB (Butoxon)	NELAP	PA	4/5/2006
EPA 515.3	Acifluorfen	NELAP	PA	1/19/2005
EPA 515.3	Bentazon (Basagran)	NELAP	PA	11/2/2005
EPA 515.3	Chloramben	NELAP	PA	11/2/2005
EPA 515.3	Dacthal (DCPA)	NELAP	PA	11/2/2005
EPA 515.3	Dalapon	NELAP	PA	9/21/2001
EPA 515.3	Dicamba	NELAP	PA	9/21/2001
EPA 515.3	Dichloroprop (Dichlorprop)	NELAP	PA	11/2/2005
EPA 515.3	Dinoseb (2-sec-butyl-4 6-dinitrophenol DNBP)	NELAP	PA	9/21/2001
EPA 515.3	Picloram	NELAP	PA	9/21/2001
EPA 524.2	1 1 1 2-Tetrachloroethane	NELAP	PA	1/24/2001
EPA 524.2	1 1 1-Trichloroethane	NELAP	PA	1/24/2001
EPA 524.2	1 1 2 2-Tetrachloroethane	NELAP	PA	1/24/2001
EPA 524.2	1 1 2-Trichloroethane	NELAP	PA	1/24/2001
EPA 524.2	1 1-Dichloroethane	NELAP	PA	1/24/2001
EPA 524.2	1 1-Dichloroethene (1 1-Dichloroethylene)	NELAP	PA	1/24/2001
EPA 524.2	1 1-Dichloropropene	NELAP	PA	1/24/2001
EPA 524.2	1 2 3-Trichlorobenzene	NELAP	PA	1/19/2005
EPA 524.2	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	11/20/2006
EPA 524.2	1 2 4-Trichlorobenzene	NELAP	PA	1/24/2001
EPA 524.2	1 2 4-Trimethylbenzene	NELAP	PA	1/19/2005
EPA 524.2	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	1/24/2001

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Drinking Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 524.2	1 2-Dichloroethane	NELAP	PA	1/24/2001
EPA 524.2	1 2-Dichloropropane	NELAP	PA	1/24/2001
EPA 524.2	1 3 5-Trimethylbenzene	NELAP	PA	1/19/2005
EPA 524.2	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	1/24/2001
EPA 524.2	1 3-Dichloropropane	NELAP	PA	1/24/2001
EPA 524.2	1 3-Dichloropropene	NELAP	PA	1/19/2005
EPA 524.2	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	1/24/2001
EPA 524.2	1-Chlorobutane	NELAP	PA	10/13/2005
EPA 524.2	2 2-Dichloropropane	NELAP	PA	1/24/2001
EPA 524.2	2-Butanone (Methyl ethyl ketone) (MEK)	NELAP	PA	10/13/2005
EPA 524.2	2-Chlorotoluene	NELAP	PA	1/24/2001
EPA 524.2	2-Hexanone	NELAP	PA	10/13/2005
EPA 524.2	2-Nitropropane	NELAP	PA	10/13/2005
EPA 524.2	4-Chlorotoluene	NELAP	PA	1/24/2001
EPA 524.2	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	1/19/2005
EPA 524.2	4-Methyl-2-pentanone (MIBK)	NELAP	PA	10/13/2005
EPA 524.2	Acetone	NELAP	PA	10/13/2005
EPA 524.2	Acrylonitrile	NELAP	PA	10/13/2005
EPA 524.2	Allyl chloride (3-Chloropropene)	NELAP	PA	10/13/2005
EPA 524.2	Benzene	NELAP	PA	1/24/2001
EPA 524.2	Bromobenzene	NELAP	PA	1/24/2001
EPA 524.2	Bromochloromethane	NELAP	PA	1/19/2005
EPA 524.2	Bromodichloromethane	NELAP	PA	1/24/2001
EPA 524.2	Bromoform	NELAP	PA	1/24/2001
EPA 524.2	Carbon disulfide	NELAP	PA	10/13/2005
EPA 524.2	Carbon tetrachloride	NELAP	PA	1/24/2001
EPA 524.2	Chloroacetonitrile	NELAP	PA	10/13/2005
EPA 524.2	Chlorobenzene	NELAP	PA	1/24/2001
EPA 524.2	Chloroethane	NELAP	PA	1/24/2001
EPA 524.2	Chloroform	NELAP	PA	1/24/2001
EPA 524.2	Dibromochloromethane	NELAP	PA	1/24/2001
EPA 524.2	Dibromomethane	NELAP	PA	1/24/2001
EPA 524.2	Dichlorodifluoromethane (Freon-12)	NELAP	PA	1/19/2005
EPA 524.2	Dichloromethane (DCM Methylene chloride)	NELAP	PA	1/24/2001
EPA 524.2	Diethyl ether	NELAP	PA	10/13/2005
EPA 524.2	Ethyl methacrylate	NELAP	PA	10/13/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Drinking Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 524.2	Ethylbenzene	NELAP	PA	1/24/2001
EPA 524.2	Hexachlorobutadiene	NELAP	PA	1/19/2005
EPA 524.2	Hexachloroethane	NELAP	PA	10/13/2005
EPA 524.2	Iodomethane (Methyl iodide)	NELAP	PA	10/13/2005
EPA 524.2	Isopropylbenzene	NELAP	PA	10/13/2005
EPA 524.2	Methacrylonitrile	NELAP	PA	10/13/2005
EPA 524.2	Methyl bromide (Bromomethane)	NELAP	PA	1/24/2001
EPA 524.2	Methyl chloride (Chloromethane)	NELAP	PA	1/24/2001
EPA 524.2	Methyl tert-butyl ether (MTBE)	NELAP	PA	1/19/2005
EPA 524.2	Methylacrylate	NELAP	PA	10/13/2005
EPA 524.2	Methylmethacrylate	NELAP	PA	10/13/2005
EPA 524.2	Naphthalene	NELAP	PA	1/19/2005
EPA 524.2	Nitrobenzene	NELAP	PA	1/19/2005
EPA 524.2	Pentachloroethane	NELAP	PA	10/13/2005
EPA 524.2	Propionitrile (Ethyl cyanide)	NELAP	PA	10/13/2005
EPA 524.2	Styrene	NELAP	PA	1/24/2001
EPA 524.2	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	1/24/2001
EPA 524.2	Tetrahydrofuran (THF)	NELAP	PA	10/13/2005
EPA 524.2	Toluene	NELAP	PA	1/24/2001
EPA 524.2	Total trihalomethanes (TTHMs)	NELAP	PA	1/24/2001
EPA 524.2	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	1/24/2001
EPA 524.2	Trichlorofluoromethane (Freon-11)	NELAP	PA	2/15/2005
EPA 524.2	Vinyl chloride	NELAP	PA	1/24/2001
EPA 524.2	Xylene (total)	NELAP	PA	1/24/2001
EPA 524.2	cis-1 2-Dichloroethene	NELAP	PA	1/24/2001
EPA 524.2	cis-1 3-Dichloropropene	NELAP	PA	1/24/2001
EPA 524.2	n-Butylbenzene	NELAP	PA	1/19/2005
EPA 524.2	n-Propylbenzene	NELAP	PA	1/19/2005
EPA 524.2	sec-Butylbenzene	NELAP	PA	1/19/2005
EPA 524.2	tert-Butylbenzene	NELAP	PA	1/19/2005
EPA 524.2	trans-1 2-Dichloroethene	NELAP	PA	1/24/2001
EPA 524.2	trans-1 3-Dichloropropene	NELAP	PA	1/24/2001
EPA 524.2	trans-1 4-Dichloro-2-butene	NELAP	PA	10/13/2005
EPA 524.2-Extended	Hexachlorobenzene	NELAP	PA	12/1/2006
EPA 524.2-Extended	1 1-Dichloro-2-propanone (1 1-Dichloropropanone)	NELAP	PA	11/2/2005
EPA 524.2-Extended	1 4-Dioxane (1 4-Diethyleneoxide)	NELAP	PA	3/9/2007

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Drinking Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 524.2-Extended	m+p-Xylene	NELAP	PA	12/1/2006
EPA 524.2-Extended	o-Xylene	NELAP	PA	12/1/2006
EPA 524.2-Extended	tert-Amyl methyl ether (TAME)	NELAP	PA	12/11/2008
EPA 524.2-Extended	tert-Butyl alcohol (2-Methyl-2-propanol)	NELAP	PA	1/19/2005
EPA 525.2	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	10/13/2005
EPA 525.2	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	10/13/2005
EPA 525.2	Acenaphthylene	NELAP	PA	12/1/2006
EPA 525.2	Anthracene	NELAP	PA	12/1/2006
EPA 525.2	Benzo(a)anthracene	NELAP	PA	12/1/2006
EPA 525.2	Benzo(a)pyrene	NELAP	PA	1/24/2001
EPA 525.2	Benzo(b)fluoranthene	NELAP	PA	12/1/2006
EPA 525.2	Benzo(g h i)perylene	NELAP	PA	12/1/2006
EPA 525.2	Benzo(k)fluoranthene	NELAP	PA	12/1/2006
EPA 525.2	Butyl benzyl phthalate (Benzyl butyl phthalate)	NELAP	PA	12/1/2006
EPA 525.2	Chrysene	NELAP	PA	12/1/2006
EPA 525.2	Di-n-butyl phthalate	NELAP	PA	12/1/2006
EPA 525.2	Dibenzo(a h)anthracene	NELAP	PA	12/1/2006
EPA 525.2	Diethyl phthalate	NELAP	PA	12/1/2006
EPA 525.2	Dimethyl phthalate	NELAP	PA	12/1/2006
EPA 525.2	Fluorene	NELAP	PA	12/1/2006
EPA 525.2	Hexachlorobenzene	NELAP	PA	1/24/2001
EPA 525.2	Hexachlorocyclopentadiene	NELAP	PA	1/24/2001
EPA 525.2	Indeno(1 2 3-cd)pyrene	NELAP	PA	12/1/2006
EPA 525.2	Pentachlorophenol (PCP)	NELAP	PA	12/1/2006
EPA 525.2	Phenanthrene	NELAP	PA	12/1/2006
EPA 525.2	Pyrene	NELAP	PA	12/1/2006
EPA 525.2	bis(2-Ethylhexyl) adipate (di(2-Ethylhexyl) adipate)	NELAP	PA	1/24/2001
EPA 525.2	bis(2-Ethylhexyl) phthalate (DEHP)	NELAP	PA	1/24/2001
EPA 525.2	4 4'-DDE	NELAP	PA	10/13/2005
EPA 525.2	Alachlor (Lasso)	NELAP	PA	1/24/2001
EPA 525.2	Aldrin (HHDN)	NELAP	PA	1/24/2001
EPA 525.2	Atrazine	NELAP	PA	1/24/2001
EPA 525.2	Butachlor	NELAP	PA	7/23/2002
EPA 525.2	Chlorpyrifos	NELAP	PA	12/1/2006
EPA 525.2	Chlorthalonil (Daconil)	NELAP	PA	12/1/2006
EPA 525.2	Diazinon (Spectracide)	NELAP	PA	12/1/2006

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Drinking Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 525.2	Dieldrin	NELAP	PA	1/31/2002
EPA 525.2	EPTC (Eptam s-Ethyl-dipropyl thio carbamate)	NELAP	PA	10/13/2005
EPA 525.2	Endrin	NELAP	PA	1/31/2002
EPA 525.2	Heptachlor	NELAP	PA	1/24/2001
EPA 525.2	Heptachlor epoxide	NELAP	PA	1/24/2001
EPA 525.2	Methoxychlor	NELAP	PA	7/23/2002
EPA 525.2	Metolachlor	NELAP	PA	1/24/2001
EPA 525.2	Metribuzin	NELAP	PA	10/31/2002
EPA 525.2	Molinate	NELAP	PA	10/13/2005
EPA 525.2	Prometon (Pramitol)	NELAP	PA	12/1/2006
EPA 525.2	Propachlor (Ramrod)	NELAP	PA	1/24/2001
EPA 525.2	Simazine	NELAP	PA	1/24/2001
EPA 525.2	Terbacil	NELAP	PA	10/13/2005
EPA 525.2	Trifluralin (Treflan)	NELAP	PA	10/13/2005
EPA 525.2	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	1/24/2001
EPA 525.2	Acetochlor	NELAP	PA	10/13/2005
EPA 525.2-Extended	2 4 5-Trichlorophenol	NELAP	PA	9/27/2007
EPA 525.2-Extended	2-Methylnaphthalene	NELAP	PA	12/1/2006
EPA 525.2-Extended	Acenaphthene	NELAP	PA	12/1/2006
EPA 525.2-Extended	Dibenzofuran	NELAP	PA	12/1/2006
EPA 525.2-Extended	Fluoranthene	NELAP	PA	12/1/2006
EPA 525.2-Extended	Dimethoate	NELAP	PA	12/1/2006
EPA 525.2-Extended	Naphthalene	NELAP	PA	12/1/2006
EPA 531.1	3-Hydroxycarbofuran	NELAP	PA	7/22/2002
EPA 531.1	Aldicarb (Temik)	NELAP	PA	1/24/2001
EPA 531.1	Aldicarb sulfone	NELAP	PA	1/24/2001
EPA 531.1	Aldicarb sulfoxide	NELAP	PA	1/24/2001
EPA 531.1	Carbaryl (Sevin)	NELAP	PA	1/24/2001
EPA 531.1	Carbofuran (Furaden)	NELAP	PA	1/24/2001
EPA 531.1	Methiocarb (Mesurol)	NELAP	PA	12/1/2006
EPA 531.1	Methomyl (Lannate)	NELAP	PA	1/24/2001
EPA 531.1	Oxamyl (Vydate)	NELAP	PA	1/24/2001
EPA 531.1	Propoxur (Baygon)	NELAP	PA	12/1/2006
EPA 547	Glyphosate	NELAP	PA	4/22/2004
EPA 548.1	Endothall	NELAP	PA	3/15/2002
EPA 549.2	Diquat	NELAP	PA	2/25/2003

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Drinking Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 549.2	Paraquat	NELAP	PA	12/1/2006
EPA 552.2	Bromoacetic acid (Monobromoacetic acid MBAA)	NELAP	PA	9/21/2001
EPA 552.2	Bromochloroacetic acid (BCAA)	NELAP	PA	1/19/2005
EPA 552.2	Chloroacetic acid (Monochloroacetic acid MCAA)	NELAP	PA	9/21/2001
EPA 552.2	Dibromoacetic acid (DBAA)	NELAP	PA	9/21/2001
EPA 552.2	Dichloroacetic acid (DCAA)	NELAP	PA	9/21/2001
EPA 552.2	Total haloacetic acids	NELAP	PA	9/21/2001
EPA 552.2	Trichloroacetic acid (TCAA)	NELAP	PA	9/21/2001
EPA 9050	Conductivity	NELAP	PA	7/27/2006
RSK-175	Ethane	NELAP	PA	1/21/2009
RSK-175	Ethene	NELAP	PA	1/21/2009
RSK-175	Methane	NELAP	PA	1/21/2009
SM 203	Langlier index	NELAP	PA	12/1/2006
SM 2120 B	Color	NELAP	PA	11/2/2005
SM 2130 B	Turbidity	NELAP	PA	1/19/2005
SM 2150 B	Odor	NELAP	PA	11/2/2005
SM 2310 B	Acidity as CaCO3	NELAP	PA	12/1/2006
SM 2320 B	Alkalinity as CaCO3	NELAP	PA	1/24/2001
SM 2340 B	Hardness	NELAP	PA	4/5/2006
SM 2340 C	Hardness	NELAP	PA	10/19/2007
SM 2510 B	Conductivity	NELAP	PA	1/19/2005
SM 2540 B	Residue-total	NELAP	PA	12/1/2006
SM 2540 C	Total dissolved solids (TDS)	NELAP	PA	1/24/2001
SM 4500-CN- G	Amenable cyanide	NELAP	PA	10/31/2002
SM 4500-CN- I	Weak acid dissociable cyanide	NELAP	PA	9/8/2008
SM 4500-Cl G	Total residual chlorine	NELAP	PA	12/1/2006
SM 4500-F- C	Fluoride	NELAP	PA	12/19/2002
SM 4500-H+ B	pH	NELAP	PA	4/5/2006
SM 4500-NH3 D	Ammonia as N	NELAP	PA	4/5/2006
SM 4500-NH3 G	Ammonia as N	NELAP	PA	4/5/2006
SM 4500-NO2- B	Nitrite	NELAP	PA	1/24/2001
SM 4500-P E	Orthophosphate as P	NELAP	PA	11/2/2005
SM 5310 B	Dissolved organic carbon (DOC)	NELAP	PA	2/25/2003
SM 5310 B	Total organic carbon (TOC)	NELAP	PA	4/5/2002
SM 5540 C	Surfactants - MBAS	NELAP	PA	11/2/2005
SM 5910 B	UV 254	NELAP	PA	2/25/2003

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Drinking Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
SM 9215 B	Heterotrophic plate count	NELAP	PA	11/2/2005
SM 9223 B	E. coli (Enumeration)	NELAP	PA	2/12/2007
SM 9223 B	Escherichia coli	NELAP	PA	1/24/2001
SM 9223 B	Total coliforms	NELAP	PA	1/24/2001
SM 9230 C	Enterococci	NELAP	PA	3/9/2007
SM 9230 C	Fecal streptococci	NELAP	PA	3/9/2007

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Non-Potable Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
ASTM D3695	Ethanol	NELAP	PA	4/5/2006
ASTM D3695	Ethyl acetate	NELAP	PA	4/5/2006
ASTM D3695	Isopropyl acetate	NELAP	PA	4/5/2006
ASTM D3695	Methanol	NELAP	PA	4/5/2006
ASTM D3695	n-Amyl acetate (n-Pentyl acetate)	NELAP	PA	4/5/2006
ASTM D3695	n-Butyl acetate	NELAP	PA	4/5/2006
ASTM D6919-03	Ammonia as N	NELAP	PA	11/7/2007
ASTM D6919-03	Ammonium ion	NELAP	PA	10/20/2008
CLAM TROL CT-1	CT-1	NELAP	PA	12/11/2008
EPA 1010	Ignitability	NELAP	PA	1/6/2006
EPA 1030	Ignitability	NELAP	PA	1/6/2006
EPA 120.1	Conductivity	NELAP	PA	2/15/2005
EPA 1311	Toxicity characteristic leaching procedure (TCLP)	NELAP	PA	1/6/2006
EPA 150.1	pH	NELAP	PA	11/2/2005
EPA 160.1	Residue-filterable (TDS)	NELAP	PA	11/2/2005
EPA 160.2	Residue-nonfilterable (TSS)	NELAP	PA	11/2/2005
EPA 160.3	Residue-total	NELAP	PA	11/2/2005
EPA 160.4	Residue-volatile	NELAP	PA	2/15/2005
EPA 160.5	Residue-settleable	NELAP	PA	4/5/2006
EPA 1664 Rev A	Oil and Grease	NELAP	PA	2/15/2005
EPA 1664 Rev A	Total petroleum hydrocarbons (TPH)	NELAP	PA	2/15/2005
EPA 170.1	Temperature deg. C	NELAP	PA	2/15/2005
EPA 200.7	Aluminum	NELAP	PA	2/15/2005
EPA 200.7	Antimony	NELAP	PA	2/15/2005
EPA 200.7	Arsenic	NELAP	PA	2/15/2005
EPA 200.7	Barium	NELAP	PA	2/15/2005
EPA 200.7	Beryllium	NELAP	PA	2/15/2005
EPA 200.7	Boron	NELAP	PA	2/15/2005
EPA 200.7	Cadmium	NELAP	PA	2/15/2005
EPA 200.7	Calcium	NELAP	PA	2/15/2005
EPA 200.7	Chromium	NELAP	PA	2/15/2005
EPA 200.7	Cobalt	NELAP	PA	2/15/2005
EPA 200.7	Copper	NELAP	PA	2/15/2005
EPA 200.7	Iron	NELAP	PA	2/15/2005
EPA 200.7	Lead	NELAP	PA	2/15/2005
EPA 200.7	Magnesium	NELAP	PA	2/15/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 200.7	Manganese	NELAP	PA	2/15/2005
EPA 200.7	Molybdenum	NELAP	PA	2/15/2005
EPA 200.7	Nickel	NELAP	PA	2/15/2005
EPA 200.7	Potassium	NELAP	PA	2/15/2005
EPA 200.7	Selenium	NELAP	PA	2/15/2005
EPA 200.7	Silver	NELAP	PA	2/15/2005
EPA 200.7	Sodium	NELAP	PA	2/15/2005
EPA 200.7	Thallium	NELAP	PA	2/15/2005
EPA 200.7	Tin	NELAP	PA	2/15/2005
EPA 200.7	Titanium	NELAP	PA	10/13/2005
EPA 200.7	Vanadium	NELAP	PA	2/15/2005
EPA 200.7	Zinc	NELAP	PA	2/15/2005
EPA 200.7	Total hardness as CaCO3	NELAP	PA	2/15/2005
EPA 200.7-Extended	Strontium	NELAP	PA	6/16/2006
EPA 200.8	Aluminum	NELAP	PA	2/15/2005
EPA 200.8	Antimony	NELAP	PA	2/15/2005
EPA 200.8	Arsenic	NELAP	PA	2/15/2005
EPA 200.8	Barium	NELAP	PA	2/15/2005
EPA 200.8	Beryllium	NELAP	PA	2/15/2005
EPA 200.8	Cadmium	NELAP	PA	2/15/2005
EPA 200.8	Chromium	NELAP	PA	2/15/2005
EPA 200.8	Cobalt	NELAP	PA	2/15/2005
EPA 200.8	Copper	NELAP	PA	2/15/2005
EPA 200.8	Lead	NELAP	PA	2/15/2005
EPA 200.8	Manganese	NELAP	PA	2/15/2005
EPA 200.8	Mercury	NELAP	PA	3/6/2008
EPA 200.8	Molybdenum	NELAP	PA	2/15/2005
EPA 200.8	Nickel	NELAP	PA	2/15/2005
EPA 200.8	Selenium	NELAP	PA	2/15/2005
EPA 200.8	Silver	NELAP	PA	2/15/2005
EPA 200.8	Thallium	NELAP	PA	2/15/2005
EPA 200.8	Vanadium	NELAP	PA	12/1/2006
EPA 200.8	Zinc	NELAP	PA	2/15/2005
EPA 245.1	Mercury	NELAP	PA	2/15/2005
EPA 300.0	Bromide	NELAP	PA	2/15/2005
EPA 300.0	Chloride	NELAP	PA	2/15/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 300.0	Fluoride	NELAP	PA	2/15/2005
EPA 300.0	Nitrate as N	NELAP	PA	2/15/2005
EPA 300.0	Nitrite as N	NELAP	PA	2/15/2005
EPA 300.0	Sulfate	NELAP	PA	2/15/2005
EPA 3005A	Preconcentration under acid	NELAP	PA	1/6/2006
EPA 3010A	Hot plate acid digestion (HNO3 + HCl)	NELAP	PA	4/5/2006
EPA 3015	Microwave assisted acid digestion	NELAP	PA	4/5/2006
EPA 3020A	Hot plate acid digestion (HNO3 only)	NELAP	PA	4/5/2006
EPA 310.1	Alkalinity as CaCO3	NELAP	PA	11/2/2005
EPA 314.0	Perchlorate	NELAP	PA	12/1/2006
EPA 335.3	Total cyanide	NELAP	PA	11/2/2005
EPA 335.4	Total cyanide	NELAP	PA	4/5/2006
EPA 350.1	Ammonia as N	NELAP	PA	12/1/2006
EPA 350.2	Ammonia as N	NELAP	PA	11/2/2005
EPA 350.3	Ammonia as N	NELAP	PA	11/2/2005
EPA 3500B	Organics extraction and sample preparation	NELAP	PA	4/5/2006
EPA 351.2	Kjeldahl nitrogen - total (TKN)	NELAP	PA	4/14/2008
EPA 351.3	Kjeldahl nitrogen - total (TKN)	NELAP	PA	11/2/2005
EPA 351.4	Kjeldahl nitrogen - total (TKN)	NELAP	PA	5/13/2008
EPA 3510C	Separatory funnel liquid-liquid extraction	NELAP	PA	4/5/2006
EPA 353.2	Total nitrate-nitrite	NELAP	PA	6/4/2007
EPA 3535	Solid-phase extraction	NELAP	PA	5/13/2008
EPA 354.1	Nitrite as N	NELAP	PA	2/15/2005
EPA 3620B	Florisil cleanup	NELAP	PA	1/6/2006
EPA 3640A	Gel permeation cleanup	NELAP	PA	5/18/2006
EPA 365.1	Phosphorus total	NELAP	PA	2/15/2005
EPA 3660B	Sulfur cleanup	NELAP	PA	1/6/2006
EPA 3665A	Sulfuric acid/permanganate clean-up	NELAP	PA	1/6/2006
EPA 370.1	Silica-dissolved	NELAP	PA	11/2/2005
EPA 376.1	Sulfide	NELAP	PA	11/2/2005
EPA 377.1	Sulfite-SO3	NELAP	PA	11/2/2005
EPA 405.1	Biochemical oxygen demand (BOD)	NELAP	PA	4/5/2006
EPA 410.4	Chemical oxygen demand (COD)	NELAP	PA	2/15/2005
EPA 415.1	Total organic carbon (TOC)	NELAP	PA	11/2/2005
EPA 418.1	Total recoverable petroleum hydrocarbons (TRPH)	NELAP	PA	2/15/2005
EPA 420.2	Total phenolics	NELAP	PA	11/2/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Non-Potable Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 420.4	Total phenolics	NELAP	PA	4/5/2006
EPA 5030B	Aqueous-phase purge-and-trap	NELAP	PA	11/2/2005
EPA 600/4-81-045	Aroclor-1016 (PCB-1016)	NELAP	PA	4/14/2008
EPA 600/4-81-045	Aroclor-1242 (PCB-1242)	NELAP	PA	4/14/2008
EPA 600/4-81-045	Aroclor-1254 (PCB-1254)	NELAP	PA	4/14/2008
EPA 600/4-81-045	Aroclor-1260 (PCB-1260)	NELAP	PA	4/14/2008
EPA 601	1 1 1-Trichloroethane	NELAP	PA	2/15/2005
EPA 601	1 1 2 2-Tetrachloroethane	NELAP	PA	2/15/2005
EPA 601	1 1 2-Trichloroethane	NELAP	PA	2/15/2005
EPA 601	1 1-Dichloroethane	NELAP	PA	2/15/2005
EPA 601	1 1-Dichloroethene (1 1-Dichloroethylene)	NELAP	PA	2/15/2005
EPA 601	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 601	1 2-Dichloroethane	NELAP	PA	2/15/2005
EPA 601	1 2-Dichloropropane	NELAP	PA	2/15/2005
EPA 601	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 601	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 601	2-Chloroethyl vinyl ether	NELAP	PA	2/15/2005
EPA 601	Bromodichloromethane	NELAP	PA	2/15/2005
EPA 601	Bromoform	NELAP	PA	2/15/2005
EPA 601	Carbon tetrachloride	NELAP	PA	2/15/2005
EPA 601	Chlorobenzene	NELAP	PA	2/15/2005
EPA 601	Chloroethane	NELAP	PA	2/15/2005
EPA 601	Chloroform	NELAP	PA	2/15/2005
EPA 601	Dibromochloromethane	NELAP	PA	1/5/2006
EPA 601	Dichlorodifluoromethane (Freon-12)	NELAP	PA	2/15/2005
EPA 601	Methyl bromide (Bromomethane)	NELAP	PA	2/15/2005
EPA 601	Methyl chloride (Chloromethane)	NELAP	PA	2/15/2005
EPA 601	Methylene chloride (Dichloromethane)	NELAP	PA	2/15/2005
EPA 601	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	2/15/2005
EPA 601	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	2/15/2005
EPA 601	Trichlorofluoromethane (Freon-11)	NELAP	PA	2/15/2005
EPA 601	Vinyl chloride	NELAP	PA	2/15/2005
EPA 601	cis-1 3-Dichloropropene	NELAP	PA	2/15/2005
EPA 601	trans-1 2-Dichloroethene	NELAP	PA	2/15/2005
EPA 601	trans-1 3-Dichloropropene	NELAP	PA	2/15/2005
EPA 601-Extended	2-Chloronaphthalene	NELAP	PA	12/1/2006

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 601-Extended	1 1-Dichloropropene	NELAP	PA	12/1/2006
EPA 601-Extended	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	12/1/2006
EPA 601-Extended	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	12/1/2006
EPA 601-Extended	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	12/1/2006
EPA 601-Extended	1 3-Dichloropropane	NELAP	PA	12/1/2006
EPA 601-Extended	2 2-Dichloropropane	NELAP	PA	12/1/2006
EPA 601-Extended	Dibromomethane	NELAP	PA	12/1/2006
EPA 6010	Total hardness as CaCO3	NELAP	PA	12/1/2006
EPA 6010-Extended	Calcium hardness as CaCO3	NELAP	PA	12/1/2006
EPA 6010B	Aluminum	NELAP	PA	1/6/2006
EPA 6010B	Antimony	NELAP	PA	1/6/2006
EPA 6010B	Arsenic	NELAP	PA	1/6/2006
EPA 6010B	Barium	NELAP	PA	1/6/2006
EPA 6010B	Beryllium	NELAP	PA	1/6/2006
EPA 6010B	Boron	NELAP	PA	4/5/2006
EPA 6010B	Cadmium	NELAP	PA	1/6/2006
EPA 6010B	Calcium	NELAP	PA	1/6/2006
EPA 6010B	Chromium	NELAP	PA	1/6/2006
EPA 6010B	Cobalt	NELAP	PA	1/6/2006
EPA 6010B	Copper	NELAP	PA	1/6/2006
EPA 6010B	Iron	NELAP	PA	1/6/2006
EPA 6010B	Lead	NELAP	PA	1/6/2006
EPA 6010B	Lithium	NELAP	PA	11/2/2005
EPA 6010B	Magnesium	NELAP	PA	1/6/2006
EPA 6010B	Manganese	NELAP	PA	1/6/2006
EPA 6010B	Molybdenum	NELAP	PA	1/6/2006
EPA 6010B	Nickel	NELAP	PA	1/6/2006
EPA 6010B	Potassium	NELAP	PA	1/6/2006
EPA 6010B	Selenium	NELAP	PA	1/6/2006
EPA 6010B	Silver	NELAP	PA	1/6/2006
EPA 6010B	Sodium	NELAP	PA	1/6/2006
EPA 6010B	Strontium	NELAP	PA	1/6/2006
EPA 6010B	Thallium	NELAP	PA	1/6/2006
EPA 6010B	Tin	NELAP	PA	4/5/2006
EPA 6010B	Titanium	NELAP	PA	4/5/2006
EPA 6010B	Vanadium	NELAP	PA	1/6/2006

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 6010B	Zinc	NELAP	PA	1/6/2006
EPA 6010B	Phosphorus total	NELAP	PA	11/2/2005
EPA 602	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 602	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 602	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 602	Benzene	NELAP	PA	2/15/2005
EPA 602	Chlorobenzene	NELAP	PA	2/15/2005
EPA 602	Ethylbenzene	NELAP	PA	2/15/2005
EPA 602	Methyl tert-butyl ether (MTBE)	NELAP	PA	11/2/2005
EPA 602	Toluene	NELAP	PA	2/15/2005
EPA 602	Xylene (total)	NELAP	PA	10/13/2005
EPA 602-Extended	Naphthalene	NELAP	PA	12/1/2006
EPA 6020	Aluminum	NELAP	PA	4/5/2006
EPA 6020	Antimony	NELAP	PA	4/5/2006
EPA 6020	Arsenic	NELAP	PA	4/5/2006
EPA 6020	Barium	NELAP	PA	4/5/2006
EPA 6020	Beryllium	NELAP	PA	4/5/2006
EPA 6020	Cadmium	NELAP	PA	4/5/2006
EPA 6020	Chromium	NELAP	PA	4/5/2006
EPA 6020	Cobalt	NELAP	PA	4/5/2006
EPA 6020	Copper	NELAP	PA	4/5/2006
EPA 6020	Lead	NELAP	PA	4/5/2006
EPA 6020	Manganese	NELAP	PA	4/5/2006
EPA 6020	Molybdenum	NELAP	PA	4/5/2006
EPA 6020	Nickel	NELAP	PA	4/5/2006
EPA 6020	Selenium	NELAP	PA	4/5/2006
EPA 6020	Silver	NELAP	PA	4/5/2006
EPA 6020	Thallium	NELAP	PA	4/5/2006
EPA 6020	Tin	NELAP	PA	5/13/2008
EPA 6020	Vanadium	NELAP	PA	4/5/2006
EPA 6020	Zinc	NELAP	PA	4/5/2006
EPA 6020-Extended	Calcium	NELAP	PA	5/13/2008
EPA 6020-Extended	Cesium	NELAP	PA	9/27/2007
EPA 6020-Extended	Iron	NELAP	PA	5/13/2008
EPA 6020-Extended	Lithium	NELAP	PA	9/27/2007
EPA 6020-Extended	Magnesium	NELAP	PA	5/13/2008

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 6020-Extended	Mercury	NELAP	PA	3/6/2008
EPA 6020-Extended	Potassium	NELAP	PA	5/13/2008
EPA 6020-Extended	Sodium	NELAP	PA	5/13/2008
EPA 6020-Extended	Strontium	NELAP	PA	7/27/2006
EPA 6020-Extended	Titanium	NELAP	PA	5/13/2008
EPA 608	Aroclor-1016 (PCB-1016)	NELAP	PA	2/15/2005
EPA 608	Aroclor-1221 (PCB-1221)	NELAP	PA	2/15/2005
EPA 608	Aroclor-1232 (PCB-1232)	NELAP	PA	2/15/2005
EPA 608	Aroclor-1242 (PCB-1242)	NELAP	PA	2/15/2005
EPA 608	Aroclor-1248 (PCB-1248)	NELAP	PA	2/15/2005
EPA 608	Aroclor-1254 (PCB-1254)	NELAP	PA	2/15/2005
EPA 608	Aroclor-1260 (PCB-1260)	NELAP	PA	2/15/2005
EPA 608	4 4'-DDD	NELAP	PA	2/15/2005
EPA 608	4 4'-DDE	NELAP	PA	2/15/2005
EPA 608	4 4'-DDT	NELAP	PA	2/15/2005
EPA 608	Aldrin (HHDN)	NELAP	PA	2/15/2005
EPA 608	Chlordane (tech.)	NELAP	PA	2/15/2005
EPA 608	Dieldrin	NELAP	PA	2/15/2005
EPA 608	Endosulfan I	NELAP	PA	2/15/2005
EPA 608	Endosulfan II	NELAP	PA	2/15/2005
EPA 608	Endosulfan sulfate	NELAP	PA	2/15/2005
EPA 608	Endrin	NELAP	PA	2/15/2005
EPA 608	Endrin aldehyde	NELAP	PA	2/15/2005
EPA 608	Heptachlor	NELAP	PA	2/15/2005
EPA 608	Heptachlor epoxide	NELAP	PA	2/15/2005
EPA 608	Methoxychlor	NELAP	PA	2/15/2005
EPA 608	Mirex	NELAP	PA	11/2/2005
EPA 608	Toxaphene (Chlorinated camphene)	NELAP	PA	2/15/2005
EPA 608	alpha-BHC (alpha-Hexachlorocyclohexane)	NELAP	PA	2/15/2005
EPA 608	beta-BHC (beta-Hexachlorocyclohexane)	NELAP	PA	2/15/2005
EPA 608	delta-BHC (delta-Hexachlorocyclohexane)	NELAP	PA	2/15/2005
EPA 608	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	2/15/2005
EPA 608-Extended	Endrin ketone	NELAP	PA	1/19/2005
EPA 608-Extended	alpha-Chlordane	NELAP	PA	12/1/2006
EPA 608-Extended	gamma-Chlordane	NELAP	PA	12/1/2006
EPA 622	Dichlorovos (DDVP Dichlorvos)	NELAP	PA	10/13/2005

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 622	Disulfoton	NELAP	PA	11/2/2005
EPA 622	Azinphos-methyl (Guthion)	NELAP	PA	2/15/2005
EPA 622	Bolstar (Sulprofos)	NELAP	PA	11/2/2005
EPA 622	Chlorpyrifos	NELAP	PA	2/15/2005
EPA 622	Demeton-O	NELAP	PA	2/15/2005
EPA 622	Demeton-S	NELAP	PA	2/15/2005
EPA 622	Diazinon (Spectracide)	NELAP	PA	10/13/2005
EPA 622	Ethoprop (Prophos)	NELAP	PA	11/2/2005
EPA 622	Fensulfothion	NELAP	PA	10/13/2005
EPA 622	Fenthion	NELAP	PA	10/13/2005
EPA 622	Methyl parathion (Parathion methyl)	NELAP	PA	11/2/2005
EPA 622	Mevinphos	NELAP	PA	11/2/2005
EPA 622	Naled	NELAP	PA	10/13/2005
EPA 622	Parathion	NELAP	PA	2/15/2005
EPA 622	Phorate (Thimet)	NELAP	PA	10/13/2005
EPA 622	Ronnel	NELAP	PA	12/1/2006
EPA 622	Stirophos (Tetrachlorovinphos)	NELAP	PA	10/13/2005
EPA 622-Extended	Dimethoate	NELAP	PA	12/1/2006
EPA 622-Extended	Malathion	NELAP	PA	11/2/2005
EPA 624	1 1 1 2-Tetrachloroethane	NELAP	PA	2/15/2005
EPA 624	1 1 1-Trichloroethane	NELAP	PA	2/15/2005
EPA 624	1 1 2 2-Tetrachloroethane	NELAP	PA	2/15/2005
EPA 624	1 1 2-Trichloroethane	NELAP	PA	2/15/2005
EPA 624	1 1-Dichloroethane	NELAP	PA	2/15/2005
EPA 624	1 1-Dichloroethene (1 1-Dichloroethylene)	NELAP	PA	2/15/2005
EPA 624	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 624	1 2-Dichloroethane	NELAP	PA	2/15/2005
EPA 624	1 2-Dichloropropane	NELAP	PA	2/15/2005
EPA 624	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 624	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 624	2-Chloroethyl vinyl ether	NELAP	PA	2/15/2005
EPA 624	Acrolein (Propenal)	NELAP	PA	10/13/2005
EPA 624	Acrylonitrile	NELAP	PA	10/13/2005
EPA 624	Benzene	NELAP	PA	2/15/2005
EPA 624	Bromodichloromethane	NELAP	PA	2/15/2005
EPA 624	Bromoform	NELAP	PA	2/15/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 624	Carbon tetrachloride	NELAP	PA	2/15/2005
EPA 624	Chlorobenzene	NELAP	PA	2/15/2005
EPA 624	Chloroethane	NELAP	PA	2/15/2005
EPA 624	Chloroform	NELAP	PA	2/15/2005
EPA 624	Dibromochloromethane	NELAP	PA	2/15/2005
EPA 624	Dichlorodifluoromethane (Freon-12)	NELAP	PA	10/13/2005
EPA 624	Ethylbenzene	NELAP	PA	2/15/2005
EPA 624	Methyl bromide (Bromomethane)	NELAP	PA	2/15/2005
EPA 624	Methyl chloride (Chloromethane)	NELAP	PA	2/15/2005
EPA 624	Methylene chloride (Dichloromethane)	NELAP	PA	2/15/2005
EPA 624	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	2/15/2005
EPA 624	Toluene	NELAP	PA	2/15/2005
EPA 624	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	2/15/2005
EPA 624	Trichlorofluoromethane (Freon-11)	NELAP	PA	2/15/2005
EPA 624	Vinyl chloride	NELAP	PA	2/15/2005
EPA 624	Xylene (total)	NELAP	PA	2/15/2005
EPA 624	cis-1 3-Dichloropropene	NELAP	PA	2/15/2005
EPA 624	trans-1 2-Dichloroethene	NELAP	PA	2/15/2005
EPA 624	trans-1 3-Dichloropropene	NELAP	PA	2/15/2005
EPA 624-Extended	1 1 2-Trichloro-1 2 2-trifluoroethane (Freon-113)	NELAP	PA	10/17/2008
EPA 624-Extended	1 1-Dichloropropene	NELAP	PA	12/1/2006
EPA 624-Extended	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	12/1/2006
EPA 624-Extended	1 2 4-Trichlorobenzene	NELAP	PA	12/1/2006
EPA 624-Extended	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	12/1/2006
EPA 624-Extended	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	12/1/2006
EPA 624-Extended	1 3-Dichloropropane	NELAP	PA	12/1/2006
EPA 624-Extended	1 4-Dioxane (1 4-Diethyleneoxide)	NELAP	PA	3/9/2007
EPA 624-Extended	2 2-Dichloropropane	NELAP	PA	12/1/2006
EPA 624-Extended	2-Butanone (Methyl ethyl ketone) (MEK)	NELAP	PA	12/1/2006
EPA 624-Extended	2-Hexanone	NELAP	PA	12/1/2006
EPA 624-Extended	4-Methyl-2-pentanone (MIBK)	NELAP	PA	12/1/2006
EPA 624-Extended	Acetone	NELAP	PA	1/19/2005
EPA 624-Extended	Acetonitrile	NELAP	PA	12/1/2006
EPA 624-Extended	Carbon disulfide	NELAP	PA	12/1/2006
EPA 624-Extended	Cyclohexane	NELAP	PA	10/17/2008
EPA 624-Extended	Dibromomethane	NELAP	PA	12/1/2006

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 624-Extended	Hexachlorobutadiene	NELAP	PA	12/1/2006
EPA 624-Extended	Isopropylbenzene	NELAP	PA	12/1/2006
EPA 624-Extended	Methyl acetate	NELAP	PA	10/17/2008
EPA 624-Extended	Methyl isobutyl ketone (Hexone)	NELAP	PA	12/1/2006
EPA 624-Extended	Methyl tert-butyl ether (MTBE)	NELAP	PA	11/2/2005
EPA 624-Extended	Methylcyclohexane	NELAP	PA	10/17/2008
EPA 624-Extended	Naphthalene	NELAP	PA	12/1/2006
EPA 624-Extended	Styrene	NELAP	PA	12/1/2006
EPA 624-Extended	Vinyl acetate	NELAP	PA	12/1/2006
EPA 624-Extended	cis-1 2-Dichloroethene	NELAP	PA	12/1/2006
EPA 624-Extended	m+p-Xylene	NELAP	PA	10/17/2008
EPA 624-Extended	o-Xylene	NELAP	PA	10/17/2008
EPA 625	2 4 5-Trichlorophenol	NELAP	PA	2/15/2005
EPA 625	2 4 6-Trichlorophenol	NELAP	PA	2/15/2005
EPA 625	2 4-Dichlorophenol	NELAP	PA	2/15/2005
EPA 625	2 4-Dimethylphenol	NELAP	PA	2/15/2005
EPA 625	2 4-Dinitrophenol	NELAP	PA	2/15/2005
EPA 625	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	2/15/2005
EPA 625	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	2/15/2005
EPA 625	2-Chloronaphthalene	NELAP	PA	2/15/2005
EPA 625	2-Chlorophenol	NELAP	PA	2/15/2005
EPA 625	2-Methyl-4 6-dinitrophenol (4 6-Dinitro-2-methylphenol)	NELAP	PA	2/15/2005
EPA 625	2-Methylnaphthalene	NELAP	PA	11/2/2005
EPA 625	2-Methylphenol (o-Cresol)	NELAP	PA	11/2/2005
EPA 625	2-Nitrophenol	NELAP	PA	2/15/2005
EPA 625	3 3'-Dichlorobenzidine	NELAP	PA	2/15/2005
EPA 625	4-Bromophenyl phenyl ether	NELAP	PA	2/15/2005
EPA 625	4-Chloro-3-methylphenol	NELAP	PA	2/15/2005
EPA 625	4-Chlorophenyl phenyl ether	NELAP	PA	2/15/2005
EPA 625	4-Nitrophenol	NELAP	PA	2/15/2005
EPA 625	Acenaphthene	NELAP	PA	2/15/2005
EPA 625	Acenaphthylene	NELAP	PA	2/15/2005
EPA 625	Acetophenone	NELAP	PA	2/15/2005
EPA 625	Aniline	NELAP	PA	2/15/2005
EPA 625	Anthracene	NELAP	PA	2/15/2005
EPA 625	Benzidine	NELAP	PA	2/15/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 625	Benzo(a)anthracene	NELAP	PA	2/15/2005
EPA 625	Benzo(a)pyrene	NELAP	PA	2/15/2005
EPA 625	Benzo(b)fluoranthene	NELAP	PA	2/15/2005
EPA 625	Benzo(g h i)perylene	NELAP	PA	2/15/2005
EPA 625	Benzo(k)fluoranthene	NELAP	PA	2/15/2005
EPA 625	Butyl benzyl phthalate (Benzyl butyl phthalate)	NELAP	PA	2/15/2005
EPA 625	Carbazole	NELAP	PA	2/15/2005
EPA 625	Chrysene	NELAP	PA	2/15/2005
EPA 625	Di-n-butyl phthalate	NELAP	PA	2/15/2005
EPA 625	Di-n-octyl phthalate	NELAP	PA	2/15/2005
EPA 625	Dibenzo(a h)anthracene	NELAP	PA	2/15/2005
EPA 625	Diethyl phthalate	NELAP	PA	2/15/2005
EPA 625	Dimethyl phthalate	NELAP	PA	2/15/2005
EPA 625	Fluoranthene	NELAP	PA	2/15/2005
EPA 625	Fluorene	NELAP	PA	2/15/2005
EPA 625	Hexachlorobenzene	NELAP	PA	2/15/2005
EPA 625	Hexachlorocyclopentadiene	NELAP	PA	2/15/2005
EPA 625	Indeno(1 2 3-cd)pyrene	NELAP	PA	2/15/2005
EPA 625	Isophorone	NELAP	PA	2/15/2005
EPA 625	Pentachlorophenol (PCP)	NELAP	PA	2/15/2005
EPA 625	Phenanthrene	NELAP	PA	2/15/2005
EPA 625	Phenol	NELAP	PA	2/15/2005
EPA 625	Pyrene	NELAP	PA	2/15/2005
EPA 625	alpha-Terpineol	NELAP	PA	2/15/2005
EPA 625	bis(2-Chloroethoxy)methane	NELAP	PA	2/15/2005
EPA 625	bis(2-Chloroethyl) ether	NELAP	PA	2/15/2005
EPA 625	bis(2-Chloroisopropyl) ether	NELAP	PA	2/15/2005
EPA 625	bis(2-Ethylhexyl) phthalate (DEHP)	NELAP	PA	2/15/2005
EPA 625	n-Nitrosodi-n-propylamine	NELAP	PA	2/15/2005
EPA 625	n-Nitrosodimethylamine	NELAP	PA	2/15/2005
EPA 625	n-Nitrosodiphenylamine	NELAP	PA	2/15/2005
EPA 625	1 2 4-Trichlorobenzene	NELAP	PA	2/15/2005
EPA 625	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 625	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 625	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 625	Hexachlorobutadiene	NELAP	PA	2/15/2005

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State Laboratory ID: 22-00293 EPA Lab Code: PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 625	Hexachloroethane	NELAP	PA	2/15/2005
EPA 625	Naphthalene	NELAP	PA	2/15/2005
EPA 625	Nitrobenzene	NELAP	PA	2/15/2005
EPA 625	Pyridine	NELAP	PA	2/15/2005
EPA 625-Extended	1 2 4 5-Tetrachlorobenzene	NELAP	PA	11/2/2005
EPA 625-Extended	1 2-Diphenylhydrazine	NELAP	PA	11/2/2005
EPA 625-Extended	2 3 4 6-Tetrachlorophenol	NELAP	PA	12/1/2006
EPA 625-Extended	2 6-Dichlorophenol	NELAP	PA	12/1/2006
EPA 625-Extended	2-Nitroaniline	NELAP	PA	12/1/2006
EPA 625-Extended	3-Methylphenol (m-Cresol)	NELAP	PA	12/1/2006
EPA 625-Extended	3-Nitroaniline	NELAP	PA	12/1/2006
EPA 625-Extended	4-Chloroaniline	NELAP	PA	12/1/2006
EPA 625-Extended	4-Methylphenol (p-Cresol)	NELAP	PA	11/2/2005
EPA 625-Extended	4-Nitroaniline	NELAP	PA	12/1/2006
EPA 625-Extended	Benzaldehyde	NELAP	PA	10/17/2008
EPA 625-Extended	Benzoic acid	NELAP	PA	11/2/2005
EPA 625-Extended	Benzyl alcohol	NELAP	PA	12/1/2006
EPA 625-Extended	Dibenzofuran	NELAP	PA	12/1/2006
EPA 625-Extended	Diphenyl ether	NELAP	PA	12/1/2006
EPA 625-Extended	Diphenylamine	NELAP	PA	12/1/2006
EPA 625-Extended	Pentachlorobenzene	NELAP	PA	12/1/2006
EPA 625-Extended	n-Nitrosodiethylamine	NELAP	PA	12/1/2006
EPA 625-Extended	n-Nitrosopyrrolidine	NELAP	PA	12/1/2006
EPA 625-Extended	2 3 7 8-TCDD (Dioxin) (screen)	NELAP	PA	3/9/2007
EPA 625-Extended	1 1-Biphenyl (Biphenyl)	NELAP	PA	10/17/2008
EPA 625-Extended	Atrazine	NELAP	PA	10/17/2008
EPA 625-Extended	Caprolactam	NELAP	PA	10/17/2008
EPA 625-Extended	1 4-Dioxane (1 4-Diethyleneoxide)	NELAP	PA	4/14/2008
EPA 625-Extended	n-Nitroso-di-n-butylamine	NELAP	PA	12/1/2006
EPA 7196A	Chromium VI	NELAP	PA	4/5/2006
EPA 7470A	Mercury	NELAP	PA	1/6/2006
EPA 8015	2-Butanone (Methyl ethyl ketone) (MEK)	NELAP	PA	11/2/2005
EPA 8015	Acetone	NELAP	PA	12/1/2006
EPA 8015	Acetonitrile	NELAP	PA	12/1/2006
EPA 8015	Allyl alcohol	NELAP	PA	12/1/2006
EPA 8015	Ethanol	NELAP	PA	11/2/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8015	Ethyl acetate	NELAP	PA	11/2/2005
EPA 8015	Ethylene glycol	NELAP	PA	11/2/2005
EPA 8015	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	11/2/2005
EPA 8015	Isopropyl alcohol (2-Propanol)	NELAP	PA	11/2/2005
EPA 8015	Methanol	NELAP	PA	11/2/2005
EPA 8015	n-Propanol (1-Propanol)	NELAP	PA	11/2/2005
EPA 8015	tert-Butyl alcohol (2-Methyl-2-propanol)	NELAP	PA	11/2/2005
EPA 8015B	Diesel-range organics (DRO)	NELAP	PA	11/2/2005
EPA 8015B	Gasoline-range organics (GRO)	NELAP	PA	11/2/2005
EPA 8015B	Methyl isobutyl ketone (Hexone)	NELAP	PA	11/2/2005
EPA 8015B-Extended	Dimethyl sulfoxide	NELAP	PA	11/2/2005
EPA 8021	1 1 1 2-Tetrachloroethane	NELAP	PA	1/6/2006
EPA 8021	1 1 1-Trichloroethane	NELAP	PA	1/6/2006
EPA 8021	1 1 2 2-Tetrachloroethane	NELAP	PA	1/6/2006
EPA 8021	1 1 2-Trichloroethane	NELAP	PA	1/6/2006
EPA 8021	1 1-Dichloroethane	NELAP	PA	1/6/2006
EPA 8021	1 1-Dichloroethene (1 1-Dichloroethylene)	NELAP	PA	1/6/2006
EPA 8021	1 1-Dichloropropene	NELAP	PA	11/2/2005
EPA 8021	1 2 3-Trichlorobenzene	NELAP	PA	1/6/2006
EPA 8021	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	1/6/2006
EPA 8021	1 2 4-Trichlorobenzene	NELAP	PA	11/2/2005
EPA 8021	1 2 4-Trimethylbenzene	NELAP	PA	11/2/2005
EPA 8021	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	11/2/2005
EPA 8021	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	1/6/2006
EPA 8021	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8021	1 2-Dichloroethane	NELAP	PA	1/6/2006
EPA 8021	1 2-Dichloropropane	NELAP	PA	1/6/2006
EPA 8021	1 3 5-Trimethylbenzene	NELAP	PA	11/2/2005
EPA 8021	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8021	1 3-Dichloropropane	NELAP	PA	1/6/2006
EPA 8021	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8021	2 2-Dichloropropane	NELAP	PA	1/6/2006
EPA 8021	2-Chloroethyl vinyl ether	NELAP	PA	1/6/2006
EPA 8021	2-Chlorotoluene	NELAP	PA	1/6/2006
EPA 8021	4-Chlorotoluene	NELAP	PA	1/6/2006
EPA 8021	Benzene	NELAP	PA	1/6/2006

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8021	Bromobenzene	NELAP	PA	1/6/2006
EPA 8021	Bromochloromethane	NELAP	PA	1/6/2006
EPA 8021	Bromodichloromethane	NELAP	PA	1/6/2006
EPA 8021	Bromoform	NELAP	PA	1/6/2006
EPA 8021	Carbon tetrachloride	NELAP	PA	1/6/2006
EPA 8021	Chlorobenzene	NELAP	PA	1/6/2006
EPA 8021	Chloroethane	NELAP	PA	1/6/2006
EPA 8021	Chloroform	NELAP	PA	1/6/2006
EPA 8021	Dibromochloromethane	NELAP	PA	1/6/2006
EPA 8021	Dibromomethane	NELAP	PA	1/6/2006
EPA 8021	Dichlorodifluoromethane (Freon-12)	NELAP	PA	12/1/2006
EPA 8021	Ethylbenzene	NELAP	PA	1/6/2006
EPA 8021	Hexachlorobutadiene	NELAP	PA	3/14/2007
EPA 8021	Isopropylbenzene	NELAP	PA	1/6/2006
EPA 8021	Methyl bromide (Bromomethane)	NELAP	PA	1/6/2006
EPA 8021	Methyl chloride (Chloromethane)	NELAP	PA	1/6/2006
EPA 8021	Methyl tert-butyl ether (MTBE)	NELAP	PA	1/6/2006
EPA 8021	Methylene chloride (Dichloromethane)	NELAP	PA	1/6/2006
EPA 8021	Naphthalene	NELAP	PA	1/6/2006
EPA 8021	Styrene	NELAP	PA	1/6/2006
EPA 8021	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	1/6/2006
EPA 8021	Toluene	NELAP	PA	1/6/2006
EPA 8021	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	1/6/2006
EPA 8021	Trichlorofluoromethane (Freon-11)	NELAP	PA	1/6/2006
EPA 8021	Vinyl chloride	NELAP	PA	1/6/2006
EPA 8021	Xylene (total)	NELAP	PA	1/6/2006
EPA 8021	cis-1 2-Dichloroethene	NELAP	PA	1/6/2006
EPA 8021	cis-1 3-Dichloropropene	NELAP	PA	1/6/2006
EPA 8021	m-Xylene	NELAP	PA	12/1/2006
EPA 8021	n-Butylbenzene	NELAP	PA	1/6/2006
EPA 8021	n-Propylbenzene	NELAP	PA	1/6/2006
EPA 8021	o-Xylene	NELAP	PA	12/1/2006
EPA 8021	p-Xylene	NELAP	PA	12/1/2006
EPA 8021	sec-Butylbenzene	NELAP	PA	1/6/2006
EPA 8021	tert-Butylbenzene	NELAP	PA	1/6/2006
EPA 8021	trans-1 2-Dichloroethene	NELAP	PA	1/6/2006

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8021	trans-1 3-Dichloropropene	NELAP	PA	1/6/2006
EPA 8021-Extended	1 1 2-Trichloro-1 2 2-trifluoroethane (Freon-113)	NELAP	PA	11/2/2005
EPA 8021-Extended	Dichlorofluoromethane (Freon-21)	NELAP	PA	11/2/2005
EPA 8081	4 4'-DDD	NELAP	PA	1/6/2006
EPA 8081	4 4'-DDE	NELAP	PA	1/6/2006
EPA 8081	4 4'-DDT	NELAP	PA	1/6/2006
EPA 8081	Alachlor (Lasso)	NELAP	PA	11/2/2005
EPA 8081	Aldrin (HHDN)	NELAP	PA	1/6/2006
EPA 8081	Chlordane (tech.)	NELAP	PA	1/6/2006
EPA 8081	Dieldrin	NELAP	PA	1/6/2006
EPA 8081	Endosulfan I	NELAP	PA	1/6/2006
EPA 8081	Endosulfan II	NELAP	PA	1/6/2006
EPA 8081	Endosulfan sulfate	NELAP	PA	1/6/2006
EPA 8081	Endrin	NELAP	PA	1/6/2006
EPA 8081	Endrin aldehyde	NELAP	PA	1/6/2006
EPA 8081	Endrin ketone	NELAP	PA	1/6/2006
EPA 8081	Heptachlor	NELAP	PA	1/6/2006
EPA 8081	Heptachlor epoxide	NELAP	PA	1/6/2006
EPA 8081	Methoxychlor	NELAP	PA	1/6/2006
EPA 8081	Mirex	NELAP	PA	11/2/2005
EPA 8081	Toxaphene (Chlorinated camphene)	NELAP	PA	1/6/2006
EPA 8081	alpha-BHC (alpha-Hexachlorocyclohexane)	NELAP	PA	1/6/2006
EPA 8081	alpha-Chlordane	NELAP	PA	1/6/2006
EPA 8081	beta-BHC (beta-Hexachlorocyclohexane)	NELAP	PA	1/6/2006
EPA 8081	delta-BHC (delta-Hexachlorocyclohexane)	NELAP	PA	1/6/2006
EPA 8081	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	1/6/2006
EPA 8081	gamma-Chlordane	NELAP	PA	11/2/2005
EPA 8082	Aroclor-1016 (PCB-1016)	NELAP	PA	12/1/2006
EPA 8082	Aroclor-1221 (PCB-1221)	NELAP	PA	12/1/2006
EPA 8082	Aroclor-1232 (PCB-1232)	NELAP	PA	12/1/2006
EPA 8082	Aroclor-1242 (PCB-1242)	NELAP	PA	12/1/2006
EPA 8082	Aroclor-1248 (PCB-1248)	NELAP	PA	12/1/2006
EPA 8082	Aroclor-1254 (PCB-1254)	NELAP	PA	12/1/2006
EPA 8082	Aroclor-1260 (PCB-1260)	NELAP	PA	12/1/2006
EPA 8141	Dichlorovos (DDVP Dichlorvos)	NELAP	PA	1/6/2006
EPA 8141	Disulfoton	NELAP	PA	1/6/2006

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8141	Atrazine	NELAP	PA	1/6/2006
EPA 8141	Azinphos-methyl (Guthion)	NELAP	PA	1/6/2006
EPA 8141	Bolstar (Sulprofos)	NELAP	PA	1/6/2006
EPA 8141	Chlorpyrifos	NELAP	PA	1/6/2006
EPA 8141	Coumaphos	NELAP	PA	1/6/2006
EPA 8141	Demeton-O	NELAP	PA	1/6/2006
EPA 8141	Demeton-S	NELAP	PA	1/6/2006
EPA 8141	Diazinon (Spectracide)	NELAP	PA	1/6/2006
EPA 8141	Dimethoate	NELAP	PA	1/6/2006
EPA 8141	EPN	NELAP	PA	1/6/2006
EPA 8141	Ethoprop (Prophos)	NELAP	PA	1/6/2006
EPA 8141	Fensulfothion	NELAP	PA	1/6/2006
EPA 8141	Fenthion	NELAP	PA	1/6/2006
EPA 8141	Malathion	NELAP	PA	1/6/2006
EPA 8141	Methyl parathion (Parathion methyl)	NELAP	PA	1/6/2006
EPA 8141	Mevinphos	NELAP	PA	1/6/2006
EPA 8141	Naled	NELAP	PA	1/6/2006
EPA 8141	Parathion ethyl (Ethyl parathion)	NELAP	PA	1/6/2006
EPA 8141	Phorate (Thimet)	NELAP	PA	1/6/2006
EPA 8141	Ronnel	NELAP	PA	1/6/2006
EPA 8141	Simazine	NELAP	PA	1/6/2006
EPA 8141	Stirophos (Tetrachlorovinphos)	NELAP	PA	1/6/2006
EPA 8141	Sulfotepp (Tetraethyl dithiopyrophosphate)	NELAP	PA	11/2/2005
EPA 8141	Thionazin (Zinophos)	NELAP	PA	1/6/2006
EPA 8141	Tokuthion (Prothiophos)	NELAP	PA	1/6/2006
EPA 8141	Trichloronate	NELAP	PA	11/2/2005
EPA 8141-Extended	Alachlor (Lasso)	NELAP	PA	11/2/2005
EPA 8141-Extended	Bromacil	NELAP	PA	11/2/2005
EPA 8141-Extended	Butachlor	NELAP	PA	11/2/2005
EPA 8141-Extended	Cyanazine (Bladex)	NELAP	PA	11/2/2005
EPA 8141-Extended	Metolachlor	NELAP	PA	11/2/2005
EPA 8141-Extended	Metribuzin	NELAP	PA	11/2/2005
EPA 8141-Extended	Molinate	NELAP	PA	11/2/2005
EPA 8141-Extended	Pendimethalin (Penoxalin)	NELAP	PA	11/2/2005
EPA 8141-Extended	Prometon (Pramitol)	NELAP	PA	12/1/2006
EPA 8141-Extended	Propachlor (Ramrod)	NELAP	PA	11/2/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8141-Extended	Propazine	NELAP	PA	12/1/2006
EPA 8141-Extended	Trifluralin (Treflan)	NELAP	PA	11/2/2005
EPA 8141-Extended	Acetochlor	NELAP	PA	11/2/2005
EPA 8151	4-Nitrophenol	NELAP	PA	11/2/2005
EPA 8151	Pentachlorophenol (PCP)	NELAP	PA	11/2/2005
EPA 8151	2 4 5-T	NELAP	PA	1/6/2006
EPA 8151	2 4 5-TP (Silvex)	NELAP	PA	1/6/2006
EPA 8151	2 4-D	NELAP	PA	1/6/2006
EPA 8151	2 4-DB (Butoxon)	NELAP	PA	1/6/2006
EPA 8151	Dalapon	NELAP	PA	1/6/2006
EPA 8151	Dicamba	NELAP	PA	1/6/2006
EPA 8151	Dichloroprop (Dichlorprop)	NELAP	PA	1/6/2006
EPA 8151	Dinoseb (2-sec-butyl-4 6-dinitrophenol DNBP)	NELAP	PA	1/6/2006
EPA 8151	Picloram	NELAP	PA	1/6/2006
EPA 8151	MCPA	NELAP	PA	1/6/2006
EPA 8151	MCPP (Mecoprop)	NELAP	PA	1/6/2006
EPA 8260-Extended	Diisopropyl ether (DIPE)	NELAP	PA	11/2/2005
EPA 8260-Extended	Diisopropyl ether (DIPE)	NELAP	PA	11/2/2005
EPA 8260-Extended	1 1 2-Trichloro-1 2 2-trifluoroethane (Freon-113)	NELAP	PA	11/2/2005
EPA 8260-Extended	1 1-Dichloro-2-propanol	NELAP	PA	11/2/2005
EPA 8260-Extended	2 4 4-Trimethyl-1-pentene (Diisobutylene)	NELAP	PA	5/31/2006
EPA 8260-Extended	Cyclohexane	NELAP	PA	11/2/2005
EPA 8260-Extended	Dichlorofluoromethane (Freon-21)	NELAP	PA	11/2/2005
EPA 8260-Extended	Ethyl tert-butyl ether (ETBE)	NELAP	PA	11/2/2005
EPA 8260-Extended	Heptane	NELAP	PA	11/2/2005
EPA 8260-Extended	Hexane	NELAP	PA	11/2/2005
EPA 8260-Extended	Methyl acetate	NELAP	PA	11/2/2005
EPA 8260-Extended	Methyl isobutyl ketone (Hexone)	NELAP	PA	11/2/2005
EPA 8260-Extended	Methylcyclohexane	NELAP	PA	11/2/2005
EPA 8260-Extended	Octane	NELAP	PA	11/2/2005
EPA 8260-Extended	Pentane	NELAP	PA	11/2/2005
EPA 8260-Extended	Tetrahydrofuran (THF)	NELAP	PA	11/2/2005
EPA 8260-Extended	tert-Amyl methyl ether (TAME)	NELAP	PA	11/2/2005
EPA 8260B	Benzyl chloride	NELAP	PA	11/2/2005
EPA 8260B	1 1 1 2-Tetrachloroethane	NELAP	PA	1/6/2006
EPA 8260B	1 1 1-Trichloroethane	NELAP	PA	1/6/2006

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Non-Potable Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260B	1 1 2 2-Tetrachloroethane	NELAP	PA	1/6/2006
EPA 8260B	1 1 2-Trichloroethane	NELAP	PA	1/6/2006
EPA 8260B	1 1-Dichloroethane	NELAP	PA	1/6/2006
EPA 8260B	1 1-Dichloroethene (1 1-Dichloroethylene)	NELAP	PA	1/6/2006
EPA 8260B	1 1-Dichloropropene	NELAP	PA	1/6/2006
EPA 8260B	1 2 3-Trichlorobenzene	NELAP	PA	11/2/2005
EPA 8260B	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	11/2/2005
EPA 8260B	1 2 4-Trichlorobenzene	NELAP	PA	1/6/2006
EPA 8260B	1 2 4-Trimethylbenzene	NELAP	PA	1/6/2006
EPA 8260B	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	11/2/2005
EPA 8260B	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	1/6/2006
EPA 8260B	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8260B	1 2-Dichloroethane	NELAP	PA	1/6/2006
EPA 8260B	1 2-Dichloropropane	NELAP	PA	1/6/2006
EPA 8260B	1 3 5-Trimethylbenzene	NELAP	PA	1/6/2006
EPA 8260B	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8260B	1 3-Dichloropropane	NELAP	PA	1/6/2006
EPA 8260B	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8260B	1 4-Dioxane (1 4-Diethyleneoxide)	NELAP	PA	1/6/2006
EPA 8260B	1-Chlorobutane	NELAP	PA	11/2/2005
EPA 8260B	1-Chlorohexane	NELAP	PA	1/6/2006
EPA 8260B	1-Propanol (n-Propanol)	NELAP	PA	1/6/2006
EPA 8260B	2 2-Dichloropropane	NELAP	PA	1/6/2006
EPA 8260B	2-Butanone (Methyl ethyl ketone) (MEK)	NELAP	PA	11/2/2005
EPA 8260B	2-Chloroethyl vinyl ether	NELAP	PA	11/2/2005
EPA 8260B	2-Chlorotoluene	NELAP	PA	1/6/2006
EPA 8260B	2-Hexanone	NELAP	PA	1/6/2006
EPA 8260B	2-Nitropropane	NELAP	PA	1/6/2006
EPA 8260B	2-Propanol (Isopropyl alcohol)	NELAP	PA	1/6/2006
EPA 8260B	4-Chlorotoluene	NELAP	PA	1/6/2006
EPA 8260B	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	11/2/2005
EPA 8260B	4-Methyl-2-pentanone (MIBK)	NELAP	PA	12/1/2006
EPA 8260B	Acetone	NELAP	PA	1/6/2006
EPA 8260B	Acetonitrile	NELAP	PA	1/6/2006
EPA 8260B	Acrolein (Propenal)	NELAP	PA	1/6/2006
EPA 8260B	Acrylonitrile	NELAP	PA	1/6/2006

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260B	Allyl chloride (3-Chloropropene)	NELAP	PA	11/2/2005
EPA 8260B	Benzene	NELAP	PA	1/6/2006
EPA 8260B	Bromobenzene	NELAP	PA	1/6/2006
EPA 8260B	Bromochloromethane	NELAP	PA	1/6/2006
EPA 8260B	Bromodichloromethane	NELAP	PA	1/6/2006
EPA 8260B	Bromoform	NELAP	PA	1/6/2006
EPA 8260B	Carbon disulfide	NELAP	PA	1/6/2006
EPA 8260B	Carbon tetrachloride	NELAP	PA	1/6/2006
EPA 8260B	Chloroacetonitrile	NELAP	PA	11/2/2005
EPA 8260B	Chlorobenzene	NELAP	PA	1/6/2006
EPA 8260B	Chloroethane	NELAP	PA	1/6/2006
EPA 8260B	Chloroform	NELAP	PA	1/6/2006
EPA 8260B	Chloroprene (2-Chloro-1,3-butadiene)	NELAP	PA	1/6/2006
EPA 8260B	Dibromochloromethane	NELAP	PA	1/6/2006
EPA 8260B	Dibromomethane	NELAP	PA	1/6/2006
EPA 8260B	Dichlorodifluoromethane (Freon-12)	NELAP	PA	1/6/2006
EPA 8260B	Diethyl ether	NELAP	PA	11/2/2005
EPA 8260B	Ethanol	NELAP	PA	6/24/2008
EPA 8260B	Ethyl acetate	NELAP	PA	1/6/2006
EPA 8260B	Ethyl methacrylate	NELAP	PA	11/2/2005
EPA 8260B	Ethylbenzene	NELAP	PA	1/6/2006
EPA 8260B	Hexachlorobutadiene	NELAP	PA	1/6/2006
EPA 8260B	Hexachloroethane	NELAP	PA	1/6/2006
EPA 8260B	Iodomethane (Methyl iodide)	NELAP	PA	1/6/2006
EPA 8260B	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	1/6/2006
EPA 8260B	Isopropylbenzene	NELAP	PA	1/6/2006
EPA 8260B	Methacrylonitrile	NELAP	PA	1/6/2006
EPA 8260B	Methyl bromide (Bromomethane)	NELAP	PA	1/6/2006
EPA 8260B	Methyl chloride (Chloromethane)	NELAP	PA	1/6/2006
EPA 8260B	Methyl tert-butyl ether (MTBE)	NELAP	PA	1/6/2006
EPA 8260B	Methylacrylate	NELAP	PA	1/6/2006
EPA 8260B	Methylene chloride (Dichloromethane)	NELAP	PA	1/6/2006
EPA 8260B	Methylmethacrylate	NELAP	PA	1/6/2006
EPA 8260B	Naphthalene	NELAP	PA	1/6/2006
EPA 8260B	Nitrobenzene	NELAP	PA	1/6/2006
EPA 8260B	Pentachloroethane	NELAP	PA	11/2/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Non-Potable Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260B	Propionitrile (Ethyl cyanide)	NELAP	PA	1/6/2006
EPA 8260B	Styrene	NELAP	PA	1/6/2006
EPA 8260B	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	1/6/2006
EPA 8260B	Toluene	NELAP	PA	1/6/2006
EPA 8260B	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	1/6/2006
EPA 8260B	Trichlorofluoromethane (Freon-11)	NELAP	PA	1/6/2006
EPA 8260B	Vinyl acetate	NELAP	PA	1/6/2006
EPA 8260B	Vinyl chloride	NELAP	PA	1/6/2006
EPA 8260B	Xylene (total)	NELAP	PA	1/6/2006
EPA 8260B	cis-1 2-Dichloroethene	NELAP	PA	1/6/2006
EPA 8260B	cis-1 3-Dichloropropene	NELAP	PA	1/6/2006
EPA 8260B	m+p-Xylene	NELAP	PA	12/1/2006
EPA 8260B	n-Butylbenzene	NELAP	PA	1/6/2006
EPA 8260B	n-Propylbenzene	NELAP	PA	1/6/2006
EPA 8260B	o-Xylene	NELAP	PA	12/1/2006
EPA 8260B	sec-Butylbenzene	NELAP	PA	1/6/2006
EPA 8260B	tert-Amyl alcohol (2-Methyl-2-butanol)	NELAP	PA	12/1/2006
EPA 8260B	tert-Amyl ethyl ether	NELAP	PA	12/1/2006
EPA 8260B	tert-Butyl alcohol (2-Methyl-2-propanol)	NELAP	PA	1/6/2006
EPA 8260B	tert-Butylbenzene	NELAP	PA	1/6/2006
EPA 8260B	trans-1 2-Dichloroethene	NELAP	PA	1/6/2006
EPA 8260B	trans-1 3-Dichloropropene	NELAP	PA	1/6/2006
EPA 8260B	trans-1 4-Dichloro-2-butene	NELAP	PA	1/6/2006
EPA 8270 SIM	Acenaphthene	NELAP	PA	2/26/2008
EPA 8270 SIM	Acenaphthylene	NELAP	PA	2/26/2008
EPA 8270 SIM	Anthracene	NELAP	PA	2/26/2008
EPA 8270 SIM	Benzo(a)anthracene	NELAP	PA	2/26/2008
EPA 8270 SIM	Benzo(a)pyrene	NELAP	PA	2/26/2008
EPA 8270 SIM	Benzo(b)fluoranthene	NELAP	PA	2/26/2008
EPA 8270 SIM	Benzo(g h i)perylene	NELAP	PA	2/26/2008
EPA 8270 SIM	Benzo(k)fluoranthene	NELAP	PA	2/26/2008
EPA 8270 SIM	Chrysene	NELAP	PA	2/26/2008
EPA 8270 SIM	Dibenzo(a h)anthracene	NELAP	PA	2/26/2008
EPA 8270 SIM	Fluoranthene	NELAP	PA	2/26/2008
EPA 8270 SIM	Fluorene	NELAP	PA	2/26/2008
EPA 8270 SIM	Indeno(1 2 3-cd)pyrene	NELAP	PA	2/26/2008

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270 SIM	Phenanthrene	NELAP	PA	2/26/2008
EPA 8270 SIM	Pyrene	NELAP	PA	2/26/2008
EPA 8270 SIM	Naphthalene	NELAP	PA	2/26/2008
EPA 8270-Extended	Dichloramine-T (p-Toluenesulfondichloramide)	NELAP	PA	12/1/2006
EPA 8270-Extended	1-Methylnaphthalene	NELAP	PA	12/1/2006
EPA 8270-Extended	2 3 5 6-Tetrachlorophenol	NELAP	PA	12/1/2006
EPA 8270-Extended	Azobenzene	NELAP	PA	12/1/2006
EPA 8270-Extended	Benzaldehyde	NELAP	PA	12/1/2006
EPA 8270-Extended	Carbazole	NELAP	PA	1/6/2006
EPA 8270-Extended	Diphenyl ether	NELAP	PA	12/1/2006
EPA 8270-Extended	alpha-Terpineol	NELAP	PA	12/1/2006
EPA 8270-Extended	bis(2-Chlorethoxy) ether	NELAP	PA	12/1/2006
EPA 8270-Extended	2 3 7 8-TCDD (Dioxin) (screen)	NELAP	PA	3/9/2007
EPA 8270-Extended	1 1-Biphenyl (Biphenyl)	NELAP	PA	12/1/2006
EPA 8270-Extended	Atrazine	NELAP	PA	12/1/2006
EPA 8270-Extended	Caprolactam	NELAP	PA	12/1/2006
EPA 8270C	1 2 4 5-Tetrachlorobenzene	NELAP	PA	1/6/2006
EPA 8270C	1 2-Dinitrobenzene (1 2-DNB)	NELAP	PA	1/6/2006
EPA 8270C	1 2-Diphenylhydrazine	NELAP	PA	11/2/2005
EPA 8270C	1 3-Dinitrobenzene (1 3-DNB)	NELAP	PA	1/6/2006
EPA 8270C	1 4-Dinitrobenzene (1 4-DNB)	NELAP	PA	1/6/2006
EPA 8270C	2 3 4 6-Tetrachlorophenol	NELAP	PA	12/1/2006
EPA 8270C	2 4 5-Trichlorophenol	NELAP	PA	1/6/2006
EPA 8270C	2 4 6-Trichlorophenol	NELAP	PA	1/6/2006
EPA 8270C	2 4-Dichlorophenol	NELAP	PA	1/6/2006
EPA 8270C	2 4-Dimethylphenol	NELAP	PA	1/6/2006
EPA 8270C	2 4-Dinitrophenol	NELAP	PA	1/6/2006
EPA 8270C	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	1/6/2006
EPA 8270C	2 6-Dichlorophenol	NELAP	PA	1/6/2006
EPA 8270C	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	1/6/2006
EPA 8270C	2-Chloronaphthalene	NELAP	PA	1/6/2006
EPA 8270C	2-Chlorophenol	NELAP	PA	1/6/2006
EPA 8270C	2-Methyl-4 6-dinitrophenol (4 6-Dinitro-2-methylphenol)	NELAP	PA	12/1/2006
EPA 8270C	2-Methylnaphthalene	NELAP	PA	1/6/2006
EPA 8270C	2-Methylphenol (o-Cresol)	NELAP	PA	1/6/2006
EPA 8270C	2-Naphthylamine (beta-Naphthylamine)	NELAP	PA	1/6/2006

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270C	2-Nitroaniline	NELAP	PA	1/6/2006
EPA 8270C	2-Nitrophenol	NELAP	PA	1/6/2006
EPA 8270C	3 3'-Dichlorobenzidine	NELAP	PA	1/6/2006
EPA 8270C	3-Methylphenol (m-Cresol)	NELAP	PA	1/6/2006
EPA 8270C	3-Nitroaniline	NELAP	PA	1/6/2006
EPA 8270C	4-Bromophenyl phenyl ether	NELAP	PA	1/6/2006
EPA 8270C	4-Chloro-3-methylphenol	NELAP	PA	1/6/2006
EPA 8270C	4-Chloroaniline	NELAP	PA	1/6/2006
EPA 8270C	4-Chlorophenyl phenyl ether	NELAP	PA	1/6/2006
EPA 8270C	4-Methylphenol (p-Cresol)	NELAP	PA	12/1/2006
EPA 8270C	4-Nitroaniline	NELAP	PA	1/6/2006
EPA 8270C	4-Nitrophenol	NELAP	PA	11/2/2005
EPA 8270C	Acenaphthene	NELAP	PA	12/1/2006
EPA 8270C	Acenaphthylene	NELAP	PA	1/6/2006
EPA 8270C	Acetophenone	NELAP	PA	11/2/2005
EPA 8270C	Aniline	NELAP	PA	11/2/2005
EPA 8270C	Anthracene	NELAP	PA	1/6/2006
EPA 8270C	Benzidine	NELAP	PA	11/2/2005
EPA 8270C	Benzo(a)anthracene	NELAP	PA	1/6/2006
EPA 8270C	Benzo(a)pyrene	NELAP	PA	1/6/2006
EPA 8270C	Benzo(b)fluoranthene	NELAP	PA	1/6/2006
EPA 8270C	Benzo(g h i)perylene	NELAP	PA	1/6/2006
EPA 8270C	Benzo(k)fluoranthene	NELAP	PA	1/6/2006
EPA 8270C	Benzoic acid	NELAP	PA	11/2/2005
EPA 8270C	Benzyl alcohol	NELAP	PA	1/6/2006
EPA 8270C	Butyl benzyl phthalate (Benzyl butyl phthalate)	NELAP	PA	11/2/2005
EPA 8270C	Chrysene	NELAP	PA	1/6/2006
EPA 8270C	Di-n-butyl phthalate	NELAP	PA	1/6/2006
EPA 8270C	Di-n-octyl phthalate	NELAP	PA	1/6/2006
EPA 8270C	Dibenzo(a h)anthracene	NELAP	PA	1/6/2006
EPA 8270C	Dibenzofuran	NELAP	PA	1/6/2006
EPA 8270C	Diethyl phthalate	NELAP	PA	1/6/2006
EPA 8270C	Dimethyl phthalate	NELAP	PA	1/6/2006
EPA 8270C	Diphenylamine	NELAP	PA	11/2/2005
EPA 8270C	Fluoranthene	NELAP	PA	1/6/2006
EPA 8270C	Fluorene	NELAP	PA	1/6/2006

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270C	Hexachlorobenzene	NELAP	PA	1/6/2006
EPA 8270C	Hexachlorocyclopentadiene	NELAP	PA	1/6/2006
EPA 8270C	Indeno(1 2 3-cd)pyrene	NELAP	PA	1/6/2006
EPA 8270C	Isophorone	NELAP	PA	1/6/2006
EPA 8270C	Nicotine	NELAP	PA	11/2/2005
EPA 8270C	Pentachlorobenzene	NELAP	PA	12/1/2006
EPA 8270C	Pentachlorophenol (PCP)	NELAP	PA	12/1/2006
EPA 8270C	Phenanthrene	NELAP	PA	1/6/2006
EPA 8270C	Phenol	NELAP	PA	1/6/2006
EPA 8270C	Pyrene	NELAP	PA	1/6/2006
EPA 8270C	Resorcinol	NELAP	PA	11/2/2005
EPA 8270C	bis(2-Chloroethoxy)methane	NELAP	PA	1/6/2006
EPA 8270C	bis(2-Chloroethyl) ether	NELAP	PA	1/6/2006
EPA 8270C	bis(2-Chloroisopropyl) ether	NELAP	PA	1/6/2006
EPA 8270C	bis(2-Ethylhexyl) phthalate (DEHP)	NELAP	PA	11/2/2005
EPA 8270C	n-Nitrosodi-n-propylamine	NELAP	PA	11/2/2005
EPA 8270C	n-Nitrosodiethylamine	NELAP	PA	11/2/2005
EPA 8270C	n-Nitrosodimethylamine	NELAP	PA	11/2/2005
EPA 8270C	n-Nitrosodiphenylamine	NELAP	PA	1/6/2006
EPA 8270C	n-Nitrosopyrrolidine	NELAP	PA	1/6/2006
EPA 8270C	2-Nitrotoluene	NELAP	PA	11/2/2005
EPA 8270C	Dimethoate	NELAP	PA	12/1/2006
EPA 8270C	1 2 4-Trichlorobenzene	NELAP	PA	1/6/2006
EPA 8270C	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8270C	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8270C	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	1/6/2006
EPA 8270C	Hexachlorobutadiene	NELAP	PA	1/6/2006
EPA 8270C	Hexachloroethane	NELAP	PA	1/6/2006
EPA 8270C	Naphthalene	NELAP	PA	1/6/2006
EPA 8270C	Nitrobenzene	NELAP	PA	1/6/2006
EPA 8270C	Pyridine	NELAP	PA	1/6/2006
EPA 8270C	n-Nitroso-di-n-butylamine	NELAP	PA	11/2/2005
EPA 8270C-Extended	1 4-Dioxane (1 4-Diethyleneoxide)	NELAP	PA	4/14/2008
EPA 8330	1 3 5-Trinitrobenzene (1 3 5-TNB)	NELAP	PA	4/10/2006
EPA 8330	1 3-Dinitrobenzene (1 3-DNB)	NELAP	PA	4/10/2006
EPA 8330	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	4/10/2006

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Non-Potable Water**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8330	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	4/10/2006
EPA 8330	2 4 6-Trinitrotoluene (2 4 6-TNT)	NELAP	PA	4/10/2006
EPA 8330	2-Amino-4 6-dinitrotoluene (2-am-dnt)	NELAP	PA	4/10/2006
EPA 8330	2-Nitrotoluene	NELAP	PA	12/1/2006
EPA 8330	3-Nitrotoluene	NELAP	PA	4/10/2006
EPA 8330	4-Amino-2 6-dinitrotoluene (4-am-dnt)	NELAP	PA	4/10/2006
EPA 8330	4-Nitrotoluene	NELAP	PA	4/10/2006
EPA 8330	Octahydro-1 3 5 7-tetranitro-1 3 5 7-tetrazocine (HMX)	NELAP	PA	4/10/2006
EPA 8330	RDX (Hexahydro-1 3 5-trinitro-1 3 5-triazine)	NELAP	PA	4/10/2006
EPA 8330	Tetryl (2 4 6-Trinitrophenylmethylnitramine)	NELAP	PA	4/10/2006
EPA 8330	Nitrobenzene	NELAP	PA	4/10/2006
EPA 9010	Total cyanide	NELAP	PA	4/5/2006
EPA 9012	Total cyanide	NELAP	PA	1/6/2006
EPA 9014	Cyanide	NELAP	PA	4/5/2006
EPA 9020	Total organic halides (TOX)	NELAP	PA	11/2/2005
EPA 9023	Extractable organic halides (EOX)	NELAP	PA	4/5/2006
EPA 9040	Corrosivity (pH)	NELAP	PA	12/1/2006
EPA 9040	pH	NELAP	PA	1/6/2006
EPA 9050	Conductivity	NELAP	PA	4/5/2006
EPA 9056	Bromide	NELAP	PA	1/6/2006
EPA 9056	Chloride	NELAP	PA	1/6/2006
EPA 9056	Fluoride	NELAP	PA	1/6/2006
EPA 9056	Nitrate	NELAP	PA	1/6/2006
EPA 9056	Nitrite	NELAP	PA	1/6/2006
EPA 9056	Sulfate	NELAP	PA	5/13/2008
EPA 9060	Total organic carbon (TOC)	NELAP	PA	4/5/2006
EPA 9066	Total phenolics	NELAP	PA	4/5/2006
RSK-175	Ethane	NELAP	PA	1/21/2009
RSK-175	Ethene	NELAP	PA	1/21/2009
RSK-175	Methane	NELAP	PA	1/21/2009
SM 2120 B	Color	NELAP	PA	12/1/2006
SM 2130 B	Turbidity	NELAP	PA	2/15/2005
SM 2310 B	Acidity as CaCO3	NELAP	PA	2/15/2005
SM 2320 B	Alkalinity as CaCO3	NELAP	PA	2/15/2005
SM 2510 B	Conductivity	NELAP	PA	4/5/2006
SM 2540 B	Residue-total	NELAP	PA	2/15/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
SM 2540 C	Residue-filterable (TDS)	NELAP	PA	2/15/2005
SM 2540 D	Residue-nonfilterable (TSS)	NELAP	PA	4/5/2006
SM 2540 E	Residue-volatile	NELAP	PA	12/1/2006
SM 2540 F	Residue-settleable	NELAP	PA	2/15/2005
SM 2540 G	Total fixed and volatile residue	NELAP	PA	2/15/2005
SM 3500-Cr D	Chromium VI	NELAP	PA	2/15/2005
SM 4500-Cl G	Residual free chlorine	NELAP	PA	2/15/2005
SM 4500-H+ B	pH	NELAP	PA	4/5/2006
SM 4500-NH3 D	Ammonia as N	NELAP	PA	4/5/2006
SM 4500-NH3 D	Kjeldahl nitrogen - total (TKN)	NELAP	PA	4/5/2006
SM 4500-NH3 G	Ammonia as N	NELAP	PA	4/5/2006
SM 4500-NH3 G	Kjeldahl nitrogen - total (TKN)	NELAP	PA	1/22/2009
SM 4500-NO2- B	Nitrite	NELAP	PA	2/15/2005
SM 4500-Norg B	Kjeldahl nitrogen - total (TKN)	NELAP	PA	12/1/2006
SM 4500-O G	Oxygen (dissolved)	NELAP	PA	4/5/2006
SM 4500-P E	Orthophosphate as P	NELAP	PA	2/15/2005
SM 4500-S F	Sulfide	NELAP	PA	12/1/2006
SM 4500-SO3 B	Sulfite-SO3	NELAP	PA	4/5/2006
SM 4500-Si D	Silica as SiO2	NELAP	PA	2/15/2005
SM 4500-Si D	Silica-dissolved	NELAP	PA	2/15/2005
SM 4500-SiO2 C (20th ed.)	Silica as SiO2	NELAP	PA	3/14/2007
SM 5210 B	Biochemical oxygen demand (BOD)	NELAP	PA	2/15/2005
SM 5210 B	Carbonaceous BOD (CBOD)	NELAP	PA	2/15/2005
SM 5310 B	Total organic carbon (TOC)	NELAP	PA	2/15/2005
SM 5540 C	Surfactants - MBAS	NELAP	PA	2/15/2005
SM 6630 C	Malathion	NELAP	PA	2/15/2005
SM 9215 B	Heterotrophic plate count	NELAP	PA	11/2/2005
SM 9222 D	Fecal coliforms	NELAP	PA	11/2/2005
SM 9222 D	Fecal coliforms with chlorine present	NELAP	PA	11/2/2005
SM 9223 B	Escherichia coli	NELAP	PA	4/19/2007
SM 9223 B	Total coliforms	NELAP	PA	4/19/2007
SM 9230 C	Enterococci (Enumeration)	NELAP	PA	12/1/2006
SM 9230 C	Fecal streptococci	NELAP	PA	3/9/2007

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Solid and Chemical Materials**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 1010	Ignitability	NELAP	PA	2/15/2005
EPA 1030	Ignitability	NELAP	PA	2/15/2005
EPA 1311	Toxicity characteristic leaching procedure (TCLP)	NELAP	PA	2/15/2005
EPA 1312	Synthetic precipitation leaching procedure (SPLP)	NELAP	PA	2/15/2005
EPA 1664 Rev A	Oil and Grease	NELAP	PA	2/15/2005
EPA 300.0	Bromide	NELAP	PA	5/13/2008
EPA 300.0	Chloride	NELAP	PA	5/13/2008
EPA 300.0	Fluoride	NELAP	PA	5/13/2008
EPA 300.0	Nitrate as N	NELAP	PA	5/13/2008
EPA 300.0	Nitrite as N	NELAP	PA	5/13/2008
EPA 300.0	Sulfate	NELAP	PA	5/13/2008
EPA 3050B	Acid digestion of solids	NELAP	PA	2/15/2005
EPA 3051	Microwave digestion of solids (HNO3 only)	NELAP	PA	8/16/2007
EPA 3060A	Alkaline digestion of Cr(VI)	NELAP	PA	4/5/2006
EPA 3510C	Separatory funnel liquid-liquid extraction	NELAP	PA	11/2/2005
EPA 3545	Pressurized fluid extraction (PFE)	NELAP	PA	2/15/2005
EPA 3546	Microwave extraction	NELAP	PA	9/8/2008
EPA 3550B	Ultrasonic extraction	NELAP	PA	2/15/2005
EPA 3620B	Florisil cleanup	NELAP	PA	2/15/2005
EPA 3660B	Sulfur cleanup	NELAP	PA	2/15/2005
EPA 3665A	Sulfuric acid/permanganate clean-up	NELAP	PA	2/15/2005
EPA 418.1	Total recoverable petroleum hydrocarbons (TRPH)	NELAP	PA	12/1/2006
EPA 5030B	Aqueous-phase purge-and-trap	NELAP	PA	11/2/2005
EPA 5035	Closed-system purge-and-trap (bisulfate option)	NELAP	PA	2/15/2005
EPA 5035	Closed-system purge-and-trap (methanol option)	NELAP	PA	2/15/2005
EPA 6010	Aluminum	NELAP	PA	2/15/2005
EPA 6010	Antimony	NELAP	PA	2/15/2005
EPA 6010	Arsenic	NELAP	PA	2/15/2005
EPA 6010	Barium	NELAP	PA	2/15/2005
EPA 6010	Beryllium	NELAP	PA	2/15/2005
EPA 6010	Boron	NELAP	PA	12/1/2006
EPA 6010	Cadmium	NELAP	PA	2/15/2005
EPA 6010	Calcium	NELAP	PA	2/15/2005
EPA 6010	Chromium	NELAP	PA	2/15/2005
EPA 6010	Cobalt	NELAP	PA	2/15/2005
EPA 6010	Copper	NELAP	PA	2/15/2005

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

**Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057**

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 6010	Iron	NELAP	PA	2/15/2005
EPA 6010	Lead	NELAP	PA	2/15/2005
EPA 6010	Magnesium	NELAP	PA	2/15/2005
EPA 6010	Manganese	NELAP	PA	2/15/2005
EPA 6010	Molybdenum	NELAP	PA	2/15/2005
EPA 6010	Nickel	NELAP	PA	2/15/2005
EPA 6010	Potassium	NELAP	PA	2/15/2005
EPA 6010	Selenium	NELAP	PA	2/15/2005
EPA 6010	Silver	NELAP	PA	2/15/2005
EPA 6010	Sodium	NELAP	PA	2/15/2005
EPA 6010	Strontium	NELAP	PA	2/15/2005
EPA 6010	Thallium	NELAP	PA	2/15/2005
EPA 6010	Tin	NELAP	PA	12/1/2006
EPA 6010	Titanium	NELAP	PA	12/1/2006
EPA 6010	Vanadium	NELAP	PA	2/15/2005
EPA 6010	Zinc	NELAP	PA	2/15/2005
EPA 6020	Aluminum	NELAP	PA	8/16/2007
EPA 6020	Antimony	NELAP	PA	8/16/2007
EPA 6020	Arsenic	NELAP	PA	8/16/2007
EPA 6020	Barium	NELAP	PA	8/16/2007
EPA 6020	Beryllium	NELAP	PA	8/16/2007
EPA 6020	Cadmium	NELAP	PA	8/16/2007
EPA 6020	Chromium	NELAP	PA	8/16/2007
EPA 6020	Cobalt	NELAP	PA	8/16/2007
EPA 6020	Copper	NELAP	PA	8/16/2007
EPA 6020	Lead	NELAP	PA	8/16/2007
EPA 6020	Manganese	NELAP	PA	8/16/2007
EPA 6020	Molybdenum	NELAP	PA	11/7/2007
EPA 6020	Nickel	NELAP	PA	8/16/2007
EPA 6020	Selenium	NELAP	PA	8/16/2007
EPA 6020	Silver	NELAP	PA	8/16/2007
EPA 6020	Strontium	NELAP	PA	8/16/2007
EPA 6020	Thallium	NELAP	PA	8/16/2007
EPA 6020	Tin	NELAP	PA	7/2/2008
EPA 6020	Vanadium	NELAP	PA	8/16/2007
EPA 6020	Zinc	NELAP	PA	8/16/2007

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 6020-Extended	Calcium	NELAP	PA	7/2/2008
EPA 6020-Extended	Iron	NELAP	PA	7/2/2008
EPA 6020-Extended	Magnesium	NELAP	PA	1/9/2008
EPA 6020-Extended	Mercury	NELAP	PA	7/2/2008
EPA 6020-Extended	Potassium	NELAP	PA	7/2/2008
EPA 6020-Extended	Sodium	NELAP	PA	7/2/2008
EPA 6020-Extended	Titanium	NELAP	PA	9/27/2007
EPA 7.3.3.2	Reactive cyanide	NELAP	PA	2/15/2005
EPA 7.3.4.2	Reactive sulfide	NELAP	PA	2/15/2005
EPA 7196A	Chromium VI	NELAP	PA	3/24/2006
EPA 7470A	Mercury	NELAP	PA	2/15/2005
EPA 7471	Mercury	NELAP	PA	2/15/2005
EPA 8015	Diesel-range organics (DRO)	NELAP	PA	11/2/2005
EPA 8015	Gasoline-range organics (GRO)	NELAP	PA	11/2/2005
EPA 8015	2-Butanone (Methyl ethyl ketone) (MEK)	NELAP	PA	5/13/2008
EPA 8015	Acetone	NELAP	PA	5/13/2008
EPA 8015	Acetonitrile	NELAP	PA	9/27/2007
EPA 8015	Allyl alcohol	NELAP	PA	5/13/2008
EPA 8015	Ethanol	NELAP	PA	5/13/2008
EPA 8015	Ethylene glycol	NELAP	PA	3/9/2007
EPA 8015	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	9/27/2007
EPA 8015	Methanol	NELAP	PA	5/13/2008
EPA 8015	n-Propanol (1-Propanol)	NELAP	PA	5/13/2008
EPA 8015	tert-Butyl alcohol (2-Methyl-2-propanol)	NELAP	PA	11/2/2005
EPA 8015B-Extended	sec-Amyl alcohol (2-Pentanol)	NELAP	PA	9/27/2007
EPA 8021	1 1 1 2-Tetrachloroethane	NELAP	PA	12/1/2006
EPA 8021	1 1 1-Trichloroethane	NELAP	PA	2/15/2005
EPA 8021	1 1 2 2-Tetrachloroethane	NELAP	PA	2/15/2005
EPA 8021	1 1 2-Trichloroethane	NELAP	PA	2/15/2005
EPA 8021	1 1-Dichloroethane	NELAP	PA	2/15/2005
EPA 8021	1 1-Dichloroethene (1 1-Dichloroethylene)	NELAP	PA	2/15/2005
EPA 8021	1 2 3-Trichlorobenzene	NELAP	PA	10/13/2005
EPA 8021	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	10/13/2005
EPA 8021	1 2 4-Trichlorobenzene	NELAP	PA	12/1/2006
EPA 8021	1 2 4-Trimethylbenzene	NELAP	PA	11/2/2005
EPA 8021	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	11/2/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8021	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	10/13/2005
EPA 8021	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 8021	1 2-Dichloroethane	NELAP	PA	2/15/2005
EPA 8021	1 2-Dichloropropane	NELAP	PA	2/15/2005
EPA 8021	1 3 5-Trimethylbenzene	NELAP	PA	11/2/2005
EPA 8021	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 8021	1 3-Dichloropropane	NELAP	PA	10/13/2005
EPA 8021	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 8021	2 2-Dichloropropane	NELAP	PA	10/13/2005
EPA 8021	2-Chlorotoluene	NELAP	PA	10/13/2005
EPA 8021	4-Chlorotoluene	NELAP	PA	10/13/2005
EPA 8021	Benzene	NELAP	PA	2/15/2005
EPA 8021	Bromobenzene	NELAP	PA	10/13/2005
EPA 8021	Bromochloromethane	NELAP	PA	10/13/2005
EPA 8021	Bromodichloromethane	NELAP	PA	2/15/2005
EPA 8021	Bromoform	NELAP	PA	2/15/2005
EPA 8021	Carbon tetrachloride	NELAP	PA	2/15/2005
EPA 8021	Chlorobenzene	NELAP	PA	2/15/2005
EPA 8021	Chloroethane	NELAP	PA	2/15/2005
EPA 8021	Chloroform	NELAP	PA	2/15/2005
EPA 8021	Dibromochloromethane	NELAP	PA	2/15/2005
EPA 8021	Dibromomethane	NELAP	PA	10/13/2005
EPA 8021	Dichlorodifluoromethane (Freon-12)	NELAP	PA	2/15/2005
EPA 8021	Ethylbenzene	NELAP	PA	2/15/2005
EPA 8021	Hexachlorobutadiene	NELAP	PA	12/1/2006
EPA 8021	Isopropylbenzene	NELAP	PA	12/1/2006
EPA 8021	Methyl bromide (Bromomethane)	NELAP	PA	2/15/2005
EPA 8021	Methyl chloride (Chloromethane)	NELAP	PA	2/15/2005
EPA 8021	Methyl tert-butyl ether (MTBE)	NELAP	PA	2/15/2005
EPA 8021	Methylene chloride (Dichloromethane)	NELAP	PA	2/15/2005
EPA 8021	Naphthalene	NELAP	PA	2/15/2005
EPA 8021	Styrene	NELAP	PA	10/13/2005
EPA 8021	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	2/15/2005
EPA 8021	Toluene	NELAP	PA	2/15/2005
EPA 8021	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	2/15/2005
EPA 8021	Trichlorofluoromethane (Freon-11)	NELAP	PA	2/15/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Solid and Chemical Materials**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8021	Vinyl chloride	NELAP	PA	2/15/2005
EPA 8021	Xylene (total)	NELAP	PA	2/15/2005
EPA 8021	cis-1 2-Dichloroethene	NELAP	PA	2/15/2005
EPA 8021	cis-1 3-Dichloropropene	NELAP	PA	2/15/2005
EPA 8021	m-Xylene	NELAP	PA	9/8/2008
EPA 8021	n-Butylbenzene	NELAP	PA	10/13/2005
EPA 8021	n-Propylbenzene	NELAP	PA	9/8/2008
EPA 8021	o-Xylene	NELAP	PA	9/8/2008
EPA 8021	p-Xylene	NELAP	PA	9/8/2008
EPA 8021	sec-Butylbenzene	NELAP	PA	10/13/2005
EPA 8021	tert-Butylbenzene	NELAP	PA	12/1/2006
EPA 8021	trans-1 2-Dichloroethene	NELAP	PA	2/15/2005
EPA 8021	trans-1 3-Dichloropropene	NELAP	PA	12/1/2006
EPA 8021B	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	11/2/2005
EPA 8081	4 4'-DDD	NELAP	PA	2/15/2005
EPA 8081	4 4'-DDE	NELAP	PA	2/15/2005
EPA 8081	4 4'-DDT	NELAP	PA	2/15/2005
EPA 8081	Alachlor (Lasso)	NELAP	PA	11/2/2005
EPA 8081	Aldrin (HHDN)	NELAP	PA	2/15/2005
EPA 8081	Chlordane (tech.)	NELAP	PA	2/15/2005
EPA 8081	Dieldrin	NELAP	PA	2/15/2005
EPA 8081	Endosulfan I	NELAP	PA	2/15/2005
EPA 8081	Endosulfan II	NELAP	PA	2/15/2005
EPA 8081	Endosulfan sulfate	NELAP	PA	2/15/2005
EPA 8081	Endrin	NELAP	PA	2/15/2005
EPA 8081	Endrin aldehyde	NELAP	PA	2/15/2005
EPA 8081	Endrin ketone	NELAP	PA	2/15/2005
EPA 8081	Heptachlor	NELAP	PA	2/15/2005
EPA 8081	Heptachlor epoxide	NELAP	PA	2/15/2005
EPA 8081	Methoxychlor	NELAP	PA	2/15/2005
EPA 8081	Mirex	NELAP	PA	11/2/2005
EPA 8081	Toxaphene (Chlorinated camphene)	NELAP	PA	2/15/2005
EPA 8081	alpha-BHC (alpha-Hexachlorocyclohexane)	NELAP	PA	2/15/2005
EPA 8081	alpha-Chlordane	NELAP	PA	2/15/2005
EPA 8081	beta-BHC (beta-Hexachlorocyclohexane)	NELAP	PA	2/15/2005
EPA 8081	delta-BHC (delta-Hexachlorocyclohexane)	NELAP	PA	2/15/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8081	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	2/15/2005
EPA 8081	gamma-Chlordane	NELAP	PA	11/2/2005
EPA 8082	Aroclor-1016 (PCB-1016)	NELAP	PA	2/15/2005
EPA 8082	Aroclor-1221 (PCB-1221)	NELAP	PA	2/15/2005
EPA 8082	Aroclor-1232 (PCB-1232)	NELAP	PA	2/15/2005
EPA 8082	Aroclor-1242 (PCB-1242)	NELAP	PA	2/15/2005
EPA 8082	Aroclor-1248 (PCB-1248)	NELAP	PA	2/15/2005
EPA 8082	Aroclor-1254 (PCB-1254)	NELAP	PA	2/15/2005
EPA 8082	Aroclor-1260 (PCB-1260)	NELAP	PA	2/15/2005
EPA 8141	Dichlorovos (DDVP Dichlorvos)	NELAP	PA	12/1/2006
EPA 8141	Disulfoton	NELAP	PA	2/15/2005
EPA 8141	Atrazine	NELAP	PA	10/13/2005
EPA 8141	Azinphos-methyl (Guthion)	NELAP	PA	2/15/2005
EPA 8141	Bolstar (Sulprofos)	NELAP	PA	10/13/2005
EPA 8141	Chlorpyrifos	NELAP	PA	2/15/2005
EPA 8141	Coumaphos	NELAP	PA	10/13/2005
EPA 8141	Demeton-O	NELAP	PA	2/15/2005
EPA 8141	Demeton-S	NELAP	PA	2/15/2005
EPA 8141	Diazinon (Spectracide)	NELAP	PA	2/15/2005
EPA 8141	Dimethoate	NELAP	PA	10/13/2005
EPA 8141	EPN	NELAP	PA	10/13/2005
EPA 8141	Ethoprop (Prophos)	NELAP	PA	10/13/2005
EPA 8141	Fensulfothion	NELAP	PA	10/13/2005
EPA 8141	Fenthion	NELAP	PA	10/13/2005
EPA 8141	Malathion	NELAP	PA	2/15/2005
EPA 8141	Methyl parathion (Parathion methyl)	NELAP	PA	1/6/2006
EPA 8141	Mevinphos	NELAP	PA	10/13/2005
EPA 8141	Monocrotophos	NELAP	PA	11/2/2005
EPA 8141	Parathion ethyl (Ethyl parathion)	NELAP	PA	2/15/2005
EPA 8141	Phorate (Thimet)	NELAP	PA	10/13/2005
EPA 8141	Ronnel	NELAP	PA	10/13/2005
EPA 8141	Simazine	NELAP	PA	10/13/2005
EPA 8141	Stirophos (Tetrachlorovinphos)	NELAP	PA	10/13/2005
EPA 8141	Sulfotepp (Tetraethyl dithiopyrophosphate)	NELAP	PA	11/2/2005
EPA 8141	Thionazin (Zinophos)	NELAP	PA	10/13/2005
EPA 8141	Tokuthion (Prothiophos)	NELAP	PA	10/13/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

**Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057**

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8141	Trichloronate	NELAP	PA	11/2/2005
EPA 8141-Extended	Alachlor (Lasso)	NELAP	PA	11/2/2005
EPA 8141-Extended	Bromacil	NELAP	PA	11/2/2005
EPA 8141-Extended	Butachlor	NELAP	PA	11/2/2005
EPA 8141-Extended	Cyanazine (Bladex)	NELAP	PA	11/2/2005
EPA 8141-Extended	Metolachlor	NELAP	PA	11/2/2005
EPA 8141-Extended	Metribuzin	NELAP	PA	11/2/2005
EPA 8141-Extended	Molinate	NELAP	PA	11/2/2005
EPA 8141-Extended	Pendimethalin (Penoxalin)	NELAP	PA	11/2/2005
EPA 8141-Extended	Prometon (Pramitol)	NELAP	PA	12/1/2006
EPA 8141-Extended	Propachlor (Ramrod)	NELAP	PA	11/2/2005
EPA 8141-Extended	Propazine	NELAP	PA	12/1/2006
EPA 8141-Extended	Trifluralin (Treflan)	NELAP	PA	11/2/2005
EPA 8141-Extended	Acetochlor	NELAP	PA	11/2/2005
EPA 8151	4-Nitrophenol	NELAP	PA	11/2/2005
EPA 8151	Pentachlorophenol (PCP)	NELAP	PA	2/15/2005
EPA 8151	2 4 5-T	NELAP	PA	2/15/2005
EPA 8151	2 4 5-TP (Silvex)	NELAP	PA	2/15/2005
EPA 8151	2 4-D	NELAP	PA	2/15/2005
EPA 8151	2 4-DB (Butoxon)	NELAP	PA	2/15/2005
EPA 8151	Dalapon	NELAP	PA	2/15/2005
EPA 8151	Dicamba	NELAP	PA	2/15/2005
EPA 8151	Dichloroprop (Dichlorprop)	NELAP	PA	10/13/2005
EPA 8151	Dinoseb (2-sec-butyl-4 6-dinitrophenol DNBP)	NELAP	PA	2/15/2005
EPA 8151	MCPA	NELAP	PA	10/13/2005
EPA 8151	MCPP (Mecoprop)	NELAP	PA	2/15/2005
EPA 8260	Benzyl chloride	NELAP	PA	10/13/2005
EPA 8260	1 1 1 2-Tetrachloroethane	NELAP	PA	2/15/2005
EPA 8260	1 1 1-Trichloroethane	NELAP	PA	2/15/2005
EPA 8260	1 1 2 2-Tetrachloroethane	NELAP	PA	2/15/2005
EPA 8260	1 1 2-Trichloroethane	NELAP	PA	2/15/2005
EPA 8260	1 1-Dichloroethane	NELAP	PA	2/15/2005
EPA 8260	1 1-Dichloroethene (1 1-Dichloroethylene)	NELAP	PA	2/15/2005
EPA 8260	1 1-Dichloropropene	NELAP	PA	10/13/2005
EPA 8260	1 2 3-Trichlorobenzene	NELAP	PA	11/2/2005
EPA 8260	1 2 3-Trichloropropane (1 2 3-TCP)	NELAP	PA	11/2/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Solid and Chemical Materials**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260	1 2 4-Trichlorobenzene	NELAP	PA	2/15/2005
EPA 8260	1 2 4-Trimethylbenzene	NELAP	PA	12/1/2006
EPA 8260	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	11/2/2005
EPA 8260	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	2/15/2005
EPA 8260	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 8260	1 2-Dichloroethane	NELAP	PA	2/15/2005
EPA 8260	1 2-Dichloropropane	NELAP	PA	2/15/2005
EPA 8260	1 3 5-Trimethylbenzene	NELAP	PA	10/13/2005
EPA 8260	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 8260	1 3-Dichloropropane	NELAP	PA	10/13/2005
EPA 8260	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 8260	1 4-Dioxane (1 4-Diethyleneoxide)	NELAP	PA	10/13/2005
EPA 8260	1-Chlorobutane	NELAP	PA	11/2/2005
EPA 8260	1-Chlorohexane	NELAP	PA	10/13/2005
EPA 8260	1-Propanol (n-Propanol)	NELAP	PA	10/13/2005
EPA 8260	2 2-Dichloropropane	NELAP	PA	10/13/2005
EPA 8260	2-Butanone (Methyl ethyl ketone) (MEK)	NELAP	PA	2/15/2005
EPA 8260	2-Chloroethyl vinyl ether	NELAP	PA	12/1/2006
EPA 8260	2-Chlorotoluene	NELAP	PA	10/13/2005
EPA 8260	2-Hexanone	NELAP	PA	2/15/2005
EPA 8260	2-Nitropropane	NELAP	PA	10/13/2005
EPA 8260	2-Propanol (Isopropyl alcohol)	NELAP	PA	10/13/2005
EPA 8260	4-Chlorotoluene	NELAP	PA	10/13/2005
EPA 8260	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	11/2/2005
EPA 8260	4-Methyl-2-pentanone (MIBK)	NELAP	PA	2/15/2005
EPA 8260	Acetone	NELAP	PA	2/15/2005
EPA 8260	Acetonitrile	NELAP	PA	10/13/2005
EPA 8260	Acrolein (Propenal)	NELAP	PA	2/15/2005
EPA 8260	Acrylonitrile	NELAP	PA	2/15/2005
EPA 8260	Benzene	NELAP	PA	2/15/2005
EPA 8260	Bromobenzene	NELAP	PA	10/13/2005
EPA 8260	Bromochloromethane	NELAP	PA	10/13/2005
EPA 8260	Bromodichloromethane	NELAP	PA	2/15/2005
EPA 8260	Bromoform	NELAP	PA	2/15/2005
EPA 8260	Carbon disulfide	NELAP	PA	2/15/2005
EPA 8260	Carbon tetrachloride	NELAP	PA	2/15/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Solid and Chemical Materials**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260	Chlorobenzene	NELAP	PA	2/15/2005
EPA 8260	Chloroethane	NELAP	PA	2/15/2005
EPA 8260	Chloroform	NELAP	PA	2/15/2005
EPA 8260	Chloroprene (2-Chloro-1,3-butadiene)	NELAP	PA	10/13/2005
EPA 8260	Dibromochloromethane	NELAP	PA	2/15/2005
EPA 8260	Dibromomethane	NELAP	PA	10/13/2005
EPA 8260	Dichlorodifluoromethane (Freon-12)	NELAP	PA	2/15/2005
EPA 8260	Diethyl ether	NELAP	PA	10/13/2005
EPA 8260	Ethyl acetate	NELAP	PA	10/13/2005
EPA 8260	Ethyl methacrylate	NELAP	PA	11/2/2005
EPA 8260	Ethylbenzene	NELAP	PA	2/15/2005
EPA 8260	Hexachlorobutadiene	NELAP	PA	2/15/2005
EPA 8260	Hexachloroethane	NELAP	PA	2/15/2005
EPA 8260	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	10/13/2005
EPA 8260	Isopropylbenzene	NELAP	PA	11/2/2005
EPA 8260	Methacrylonitrile	NELAP	PA	10/13/2005
EPA 8260	Methyl bromide (Bromomethane)	NELAP	PA	2/15/2005
EPA 8260	Methyl chloride (Chloromethane)	NELAP	PA	2/15/2005
EPA 8260	Methyl tert-butyl ether (MTBE)	NELAP	PA	2/15/2005
EPA 8260	Methylacrylate	NELAP	PA	10/13/2005
EPA 8260	Methylene chloride (Dichloromethane)	NELAP	PA	2/15/2005
EPA 8260	Methylmethacrylate	NELAP	PA	10/13/2005
EPA 8260	Naphthalene	NELAP	PA	2/15/2005
EPA 8260	Nitrobenzene	NELAP	PA	2/15/2005
EPA 8260	Pentachloroethane	NELAP	PA	11/2/2005
EPA 8260	Styrene	NELAP	PA	2/15/2005
EPA 8260	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	2/15/2005
EPA 8260	Toluene	NELAP	PA	2/15/2005
EPA 8260	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	2/15/2005
EPA 8260	Trichlorofluoromethane (Freon-11)	NELAP	PA	2/15/2005
EPA 8260	Vinyl acetate	NELAP	PA	10/13/2005
EPA 8260	Vinyl chloride	NELAP	PA	2/15/2005
EPA 8260	Xylene (total)	NELAP	PA	2/15/2005
EPA 8260	cis-1 2-Dichloroethene	NELAP	PA	2/15/2005
EPA 8260	cis-1 3-Dichloropropene	NELAP	PA	2/15/2005
EPA 8260	n-Butylbenzene	NELAP	PA	10/13/2005

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Solid and Chemical Materials**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260	n-Propylbenzene	NELAP	PA	10/13/2005
EPA 8260	sec-Butylbenzene	NELAP	PA	10/13/2005
EPA 8260	tert-Butylbenzene	NELAP	PA	10/13/2005
EPA 8260	trans-1 2-Dichloroethene	NELAP	PA	2/15/2005
EPA 8260	trans-1 3-Dichloropropene	NELAP	PA	2/15/2005
EPA 8260	trans-1 4-Dichloro-2-butene	NELAP	PA	10/13/2005
EPA 8260-Extended	Diisopropyl ether (DIPE)	NELAP	PA	11/2/2005
EPA 8260-Extended	Diisopropyl ether (DIPE)	NELAP	PA	11/2/2005
EPA 8260-Extended	1 1 2-Trichloro-1 2 2-trifluoroethane (Freon-113)	NELAP	PA	11/2/2005
EPA 8260-Extended	1 1-Dichloro-2-propanol	NELAP	PA	11/2/2005
EPA 8260-Extended	2 4 4-Trimethyl-1-pentene (Diisobutylene)	NELAP	PA	5/31/2006
EPA 8260-Extended	Cyclohexane	NELAP	PA	11/2/2005
EPA 8260-Extended	Ethyl tert-butyl ether (ETBE)	NELAP	PA	11/2/2005
EPA 8260-Extended	Heptane	NELAP	PA	11/2/2005
EPA 8260-Extended	Hexane	NELAP	PA	11/2/2005
EPA 8260-Extended	Methyl acetate	NELAP	PA	11/2/2005
EPA 8260-Extended	Methyl isobutyl ketone (Hexone)	NELAP	PA	11/2/2005
EPA 8260-Extended	Methylcyclohexane	NELAP	PA	11/2/2005
EPA 8260-Extended	Octane	NELAP	PA	11/2/2005
EPA 8260-Extended	Pentane	NELAP	PA	11/2/2005
EPA 8260-Extended	Tetrahydrofuran (THF)	NELAP	PA	11/2/2005
EPA 8260-Extended	tert-Amyl alcohol (2-Methyl-2-butanol)	NELAP	PA	12/1/2006
EPA 8260-Extended	tert-Amyl ethyl ether	NELAP	PA	12/1/2006
EPA 8260-Extended	tert-Amyl methyl ether (TAME)	NELAP	PA	11/2/2005
EPA 8260B	1 1 1 2-Tetrachloroethane	NELAP	PA	11/2/2005
EPA 8260B	Allyl chloride (3-Chloropropene)	NELAP	PA	11/2/2005
EPA 8260B	Diethyl ether	NELAP	PA	11/2/2005
EPA 8270	1 2 4 5-Tetrachlorobenzene	NELAP	PA	10/13/2005
EPA 8270	1 2-Dinitrobenzene (1 2-DNB)	NELAP	PA	10/13/2005
EPA 8270	1 3-Dinitrobenzene (1 3-DNB)	NELAP	PA	10/13/2005
EPA 8270	1 4-Dinitrobenzene (1 4-DNB)	NELAP	PA	10/13/2005
EPA 8270	2 3 4 6-Tetrachlorophenol	NELAP	PA	12/1/2006
EPA 8270	2 4 5-Trichlorophenol	NELAP	PA	2/15/2005
EPA 8270	2 4 6-Trichlorophenol	NELAP	PA	2/15/2005
EPA 8270	2 4-Dichlorophenol	NELAP	PA	2/15/2005
EPA 8270	2 4-Dimethylphenol	NELAP	PA	2/15/2005

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State Laboratory ID: 22-00293 **EPA Lab Code:** PA00102 (717) 944-5541

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Solid and Chemical Materials**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270	2 4-Dinitrophenol	NELAP	PA	2/15/2005
EPA 8270	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	2/15/2005
EPA 8270	2 6-Dichlorophenol	NELAP	PA	10/13/2005
EPA 8270	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	2/15/2005
EPA 8270	2-Chloronaphthalene	NELAP	PA	2/15/2005
EPA 8270	2-Chlorophenol	NELAP	PA	2/15/2005
EPA 8270	2-Methyl-4 6-dinitrophenol (4 6-Dinitro-2-methylphenol)	NELAP	PA	11/2/2005
EPA 8270	2-Methylnaphthalene	NELAP	PA	2/15/2005
EPA 8270	2-Methylphenol (o-Cresol)	NELAP	PA	2/15/2005
EPA 8270	2-Naphthylamine (beta-Naphthylamine)	NELAP	PA	10/13/2005
EPA 8270	2-Nitroaniline	NELAP	PA	2/15/2005
EPA 8270	2-Nitrophenol	NELAP	PA	2/15/2005
EPA 8270	3 3'-Dichlorobenzidine	NELAP	PA	2/15/2005
EPA 8270	3-Methylphenol (m-Cresol)	NELAP	PA	2/15/2005
EPA 8270	3-Nitroaniline	NELAP	PA	2/15/2005
EPA 8270	4-Bromophenyl phenyl ether	NELAP	PA	2/15/2005
EPA 8270	4-Chloro-3-methylphenol	NELAP	PA	2/15/2005
EPA 8270	4-Chloroaniline	NELAP	PA	2/15/2005
EPA 8270	4-Chlorophenyl phenyl ether	NELAP	PA	2/15/2005
EPA 8270	4-Methylphenol (p-Cresol)	NELAP	PA	11/2/2005
EPA 8270	4-Nitroaniline	NELAP	PA	2/15/2005
EPA 8270	4-Nitrophenol	NELAP	PA	11/2/2005
EPA 8270	Acenaphthene	NELAP	PA	2/15/2005
EPA 8270	Acenaphthylene	NELAP	PA	2/15/2005
EPA 8270	Acetophenone	NELAP	PA	11/2/2005
EPA 8270	Aniline	NELAP	PA	11/2/2005
EPA 8270	Anthracene	NELAP	PA	2/15/2005
EPA 8270	Benzidine	NELAP	PA	11/2/2005
EPA 8270	Benzo(a)anthracene	NELAP	PA	2/15/2005
EPA 8270	Benzo(a)pyrene	NELAP	PA	2/15/2005
EPA 8270	Benzo(b)fluoranthene	NELAP	PA	2/15/2005
EPA 8270	Benzo(g h i)perylene	NELAP	PA	2/15/2005
EPA 8270	Benzo(k)fluoranthene	NELAP	PA	2/15/2005
EPA 8270	Benzoic acid	NELAP	PA	12/1/2006
EPA 8270	Benzyl alcohol	NELAP	PA	10/13/2005
EPA 8270	Butyl benzyl phthalate (Benzyl butyl phthalate)	NELAP	PA	11/2/2005

Attachment to Certificate of Accreditation 007, expiration date January 31, 2010. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270	Chrysene	NELAP	PA	2/15/2005
EPA 8270	Dibenzo(a h)anthracene	NELAP	PA	2/15/2005
EPA 8270	Dibenzofuran	NELAP	PA	2/15/2005
EPA 8270	Diethyl phthalate	NELAP	PA	2/15/2005
EPA 8270	Dimethyl phthalate	NELAP	PA	2/15/2005
EPA 8270	Diphenylamine	NELAP	PA	11/2/2005
EPA 8270	Fluoranthene	NELAP	PA	2/15/2005
EPA 8270	Fluorene	NELAP	PA	2/15/2005
EPA 8270	Hexachlorobenzene	NELAP	PA	2/15/2005
EPA 8270	Hexachlorocyclopentadiene	NELAP	PA	2/15/2005
EPA 8270	Indeno(1 2 3-cd)pyrene	NELAP	PA	2/15/2005
EPA 8270	Isophorone	NELAP	PA	2/15/2005
EPA 8270	Nicotine	NELAP	PA	11/2/2005
EPA 8270	Pentachlorobenzene	NELAP	PA	12/1/2006
EPA 8270	Pentachlorophenol (PCP)	NELAP	PA	2/15/2005
EPA 8270	Phenanthrene	NELAP	PA	2/15/2005
EPA 8270	Phenol	NELAP	PA	2/15/2005
EPA 8270	Pyrene	NELAP	PA	2/15/2005
EPA 8270	Resorcinol	NELAP	PA	11/2/2005
EPA 8270	bis(2-Chloroethoxy)methane	NELAP	PA	2/15/2005
EPA 8270	bis(2-Chloroethyl) ether	NELAP	PA	10/13/2005
EPA 8270	bis(2-Chloroisopropyl) ether	NELAP	PA	2/15/2005
EPA 8270	bis(2-Ethylhexyl) phthalate (DEHP)	NELAP	PA	2/15/2005
EPA 8270	n-Nitrosodi-n-propylamine	NELAP	PA	11/2/2005
EPA 8270	n-Nitrosodiethylamine	NELAP	PA	11/2/2005
EPA 8270	n-Nitrosodimethylamine	NELAP	PA	11/2/2005
EPA 8270	n-Nitrosodiphenylamine	NELAP	PA	2/15/2005
EPA 8270	n-Nitrosopyrrolidine	NELAP	PA	10/13/2005
EPA 8270	1 2 4-Trichlorobenzene	NELAP	PA	2/15/2005
EPA 8270	1 2-Dichlorobenzene (o-Dichlorobenzene)	NELAP	PA	10/13/2005
EPA 8270	1 3-Dichlorobenzene (m-Dichlorobenzene)	NELAP	PA	10/13/2005
EPA 8270	1 4-Dichlorobenzene (p-Dichlorobenzene)	NELAP	PA	2/15/2005
EPA 8270	Hexachlorobutadiene	NELAP	PA	2/15/2005
EPA 8270	Hexachloroethane	NELAP	PA	2/15/2005
EPA 8270	Naphthalene	NELAP	PA	2/15/2005
EPA 8270	Nitrobenzene	NELAP	PA	2/15/2005

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State Laboratory ID: 22-00293 **EPA Lab Code: PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270	Pyridine	NELAP	PA	2/15/2005
EPA 8270	n-Nitroso-di-n-butylamine	NELAP	PA	11/2/2005
EPA 8270-Extended	Dichloramine-T (p-Toluenesulfondichloramide)	NELAP	PA	12/1/2006
EPA 8270-Extended	1-Methylnaphthalene	NELAP	PA	12/1/2006
EPA 8270-Extended	2 2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl) ether)	NELAP	PA	12/1/2006
EPA 8270-Extended	2 3 5 6-Tetrachlorophenol	NELAP	PA	12/1/2006
EPA 8270-Extended	Azobenzene	NELAP	PA	12/1/2006
EPA 8270-Extended	Benzaldehyde	NELAP	PA	9/8/2008
EPA 8270-Extended	Carbazole	NELAP	PA	2/15/2005
EPA 8270-Extended	Diphenyl ether	NELAP	PA	12/1/2006
EPA 8270-Extended	alpha-Terpineol	NELAP	PA	12/1/2006
EPA 8270-Extended	bis(2-Chlorethoxy) ether	NELAP	PA	12/1/2006
EPA 8270-Extended	2 3 7 8-TCDD (Dioxin) (screen)	NELAP	PA	3/9/2007
EPA 8270-Extended	1 1-Biphenyl (Biphenyl)	NELAP	PA	12/1/2006
EPA 8270-Extended	Caprolactam	NELAP	PA	12/1/2006
EPA 8270C	Di-n-butyl phthalate	NELAP	PA	2/15/2005
EPA 8270C	Di-n-octyl phthalate	NELAP	PA	2/15/2005
EPA 8270C	Dimethoate	NELAP	PA	12/1/2006
EPA 8270C-Extended	Atrazine	NELAP	PA	12/1/2006
EPA 8270C-Extended	1 4-Dioxane (1 4-Diethyleneoxide)	NELAP	PA	4/14/2008
EPA 8330	1 3 5-Trinitrobenzene (1 3 5-TNB)	NELAP	PA	4/10/2006
EPA 8330	1 3-Dinitrobenzene (1 3-DNB)	NELAP	PA	4/10/2006
EPA 8330	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	7/27/2006
EPA 8330	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	7/27/2006
EPA 8330	Methyl-2 4 6-trinitrophenylnitramine (Tetryl)	NELAP	PA	4/10/2006
EPA 8330	2 4 6-Trinitrotoluene (2 4 6-TNT)	NELAP	PA	4/10/2006
EPA 8330	2-Amino-4 6-dinitrotoluene (2-am-dnt)	NELAP	PA	4/10/2006
EPA 8330	2-Nitrotoluene	NELAP	PA	4/10/2006
EPA 8330	3-Nitrotoluene	NELAP	PA	4/10/2006
EPA 8330	4-Amino-2 6-dinitrotoluene (4-am-dnt)	NELAP	PA	4/10/2006
EPA 8330	4-Nitrotoluene	NELAP	PA	4/10/2006
EPA 8330	Octahydro-1 3 5 7-tetranitro-1 3 5 7-tetrazocine (HMX)	NELAP	PA	4/10/2006
EPA 8330	RDX (Hexahydro-1 3 5-trinitro-1 3 5-triazine)	NELAP	PA	4/10/2006
EPA 8330	Nitrobenzene	NELAP	PA	7/27/2006
EPA 9010	Total cyanide	NELAP	PA	4/5/2006

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State Laboratory ID: **22-00293** **EPA Lab Code:** **PA00102** **(717) 944-5541**

Analytical Laboratory Services, Inc.
34 Dogwood Lane
Middletown, PA 17057

Program **Solid and Chemical Materials**

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 9012	Total cyanide	NELAP	PA	2/15/2005
EPA 9020	Total organic halides (TOX)	NELAP	PA	11/2/2005
EPA 9023	Extractable organic halides (EOX)	NELAP	PA	12/19/2006
EPA 9040	Corrosivity (pH)	NELAP	PA	2/15/2005
EPA 9040	pH	NELAP	PA	2/15/2005
EPA 9045	pH	NELAP	PA	2/15/2005
EPA 9056	Bromide	NELAP	PA	2/15/2005
EPA 9056	Chloride	NELAP	PA	2/15/2005
EPA 9056	Fluoride	NELAP	PA	2/15/2005
EPA 9056	Nitrate	NELAP	PA	2/15/2005
EPA 9056	Nitrite	NELAP	PA	2/15/2005
EPA 9056	Sulfate	NELAP	PA	12/1/2006
EPA 9060	Total organic carbon (TOC)	NELAP	PA	4/5/2006
EPA 9066	Total phenolics	NELAP	PA	4/5/2006
EPA 9071	Oil and Grease	NELAP	PA	2/15/2005
EPA 9095A	Paint filter liquids test	NELAP	PA	2/15/2005
SM 2540 G	Residue-total	NELAP	PA	12/1/2006

Aaren Alger

Helen M. MacMinn — Quality Assurance Manager

Rev. 01-2009

EDUCATION

B.A. Chemistry (Mathematics), 1980, Cheyney University,
Teaching Certificate in Secondary Science, 1984, Cheyney University/Immaculate College

POSITION OVERVIEW

As Quality Assurance Manager, Ms. MacMinn is responsible for maintaining current laboratory certifications and accreditations obtained from the American Association for Laboratory Accreditation Program, National Environmental Laboratory Accreditation Program, and various state agencies including the Pennsylvania Department of Environmental Protection, the State of Maryland Department of the Environment, the State of Connecticut Department of Public Health, Delaware Health and Social Services, the Commonwealth of Virginia Department of General Services, the State of New York Department of Health, the State of New Jersey Department of Environmental Protection, the State of Georgia Department of Natural Resources, and the Sate of West Virginia . Ms. MacMinn was a key player in obtaining primary NELAP accreditation in Pennsylvania for the SDWA, CWA, RCRA programs and secondary NELAP accreditation in the states of New Jersey and New York. The NELAP program is based on ISO/IEC Guide 25 – 1990, "General Requirements for the Competence of Calibration and Testing Laboratories" and ISO/IEC Guide 58, "Calibration and Testing Laboratory Accreditation Systems—General Requirements for Operation and Recognition". Ms. MacMinn also received validation from the Navy Facilities Engineering Services Center (Department of the Navy) to perform analytical testing for the Navy program and transitioned laboratory from the original USACE HTRW validation program to ALSI's compliance to the latest DOD QSM and NELAC participation. In order to maintain these certifications and accreditations, Ms. MacMinn continually interacts with regulatory personnel and participates in numerous audits which not only tests the technical abilities in the laboratories but also the overall operation and service of the laboratory.

As manager of the laboratory's quality system, responsibilities include overseeing quality assurance aspects of the data, conducts internal performance and system audits on the entire technical operation annually, approves and modifies the laboratories' Standard Operating Procedures, maintains document control, and updates the laboratory Quality Assurance Manual as required. Ms. MacMinn also orchestrates the PT Program which includes proficiency evaluation samples for wastewater, drinking water, solid and hazardous waste samples, and soil samples; and runs a single blind PE sample program.

Some other tasks include conducting an annual quality review with upper management; initiates and maintains employee training records; maintains a subcontractor approval program; organizes and performs orientation for new employees detailing laboratory QA/QC requirements; and assists the marketing group with required quality control documentation for proposal and bid submissions.

PROFESSIONAL EXPERIENCE

Philip Analytical Services, Reading, PA (FKA/ SSM/Laboratories, Inc.)
Technical Director/Quality Assurance Manager (1995 – 2000)
As Technical Director/Quality Assurance Manager, Ms. MacMinn served as a major source of technical information and expertise on analytical methods in the laboratory. Ms. MacMinn was responsible for assisting clients and the Client Services Department in the interpretations of regulatory and analytical requirements to meet required protocols. She provided experience in the implementation of methodologies for the analytical staff of the laboratory. Ms. MacMinn developed and implemented the laboratory's Quality Assurance Program, coordinated the laboratory's certifications, accreditations, internal audits, analytical performance evaluations, employee training and safety programs. In addition, Ms. MacMinn initiated and maintained the quality assurance manual, qualification manual and standard operating procedures for the laboratory. During her tenure at Philip's, Ms. MacMinn instituted a data validation program for evaluating all environmental analyses according to criteria set forth in USEPA CLP (Contract Laboratory Program), SW-846, 40 CFR, NIOSH, OSHA, and NELAC for the analysis of drinking water, wastewater, solid and hazardous waste and air emissions. Ms. MacMinn became familiar with GLP and ISO Guide 25 and 17025 for Environmental Laboratory Services.

Thermo Analytical, Pottstown, PA
Quality Assurance/Quality Control Manager/Senior Analytical Chemist (1988-1995)
Ms. MacMinn was responsible for quality assurance/quality control including managing the Quality Assurance Program, the validation of analytical chemistry data, certification and accreditation programs, internal audits, maintenance of control charts, upgrading the QA/QC Manual and personnel training.

Roy F. Weston, Inc., Lionville, PA
Associate Project Scientist (1987-1988)
Ms. MacMinn was responsible for QA/QC involving data validation, certifications, accreditations, performance evaluation studies, internal audits and maintenance of control charts.

Foote Mineral, Exton, PA

Chemist/Quality Assurance (1986-1987)

Ms. MacMinn was responsible for the quality control testing of chemical and mineral products by wet chemistry analysis including atomic absorption determinations. Ms. MacMinn also engaged in environmental analysis of wastewater including dissolved oxygen, suspended soils, nitrogen and phosphate analysis.

Hernderson Senior High School, West Chester, PA

Teacher (1984-1986)

Ms. MacMinn taught Advanced Seminar Chemistry and Introduction to Physical Chemistry.

Scott Paper Company, Chester, PA

Chemist/Packaging Engineer (1980-1983)

Ms. MacMinn was responsible for quality standards and compliance related to corrugated cases, poly/paper wrappers and adhesives materials. Ms. MacMinn developed specifications changes and ensured test and equipment reliability and validation; initiated waste monitoring programs and served as technical consultant to production personnel on problems related to packaging/adhesive issues as they applied to high-speed equipment. Ms. MacMinn supervised a modern adhesive batch make-up facility and coordinated vendor activities with production including developmental work on new projects.

TRAINING

Problem Solving
Troubleshooting
Technical Writing
Time Management
Multiple Project Management
Good Laboratory Practices (GLP)
USEPA Contract Laboratory Program Organic Validation Certification (1994)
American Red Cross Adult CPR/Standard First Aid (2001) (2008)
ALSI Hazard Communications Training (2001)
Advanced Systems, Inc. – *Measurement Uncertainty for Testing Laboratories* – 8 hours (2001)
ALSI Fire Extinguisher Training (2002)
SkillPath *Managers and Supervisors Conference* (2002)
Red Cross Adult CPR Refresher (2002)
NYAAEL *"Environmental Laboratory Data Issues"* (2002)
ASQ *"Certified Quality Management Refresher"* – 30 hours (2003)
INELA *"Internal Audits, Management Reviews, and Corrective Actions"* (2004)
The NELAC Institute – Recognition of Outstanding Contribution to the *Establishment of a NELAP* (2004)
American Red Cross – First Aid Basics, Adult/Infant/Child CPR, Preventing Disease Transmission, AED Essentials (2005)
NY/PAAAEL Certificate of Attendance – 5 hours – *Water Security* (2005)
NY/PAAEL Certificate of Attendance – 3 hours – *EPA Quality Update* (2005)
Advanced Systems, Inc. – *Preventing Improper Laboratory Practice* (2005)
NY/PAAAEL – 3 hours – *MUR Updates Microbiology* (2006)
American Red Cross – CPR/AED Adult (2006)
ALSI *SOP Validation Training* Participation (2006)
NJWEA Recognition of Participation at the May 2007 NJWEA Annual Conference (2007)
CareerTrack – *Managing Emotions Under Pressure* – 0.6 CEUs (2007)
The NELAC Institute – *Data Review and Validation* (2007)
Advanced Systems Inc. – Root Cause Analysis (2007)
Engle-Hambright & Davies, Inc. – PA Labor & Industry Annual Safety Committee Training (2008)

PUBLICATIONS

Helen MacMinn and B. Chris Weathington, "Double Blind/Single Blind Performance Evaluation Samples and Their Treatment,"—presented at the American Chemical Society/Quality Assurance Symposium, 1990.

Christopher P. Kahler

GC/MS Volatiles Group Leader

Rev. 01-2009

EDUCATION

Earned 90 Credits towards B.S., Chemistry, Lebanon Valley College, Lebanon, PA

POSITION OVERVIEW

Mr. Kahler has been a professional chemist for 13 years. In March 2007, Mr. Kahler was appointed GC/MS Group Leader for the GC/MS Volatiles Laboratory at ALSI. Mr. Kahler is responsible for the performance of environmental testing of water, soils, solids for volatiles organic compounds using Gas Chromatography/Mass Spectrometry instrumentation according to the criteria set forth in various EPA and SW-846 methods. In assuring high quality data, Mr. Kahler reviews all technical information originating from his department. He trains his analysts and maintains all documentation to assure proper training and competency. Mr. Kahler is responsible for maintaining the HP ChemServer Administrator for the GC, GC/MS and HPLC departments which includes full knowledge of the HP DOS ChemStation, HP ChemServer, and PC stations. In conjunction with his computer responsibilities, Mr. Kahler maintains and runs the ThruPut Envision Software which produces CLP forms which are required for data deliverables packages. As part of mass spectral interpretation, Mr. Kahler is responsible for data review of QC and samples. He performs compound identification which is done by comparing retention times and mass spectra for each analyte found in the samples to those found through the analysis of a known standard. Mr. Kahler reviews nonstandard analytes in the samples by utilizing the NBS library search capabilities in the Target3 Software.

As a chemist, Mr. Kahler is responsible for analyzing a variety of samples to determine volatile and semivolatile organic compounds using direct injection and purge/trap methods of GC/MS and analyzing solids, soil, surface water, groundwater, and wastewater using EPA methods such as 524, 525, 624, 625, and SW-846 methods such as 8260 and 8270. Mr. Kahler uses the HP ChemServer software to conduct GC/MS data validation and enter results into the Horizon LIMS. As part of the QA/QC practices in this department, Mr. Kahler maintains quality control reports and logbooks on a daily, monthly, and yearly basis. Mr. Kahler also took the lead in developing EPA Methods 527 and 529 for the upcoming EPA UCMR2 regulations for PWSs across the nation.

PROFESSIONAL EXPERIENCE

Analytical Laboratory Services, Inc., Middletown, PA

GC/MS Chemist (1998-2007)

Mr. Kahler became a GC/MS Chemist in 1998 where he was responsible for analytical testing of GC/MS volatiles and prompt turnaround time of client's samples. Mr. Kahler traced samples from the time the sample was entered into the LIMS to when it was analyzed, reviewed, and approved. In addition, Mr. Kahler was responsible for ordering and preparing the standards used by the GC/MS volatiles group; backing up data from the Chemserver to archive tapes for future reference; ran samples of various matrices such as liquid, soil, solids (low-level and medium (MeOH-preserved) using methods 8260B, 624, 524.2, and 5035. Use of software included Target Chemserver, Enviroquant; HP-RTE, Word, Excel, Write, WordPerfect. Mr. Kahler was also responsible for developing methods for 525.2 – Semivolatiles by GC/MS in drinking water and method 527 and 529 for the new UCMR2 List 1 contaminant regulations for PWSs.

Analytical Laboratory Services, Inc., Middletown, PA

GC Chemist (1996-1998)

Mr. Kahler became a GC Chemist in 1996 where he was responsible for running GC and HPLC instrumentation and tests. Some of the tests he was responsible for included 8021, 502.2, 601,602, GRO and HPLC 531.1.

Analytical Laboratory Services, Inc., Middletown, PA

Prep Technician (1994-1996)

Mr. Kahler began his career at ALSI as a prep technician performing organic and inorganic prep methods to support the GC/MS, GC, and Metals laboratories.

TRAINING

- ALSI Standards of Business Ethics and Conduct (2000)
- ALSI Hazard Communications Training (2001)
- ALSI Fire Extinguisher Training (2002)
- ALSI Safe Handling and Storage of Compressed Gas (2002)
- Red Cross Adult CPR Refresher (2002)
- ALSI Chemical Hygiene Plan (2002
- PaAAEL, "Optimizing GC/MS Parameters" (2002)
- ALSI Horizon LIMS Training (2003)
- Advanced Systems Inc - Preventing Improper Laboratory Practice, (2005)
- Thermo Xcaliber Training (2005)
- Excelling as a First-Time Manager or Supervisor, (.5 CEUs), SkillPath Seminars (2007)
- ALSI Hazcom, Lab Standards, Ventilation, Flammable and Combustible Liquids, Eye Protection, PPE, Compressed Gasses Training (2007)
- MDL Systems – One-Day GC/MS Volatiles Training Course (2007)
- Advanced Systems Inc. – Root Cause Analysis (2007)
- Entech Air Academy—Air Analysis Training (2008)

Anna G. Milliken — Laboratory Operations Manager

Rev. 01-2009

EDUCATION

B.S. Chemistry, 1986 (graduated summa cum laude), Slippery Rock University, Pennsylvania

POSITION OVERVIEW

Ms. Milliken is responsible for directing and coordinating the activities of the laboratory departments including management of all personnel and capital resources available to successfully meet client and laboratory turnaround times (TAT). Ms. Milliken maintains a basic knowledge of all technical areas of the laboratory, laboratory processes, and Horizon LIMS in order to manage laboratory production of all laboratory analytical departments. Ms. Milliken has the final authority and responsibility regarding all analytical and reporting activities for all the departments including GC/MS, GC, Metals, Inorganic Prep, Organic Prep, Water Quality, and Microbiology. Ms. Milliken manages and provides daily guidance for all laboratory activities including but not limited to: serving as a liaison between analytical and other departments; monitoring turnaround time and resources; implementing QA directives and corrective actions; addressing suggestions and concerns of clients and external auditors; and approving the purchase of equipment, Ms. Milliken works hand-in-hand with the V.P. Corporate Operations, QA Manager, and IT Director.

Ms. Milliken is responsible for ensuring commitment to compliance with the standards as stated in ISO17025. She supports the activities of the production laboratory by providing technical guidance and client support in relation to troubleshooting instrument problems, methods development, results interpretation and compliance with NELAP, DoD, and other QA Program requirements; ensures the efficient operations of all laboratory instrumentation by providing the departmental supervisors technical guidance with relation to method compliance and method development; develops and maintains laboratory systems, working with the QA Manager to ensure ALSI compliance with the DoD QSM, NELAP, and other QA Program requirements.

In addition Ms. Milliken assists the IT Director in the understanding and development of automated data deliverables for ALSI clientele including direct interface with the IT Group, software vendors, and laboratory staff which are required to accomplish this task; assists analytical staff in the timely development of new methods in a cost-effective manner; responds to client inquiries as a direct response to their analytical results; contributes to the Senior Management Team by assisting and advising on policies and creating a strategy for directing growth of the laboratory and provides assistance to the Sales and Marketing team on technical presentations to be presented to potential and existing customer base. Ms. Milliken also provides technical review of QAPPs and SOWs submitted for request for proposals. She provides oversight to the Sample Management group following a demonstration of proficiency in all aspects of Horizon LIMS and Field Scheduling activities.

Ms. Milliken supports the laboratory by maintaining the knowledge of and responsible for investigating all regulations and technical requirements for both Federal and State environmental programs and communicating updates and revisions to all personnel affected by these changes.

PROFESSIONAL EXPERIENCE

Analytical Laboratory Services, Inc, Middletown, PA
Wet Chemistry Group Leader (1999 – 2005)
Ms. Milliken supervised the water quality/wet chemistry department which operates on three (3) shifts, five (5) days a week. Ms. Milliken maintained a general working knowledge of all test methods performed in these sections including the TOC/TOX and asbestos sections where she was responsible for departmental data review and interpretation and implementation of EPA analytical methods for analysis of soils, solid waste, drinking water and wastewater. Ms. Milliken was also responsible for following the QA/QC program, which included the development of standard operating procedures (SOPs) and the analysis of MDLs for all analytical procedures. Ms. Milliken also provided orientation and training of new employees on new methods, instrumentation training, cross training, etc.

Gannett Fleming Environmental Laboratory, Camp Hill, PA
Wet Chemistry Supervisor (1997 – 1999)
Ms. Milliken was responsible for supervising the wet chemistry department. She was responsible for the training and supervision of chemists and technicians. She was responsible for analytical testing on various matrices using SW-846, EPA, and Standard

Method protocols. She was responsible for the scheduling, analysis, and completion of all samples received for the wet chemistry department.

Wright Laboratory Services, Inc., Middletown, PA
1993 – 1995; Quality Assurance Coordinator
Ms. Milliken was responsible for maintaining the laboratory's Quality Assurance Plan and ensured all protocol set forth in the plan was followed. Ms. Milliken was responsible for maintaining current certifications/accreditations and pursuing interest in other programs. Ms. Milliken assisted in preparing data validation packages including USACE and CLP-type data deliverables. During this time, Ms. Milliken acted as a client contact and technical representative for several government and landfill clients.

1988 – 1993; Water Quality Supervisor
Ms. Milliken was responsible for supervising and training all employees in the Water Quality, Microbiology, and TOC/TOX departments. She was also responsible for approving all data produced in these departments. During this time, Ms. Milliken was significant in the expansion of the Water Quality Department from two (2) employees working one (1) shift to eight (8) employees working three (3) shifts. Ms. Milliken researched and developed new methodologies and assisted in the purchasing of new instrumentation. She also successfully completed the Water Supply and Water Pollution Performance Evaluation Studies, and implemented a radon testing program.

1986 – 1988; Water Quality Chemist
Ms. Milliken acted as a Water Quality Chemist performing various wet chemistry methods using EPA, SW-846, and APHA methodologies.

TRAINING

Pennsylvania Department of Environmental Protection, Certification for Analysis of Radon Using Charcoal Canisters
ALSI Flammables and Explosives Safety Training (2001)
ALSI Hazard Communications Training (2001)
ALSI Safe Handling and Storage of Compressed Gases (2002)
ALSI Chemical Hygiene Plan (2002)
ALSI Horizon LIMS Training (2003)
Advanced Systems Inc. – Course 011 – Root Cause Analysis (2007)

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

G-3: LDC

MALCOLM PIRNIE

2118151 / BAL

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

STATEMENT

OF

QUALIFICATIONS

PRESENTED BY:

LABORATORY DATA CONSULTANTS, Inc.
7750 El Camino Real, Suite 2L
Carlsbad, CA 92009

January 1, 2008

Table of Contents

INTRODUCTION

Laboratory Data Consultants, Inc. (LDC) is an environmental chemistry, data management, and software development company with over 17 years experience in data quality, database implementation, data usability, and environmental software development. Our services include:

- Data validation
- Database development and management
- Laboratory audits/Electronic tape audits
- Litigation support
- QA/QC training
- Automated data review software
- Automated audit software
- Software development

Our corporate office in Carlsbad, California is directed by Mr. Richard Amano, principal chemist, who has over twenty-five years experience in the environmental laboratory industry. Our Northern California operation is directed by Ms. Nanny Bosch, senior scientist. She oversees offices in Sacramento and Richmond, California. Our Florida office is directed by Mr. Julio Paredes, principal scientist.

Laboratory Data Consultants, Inc. (LDC) is an experienced commercial, Navy, AFCEE, and Army Corps of Engineers QA subcontractor. LDC's experience as a data validation, data management, quality assurance, litigation support, and software development subcontractor includes projects under the following contracts:

- Shell Oil (formerly Equiva) Laboratory QA Program
- Stringfellow QA/QC Program (Dept of Toxic Substances, California)
- Aerojet QA/QC Program (Aerojet)
- Automated Software Program (Florida DEP)
- Caltrans QA/QC Software Program (Caltrans)
- Navy CLEAN EFA West (Tetra Tech EMI)
- Navy CLEAN Pacific Division (Earth Tech)
- Navy CLEAN Southwest Division (Bechtel National)
- Navy RAC Southwest Division (IT/OHM Remediation)
- Army Corps of Engineers, Fort Ord (Harding Lawson)
- Army Corps of Engineers, Travis AFB (CH2M Hill)
- Army Corps of Engineers, Fort Irwin (ACOE, Sacramento District 8A)
- AFCEE/Army Corps, George AFB (Montgomery Watson)
- AFCEE, McClellan AFB (Jacobs Engineering Group)
- AFCEE, Various bases, Mentor Protegee Program (Montgomery Watson)
- AFCEE, Pease AFB (Bechtel National, Inc.)

Company Strengths

Laboratory Data Consultants, Inc. (LDC) can provide your company with professional services with an impeccable track record for timeliness, quality, technical expertise, and the ability to mitigate complex issues. Our clients will confirm our current and past performance under DOD, DOE, and commercial programs. We have experience and a proven track record demonstrated by the following:

- Data validation experience as a subcontractor for more than 80 Army Corps sites, over 100 AFCEE sites, several EPA sites, and under 6 Navy CLEAN and RAC contracts. This experience includes thorough understanding of the EPA, NAVFAC, AFCEE, and Army Corps validation guidelines. Data validation work has totaled over 10 million dollars in the past five years.

- Developed software applications for the Army Corps of Engineers, Caltrans, and the Navy to automate and streamline the quality of the data validation process.

- Developed software applications lab and field assessors to automate and streamline the auditing process.

- Supported Web-enabled databases and secured project management collaboration portals over the Internet for large environmental projects.

- Provided litigation support on several high profile environmental contamination projects including data fraud, MtBE, perchlorate, and NDMA.

- Thorough secondary QA review program and the staffing capacity (36 full time staff) to handle large projects of significant magnitude and importance.

- Successful completion of two DOE and four DOD audits to approve LDC's internal data validation procedures, QA program and documentation systems.

- LDC is a small, minority and disadvantaged business under the Metro Transit Authority program and has previously been 8(a) certified under the Small Business Administration.

Capabilities and Services

Analytical and field data on environmentally impacted sites are used for many purposes including: compliance with regulatory requirements, determination of the presence, concentration, and movement of hazardous substances in the environment, potential effects upon a community, and for the disposal, treatment, or other remedial actions of hazardous materials. In some cases, the data may be used in litigation in defense of a PRP action or final site closure. Therefore data must be of known quality. LDC provides the following services:

Third Party Data Validation

LDC provides third party data validation services under a strict internal and external Quality Assurance program which will assure the data end user of known and documented quality. With our data validation experience on high profile projects over the past fifteen years, LDC has developed well-documented procedures which support all facets of the data review process. This includes critical steps such as:

- Receipt and handling of data packages
- Project tracking
- Peer review for all data validation activities
- Internal training programs
- Internal and external audits
- Electronic data transfer and verification processes

Data Management/Software Programming

LDC provides database management and operations support to prime contractors and government entities. Additionally, LDC software programmers can customize programs to generate company specific reports and outputs. Our professionals will improve your productivity by producing high quality information systems for your applications. Our services include:

- Provide current hardware and software support
- Customize programs and reports
- Develop user friendly front end screens
- Train staff
- Provide Web hosted LDC Project Management System (LPMS)
- Provide LDC Web based EDMSi database on EQ5 platform

Other software applications developed by LDC include the following:

- Army Corps Automated Data Review (ADR) software
- Army Corps Environmental Data Management System (EDMS) software

- Florida DEP ADaPT software
- Florida DEP EDMS software
- Caltrans Automated Data Validation software
- LDC Automated Lab Audit software (AAS)
- LDC Automated Field Audit Software (FAS)
- EDMS/NEDD NIRIS software
- Florida STORET software

Electronic Data Deliverables

As a supplement to hard copy data validation reports, LDC has the ability to deliver electronic data deliverables (EDD) in a variety of formats. The scope of this effort is based on client requirements although generally includes the transfer of data validation qualifiers from hard copy validation reports to an existing data base. The EDD format is based on project specific requirements and may assume a variety of established database structures (i.e. IRPIRMS, SEDD, NEDD, ERPIMS, ADaPT, ADR, ITEMS, IRDMIS, OREIS). In addition, LDC has the ability to customize the format of electronic data deliverables to suit specific client demands.

Litigation Consulting

LDC has provided litigation support to attorneys as a technical expert in several cases. Our experience includes projects relating to:

- Laboratory fraud
- Inaccurate reporting of analytical data
- False claims
- Leaking underground storage tank liability
- Tracing plume contamination
- PCB characterization

LDC's performance as an expert witness or technical support expert has simplified environmental chemistry and laboratory issues for attorneys such that they can effectively address the issues. Several references can be provided upon request.

Automated Electronic Data Validation

LDC's automated data review tool (ADR) combines comprehensive relational database functionality with fully automated data validation performance. In either a single or multi-user environment, the system provides storage of analytical data, streamlined data access and retrieval, powerful browse and search tools, and a variety of data reporting formats. In addition, the core of the system consists of a powerful data verification and validation engine. Analytical data is evaluated against a variety of logical conditions and EPA Functional Guideline technical criteria. In addition to generating a host of outlier reports, the data is qualified in accordance with the EPA Organic and Inorganic Functional Guidelines.

ADR was designed to provide unparalleled access and validation of environmental analytical data. The system was designed and produced by developers who have broad exposure to data validation, data management and the environmental chemistry industry.

ADR Ease of Use

- Designed to provide maximum user comfort utilizing MS Windows® features.
- Easy Installation
- User friendly search and data filtering capabilities
- Import and export data directly to other Windows applications (MS Word, MS Excel, etc.)

ADR Database Features

- A fully integrated relational database.
- Robust database engine
- Stand alone relational database or connectivity with other databases
- ODBC connectivity to SQL database servers
- Easily import and export data to other database systems

ADR Data Verification and Validation Features

- Fully automated data validation
- Fully automated data verification and data logic evaluations
- Unparalleled ease of access to all stored data
- Automated routines to evaluate compliance with data deliverable specifications.

ADR Additional Features

- OLE functionality allows data to be linked to other applications
- System security with multiple levels of permissions
- Single or multi-user environment
- Integration with SEDD and NEDD data deliverables
- Specialized tools integrated with ERPIMS

ADR does not require specialized computer skills for operation. It was designed for ease of use with minimal user interface. The tool's powerful logic capabilities provide consistent, yet transparent, data validation conforming to EPA Inorganic and Organic Functional Guidelines.

Laboratory and Electronic Data Tape Audits

LDC has provided laboratory audits for DOD and industrial clients to assure production of quality data from contract analytical laboratories. LDC also has experience and expertise in electronic tape audits generally required for litigation cases.

Laboratory QA/QC audits have been performed under DTSC, Shell Oil, Hewlett Packard, NFESC, Army Corps, and other major programs.

Project Experience

Laboratory Data Consultants, Inc. (LDC) has performed quality assurance services for contaminated sites overseen by the DOE and DOD, EPA Superfund projects overseen by the EPA, Army Corps, Navy, and Air Force projects.

LDC has validated over 1,000,000 analyses for tests such as volatile organics (CLP 0LM01.8, CLP 0LM03.2, EPA Method 8260B, TO-15), semivolatile organics (CLP OLM01.8, CLP 0LM03.2, EPA Method 8270C), organochlorine pesticides/PCBs (CLP 0LM01.8, CLP 0LM03.0, EPA Method 8080/8081/8082), chlorinated herbicides (EPA Method 8150/8151), purgeable halocarbons and aromatics (EPA Method 8010/8020/8021), trace metals (CLP ILM02.1, CLP ILM03.0, CLP ILM04.0, EPA Method 6010/7000), total petroleum hydrocarbons (EPA Method 8015/CDOHS LUFT), explosives, radiochemical constituents, perchlorate, NDMA, and general minerals.

Additionally, several of the projects listed below included the submittal of electronic data deliverables (EDDs) with data qualifiers. LDC has the ability to work with various formats utilizing its ACCESS, ADR, and ADAPT customized programs. LDC's data management and software development staff have supported several clients in managing databases and developing software programs with user friendly interfaces. LDC has provided web based hosted and network based solutions for clients using the EQuIS database platform along other custom platforms.

Laboratory Data Consultants, Inc. (LDC) has met contractual turnaround time and quality requirements on over 99% of the projects completed. The following data validation, software development, and quality assurance projects are representative of our technical capabilities and demonstrate our capacity.

Project Experience

Name and Address, Contact Person, Telephone	Work Description and Location	Requested Deliverables	Number of samples/ Matrix	Value ($)	Start/Stop
Florida Dept of Environmental Protection 2600 Blair Stone Road, MS 6511 Tallahassee, FL 32399-2400 Attn: Mr. Tom Frick	Developed automated data review software for the Florida DEP for state wide distribution. The software product is called, Florida ADaPT.	ADaPT Software and technical support	NA	$80,000	10/02-6/03
California DTSC Site Mitigation Stringfellow Branch 8810 Cal Center Drive Sacramento, CA 95812 Attn: Mr. Darrell Nations	Lab QA/QC technical support and data validation for the Stringfellow Superfund site. All project data is processed using LDC's Automated Data Review (ADR) software which included customized site tools.	QA/QC reports and documents	NA	$400.000	5/02-present
Aerojet P.O. Box 13222 Sacramento, CA 95813-6000 Attn: Mr. Steve Costello	Environmental chemistry and QA/QC support under an IDIQ contract. Professional services included data review, QAPP generation and review, regulatory responses, laboratory and field audits.	Various reports for EPA and other agencies,	NA	$800,000	1/01-present
SFWMD 1480 Skees Road, Bldg #9 West Palm Beach, FL 33411-2642 Attn: Ms. Delia Ivanoff	Developed software for automating the laboratory and field auditing process. Software was developed to integrate with Tablet based PCs such that the laptops could use handwriting recognition software.	Automated Audit Software for Laboratory and Field Audits.	NA	$40,000	2/03-2/04
ICF 9300 Lee Highway Fairfax, Virginia 22031-1207 Attn: Mr. Jerry Vail	EPA Region IX ESAT technical support for data validation and document review ,	Data validation and QA reports	>10,000 samples	$1,000,000	4/01-present
Battelle 505 King Avenue Columbus, OH 43201 Attn: Ms. Rosanna Buhl	Data validation per EPA level "3" and "4" guidelines for volatile organics, semivolatile organics, pesticides/PCBs, TPH-diesel, TPH-gasoline, explosives, wet chemistry, organotin, radiochemistry, and trace metal analyses. (Various Navy projects)	LDC In-house validation worksheets and validation reports.	>10,000 samples	$300,000	1/03-present
Bechtel National, Inc. 1230 Columbia Street, Suite 400 San Diego, CA 92101 Contact: Ms. Toni Kuzmack	Data validation per EPA level "3" and "4" guidelines for volatile organics, semivolatile organics, pesticides/PCBs, TPH-diesel, TPH-gasoline, explosives, wet chemistry, organotin, radiochemistry, and trace metal analyses. (Navy Southwest Territory CLEAN, San Diego, CA)	LDC In-house validation worksheets and validation reports.	>50,000 samples Water/Soil Tissue/Air	$1,800,000	10/94-present
Army Corps, Sacramento District 1325 J Street Sacramento, CA 95814 Contact: Ms. Pam Wehrmann	Environmental chemistry and QA/QC support under a SBA 8(a) IDIQ contract. Professional services included data review, QCSR review, DQAR generation, QAPP generation and review, database management, regulatory responses, laboratory and field audits. Several projects including Benicia Arsenal, Camp Ono, Camp Roberts, Hamilton army Airfield, Fort Irwin, Fort Hunter Liggett, Dugway, Monterey Airport, east Fort baker, Tooele Army	Various reports in Army Corps format	>20,000 samples Water. Soil/ Air	$400,000	11/96-3/06

Name and Address, Contact Person, Telephone	Work Description and Location	Requested Deliverables	Number of samples/ Matrix	Value ($)	Sta[illegible]
	Depot, and Presidio of San Francisco.				
Law Engineering and Environmental Services 9177 Sky Park Court, Suite A San Diego, CA 92123 Contact: Mr. Ed Othmer	Develop and implement software applications for the Caltrans Stormwater program. The applications include an EDD checker, data validation module, and database for exporting.	Software applications for automated data review and EDD verification for Caltrans.	N/A	$67,000	4/0[illegible]-2[illegible]02
Earth Tech 700 Bishop Street Honolulu, HI 96813 Contact: Scott Lewis	Data validation per PACDIV level "C" and "D" guidelines for volatile organic, semivolatile organic, pesticides/PCBs, herbicides, phenols, phosphorus pesticides, dioxin, and trace metal analyses in soil, water, and tissue matrices. (Navy PACDIV CLEAN, Honolulu, HI	PACDIV report format and LDC worksheets	>2000 samples Water/Soil/Air/Biota	$500,000	4/98-present
Tetra Tech EM, Inc. 10670 White Rock Road, Suite 100 Sacramento, CA 95670 Contact: Mr. Noel Shrum	Data validation per EPA level "3" and "4" guidelines for volatile organic, semivolatile organic, pesticides/PCBs, herbicides, phenols, phosphorus pesticides, dioxin, and trace metal analyses in soil, water, and tissue matrices. This project also includes a PACDIV site at Barber's Point. (Navy EFA West CLEAN, San Francisco, CA)	Tetra Tech EMI report format and LDC worksheets	>3000 samples Water/Soil/Air	$600,000	4/97-present
IT/OHM Remediation Services 2031 Main Street Irvine, CA 92714-6509 Contact: Jim Franklin	Database support and software program development for the Southwest Division Navy RAC program	Software programs and database deliverables	N/A	$90,000	10/97-present
The IT Group (formerly OHM) 3347 Michelson Drive, Ste 200 Irvine, CA 92612 Contact: Mr. Dwayne Ishida	Data validation per EPA level "3" and "4" guidelines for volatile organic, semivolatile organic, pesticides/PCBs, herbicides, phenols, phosphorus pesticides, dioxin, and trace metal analyses in soil, water, and tissue matrices. (Navy Southwest Division RAC, San Diego, CA)	LDC In-house validation worksheets and validation reports	>5000 samples Water/Soil/Air	$400,000	8/97-3/03
Foster Wheeler Corp. 1230 Columbia Street, Suite 640 San Diego, CA 92101 Attn: Ms. Lisa Bienkowski	Data validation per EPA level "3" and "4" guidelines for volatile organics, semivolatile organics, pesticides/PCBs, TPH-diesel, TPH-gasoline, explosives, wet chemistry, organotin, radiochemistry, and trace metal analyses. (Navy Southwest Division RAC, San Diego, CA)	LDC In-house validation worksheets and validation reports.	>1000 samples Water/Soil/Air	$200,000	1/99-2/05
Harding Lawson Associates 90 Digital Drive Novato, CA 94949 Attn: Mr. Tony Blake/ Ms. Debbie Liebensberger	Data validation per Army Corps (EPA level 3 and 4) guidelines for volatile organic, trace metals, and wet chemistry analyses. Data Quality Summary Report (QCSR) per the Army Corps Sacramento District's CDQMP 1.08 specifications. (Fort Ord, Basewide)	LDC In-house validation worksheets and validation reports.	>800 samples Water	$100,000	12/98-3/05
Shell Development Company 3333 Highway 6 South Houston, TX 77082 Attn: Dr. Gerard Spinnler	On-site chemistry and data management support for the retrieval and compilation of laboratory reports and WIP data packages	Laboratory reports and EPA level 4 data packages	N/A	$140,000	3/98-7/98
EPA Region IX 75 Hawthorne Street	Data validation per EPA level "4" guidelines for volatile organic, semivolatile organic, pesticides/PCBs, and trace	EPA Region IX report format and LDC worksheets	>400 samples	$23800	4/98-7/98

Name and Address, Contact Person, Telephone	Work Description and Location	Requested Deliverables	Number of samples/ Matrix	Value ($)	Start/Stop
San Francisco, CA 94105 Attn: Ms. Dawn Richmond	metal analyses in soil and water matrices. (Various sites in California)		Water/Soil		
ENSR 17952 Sky Park Circle, Suite E Irvine, Ca 92614 Attn: Linda Conlan	Database support and software program development for an aerospace project	Software programs and database deliverables	N/A	$40,000	1/98-2/04
Navy PWC (Guam) NAVFAV Marianas Contact: Gorman Dorsey	Install and implement a laboratory computer system for the generation and tracking of chemistry data. The software platform was ACCESS based with a Windows interface. Additionally, develop SOPs and a QA/QC manual for laboratory operations. Provided QA training to all laboratory staff. (Navy PWC, Guam)	Training and system installation, QA/QC manual and SOPs for laboratory operations.	N/A	$382,000	10/95-11/96
Jacobs Engineering 125 Broadway Avenue Oak Ridge, TN 37830 Contact: Saundra Gadson	Data validation per DOE guidelines for volatile organic, semivolatile organic, TPH-diesel, radiochemistry, and trace metal analyses. (DOE, Oak Ridge, TN)	LDC In-house validation worksheets and validation reports including electronic data deliverables (EDD).	>300 samples Water/Soil	$32,000	6/95-4/96
Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, CA 91109 Contact: Judy Novelly	Data validation per EPA level "3" and "4" guidelines for volatile organics, semivolatile organics, TPH-diesel, and trace metal analyses. (Pasadena, CA)	LDC In-house validation worksheets and validation reports.	>200 samples Water/Soil	$75,000	12/94-12/99
Texaco Marketing and Refining 108 Cutting Blvd. Richmond, CA 94804 Contact: Karen Petryna	Provide oversight of the Texaco laboratory QA/QC program for California site investigation and remediation projects. Includes on-site lab audits and data assessment. (Richmond, CA)	Laboratory audit reports	N/A	$15,000	1/95-11/2001
CH2M Hill 2485 Natomas Park Drive, Ste 600 Sacramento, CA 95833 Contact: Dr. Artemis Antipas	Data validation per Army Corps (EPA level 3 and 4) guidelines for volatile organics, semivolatile organics, pesticides/PCBs, TPH, general minerals, explosives, and trace metal analyses. (Travis, AFB Sacramento, CA)	LDC In-house validation worksheets and validation reports.	>500 samples Water/Soil	$120,000	2/95-8/95
Jacobs Engineering Group 2525 Natomas Drive, Suite 260 Sacramento, CA 95833 Contact: Linda Nuss	Data validation and ITIR report generation per AFCEE level 1 and 2 (EPA level 3 and 4) guidelines for volatile organics, semivolatile organics, pesticides/PCBs, TPH, general minerals, trace metal, and radiochemistry analyses. (McClellan AFB, Sacramento, CA)	On-site support using client specified forms.	>2000 samples Water/Soil	$120,000	3/94-1/95

CLIENT/PROFESSIONAL REFERENCES

Company	Contact	Phone#
Army Corps, Sacramento	Pam Wehrmann	(916) 557-6662
Army Corps, New Mexico	Brian Jordan	(505) 425-9586
Earth Tech	Chris Barr	(858) 536-5610
Montgomery Watson	Ruth Siegmund	(925) 975-3400
Bechtel National	Toni Kuzmack	(619) 744-5056
USEPA	Anand Mudambi	(703) 603-8796
TTEC	Lisa Bienkowski	(949) 756-7592
Sealaska	Mary Schneider	(909) 973-1473
Florida DEP	Tom Frick	(850) 245-8069
SFWMD	Delia Ivanoff	(561) 681-2681
BMT/ENTECH	John D'Ath	(703) 793-9779
Earth Tech	Scott Lewis	(808) 523-8874
SWFWMD	Mark Rials	(352) 796-7211

Staff and Capabilities

Laboratory Data Consultants, Inc. (LDC) personnel have experience and formal training in the area of data validation, electronic data deliverables, laboratory QA/QC, and data management. As documented in the resumes and past experience of our data review staff, most of the LDC personnel have performed activities in several analytical disciplines. These include, but are not limited to, GC/MS volatiles, GC/MS semivolatiles, GC pesticides, ICP metals, ICP/MS metals, GFAA metals, GC petroleum hydrocarbons, GC/MS dioxins, explosives, radiochemistry, and wet chemistry. This versatility allows our organization to adapt to workload shifts and allows for an excellent secondary review system.

Our software engineering and data management staff have successfully worked with clients on developing cost effective database programs, processes, and software applications. Additionally, LDC's automated data review and automated audit software programs have been implemented at a national level.

A completed Key Staff and Qualifications Summary, Table 1, highlights the experience and qualifications of our staff. Selected full resumes of key staff are submitted as Enclosure 1.

Table 1

Key Staff and Capabilities Summary

Name	Education		Number of Years of Experience						Brief Description of Validation Expertise	Primary and Secondary Task Responsibilities
	Chemistry or related science	Other	Company Name/Years	Company Name/Years	Company Name/Years	This Company	Validation Experience (total years)	As an Analyst		
Richard M. Amano	B.S.		West Coast Technical Service/ 3 years	Brown & Caldwell/ 3 years	Analytical Technologies/5 years	15	17	11	GC/MS VOCs, SVOCs, Pesticides, PCBs, Herbicides, TPH, Butlytins	Principal Chemist
Scott Denzer	B.S		SAIC/5 years	Analytical Technologies/ 4 years	Guam EPA/ 3 years	12	17	12	Pesticides, PCBs, Herbicides, TPH, Butlytins	Principal Chemist/ Technical Director
Erlinda T. Rauto	B.S.		PWCSA County Complex/ 3 years	AECOS/ 3 years	Appropriate Technologies/ 2 years	10	14	8	Pesticides, PCBs, Herbicides, TPH, Butlytins	Senior Chemist/ Operations Manager
Calvin Tanaka	B.A.		California Analytical Laboratories/6 years	Radian Analytical Services/4 years	Enseco/Quanterra/15 years	7	7	20	GC/MS VOCs and SVOCs, Pesticides, PCBs, Explosives, Dioxins & Furans, Metals, Wet Chemistry	Senior Chemist
Nanny Bosch	B.S.		University of California at Davis / 4 years	Quanterra (formerly Enseco-CAL) / 11 years	Severn-Trent Laboratories /1 year	7	7	7	Dioxins/Furans PCB Congeners & PAHs by High Resolution GC/MS Methods	Senior Chemist/ Operations Manager
Jill Henes	PhD.		CompuChem Labs/ 9 years	Env Standards/ 3 years	Veridian /3 years	1	13	11	All Methods Dioxins/Furans	Principal Chemist
Kendra DeSantolo	B.S.		Teledyne Electronic Technologies (formerly Teledyne MEC)/4 years	Anlab Analytical Laboratory / 2 years	Quanterra (formerly Enseco-CAL Labs) / 8 years	5	5	3	GC/MS VOCs and SVOCs, GC VOCs, TPH, TO-14, Metals, Wet chemistry	Senior Chemist
Becky Coan		B.S			Analytical Technologies/ 8 years	11	NA	NA	NA	Database Manager

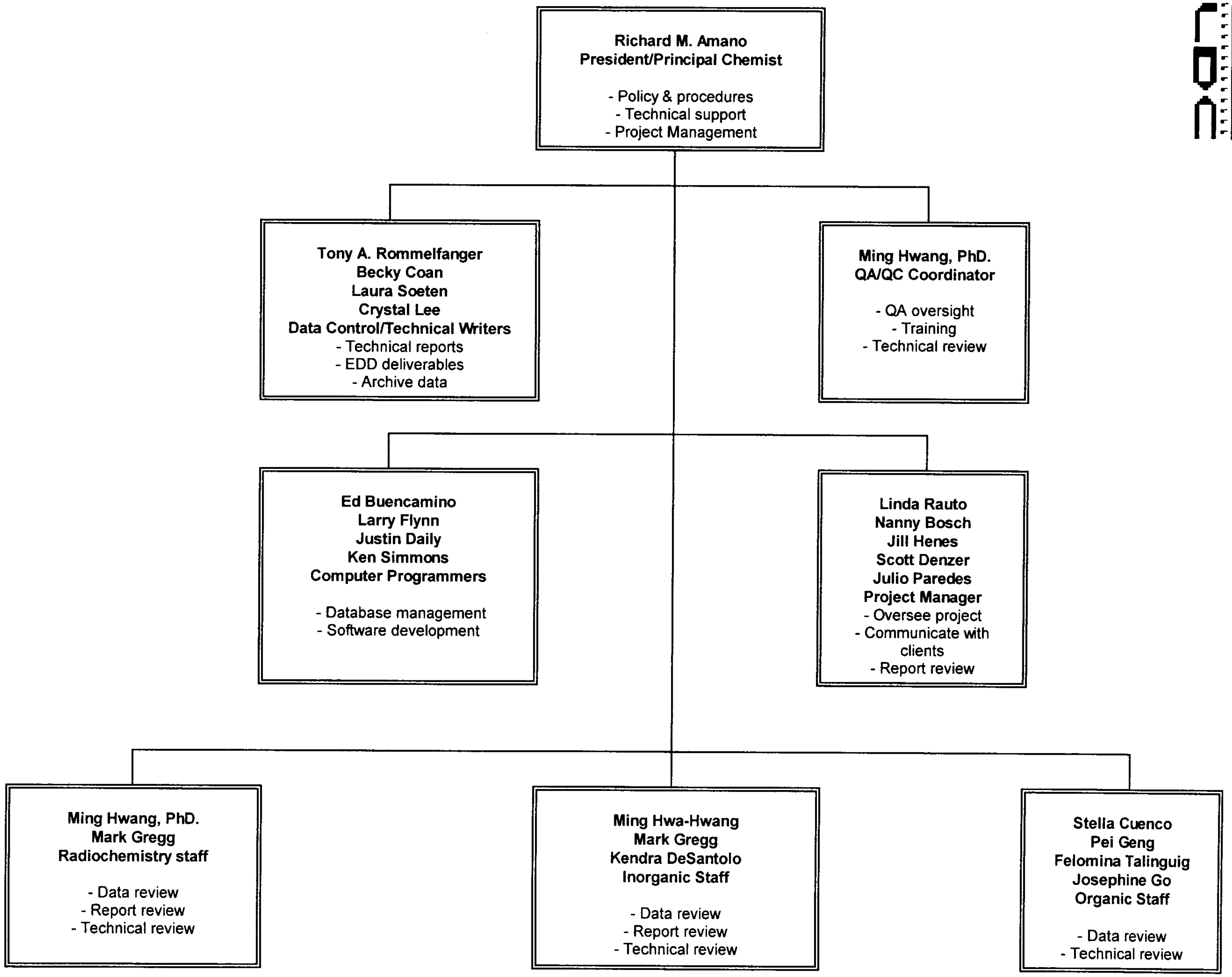
Name	Education		Number of Years of Experience						Brief Description of Validation Expertise	Primary and Secondary Task Responsibilities
	Chemistry or related science	Other	Company Name/Years	Company Name/Years	Company Name/Years	This Company	Validation Experience (total years)	As an Analyst		
Terrell Collins		B.A.				3	NA	NA	NA	EDD Specialist
Stella Cuenco	B.S.				Analytical Technologies/ Ceimic Corporation/ 5 years	10	10	5	GC/MS VOCs, SVOCs, Dioxins/Furans	Senior Chemist
Pei Geng	M.S.			Pace Analytical/ 6 years	Ceimic Corporation/ 1 year	9	9	7	GC/MS VOCs, SVOCs, Dioxins/Furans Pesticides, PCBs, TPH	Senior Chemist
Ming Hwang	PhD			Analytical Technologies/ 3 years	Laucks/ 5 years	5	5	8	Metals, Wet Chemistry	Senior Chemist
Mark Gregg	B.S.				Pacific Analytical/ 9 years	7	7	9	GC/MS VOCs, SVOCs, Metals, Wet chemistry	Chemist
Felomina Tanguilig	B.S.		Engineering Science/2 years	Superior Analytical Lab/5 years	Transglobal Environmental/4 years	6	6	7	GC/MS VOCs, SVOCS, Pesticides, PCBs, TPH, Herbicides	Chemist
Josephine Go	B.S.		Sentro Tek Corp/ 1 year	Advanced Technology Labs/ 1 year	CRL Environmental Corp/ 1 year	4	4	4	Pesticides, PCBs, TPH, Herbicides	Chemist
Laura Soeten	B.A.			Pacific Analytical/ 3 years	QA Labs/ 1 year	9	1	NA	GC/MS VOCs, SVOCs	Technical Writer
Crystal Lee-Cooper	B.A.			SAIC/ 3 years	Bayer Corp/ 3 years	7	NA	3	NA	Technical Writer
Tony Rommelfanger			Smith Emery Co/ 2 years	Analytical Technologies/ 1 year	Terra Tech Labs/ 1 year	15	NA	NA	NA	Data Control Manager
Ed Buencamino		M.S.	Diversified Collection Services/ 2 years	ITC, 6 years	OHM Remediation Services/ 2 years	9	NA	NA	NA	Senior Programmer
Larry Flynn	B.S.			SAIC/ 3 years	Analytical Technologies/Ceimic Corporation/ 10 years	8	6	8	GC/MS VOCs, SVOCs, Metals	Software Development Manager
Julio Paredes	B.S. (eq)			Smith & Smith/ 2 years	ATI/Ceimic Corporation/ 13 years	8	13	13	Metals, wet Chemistry	Senior Chemist

Name	Education		Number of Years of Experience						Brief Description of Validation Expertise	Primary and Secondary Task Responsibilities
	Chemistry or related science	Other	Company Name/Years	Company Name/Years	Company Name/Years	This Company	Validation Experience (total years)	As an Analyst		
Justin Dailey	M.S.			Dept of Geology/ UC Davis/ 3 yrs	Analytical Chemists, Inc/ 2 years	5	3	2	NA	Senior Programmer
Dung Ngo					Analytical Technologies/ 3 years	10	10	3	Pesticides, PCBs, Herbicides, TPH	Senior Analyst/ADR Operator
Ken Simmons		B.S.	CSK Auto, Inc./ 1 year	Qiva, Inc/ 1 year	Xenon Software/ 3 years	3	NA	NA	NA	Software Programmer
Tim Fitzpatrick	B.S.		Transglobal Environmental/ 6 years	AMEC/Ogden/ 3 years	Cardinal Health/ 1 year	3	NA	10	NA	Senior Scientist/ Marketing Director
Ryan Dewitt		B.A.	Inetcame, Inc. 2 years	PRAJA, Inc./ 3 years	Tyco, Video Systems Division/ 2 years	3	NA	NA	NA	Network Administrator/

LDC Organizational Chart

The LDC Organization Chart outlines the company structure which includes the selected project personnel.

LDC Organizational Chart (as of 1/1/08)



Enclosure 1

Resumes of Key Personnel

RESUME
RICHARD M. AMANO

EDUCATION

B.S. Biochemistry
University of California, Los Angeles, 1979

A.A. Chemistry
El Camino College, 1977

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
President/Principal Chemist
1991 to present

Analytical Technologies, Inc
Laboratory Director
1986 to 1991

Brown & Caldwell
Laboratory Supervisor
1983 to 1986

West Coast Technical Service
Senior Chemist
1980 to 1983

University of California, Los Angeles
Laboratory Technician
1979 to 1980

REPRESENTATIVE EXPERIENCE

Mr. Amano has over 25 years of combined environmental laboratory, QA/QC, laboratory auditing, and data validation experience. Prior to founding LDC in 1991, he directed to two major laboratories, Analytical Technologies, Inc. (San Diego) and Brown and Caldwell. His experience includes oversight and direction of major QA/QC and data validation efforts for Superfund sites, DOE sites, Navy RI/FS projects, Army Corps of Engineers investigations, and AFCEE projects. He also has overseen several laboratory audits for major analytical testing programs.

Specifically, Mr. Amano has over 15 years experience with the validation of organic, inorganic, and radiochemical analyses using USEPA CLP (including Region III) functional guidelines and other applicable guidance documents.

- As principal chemist with Laboratory Data Consultants, Inc., Mr. Amano manages the daily activities of the data validation group. He provides technical support in the organic, inorganic, and radiochemical areas. Acting as project manager for several major QA/QC and data validation programs, he provides a final review of all data validation and assessment reports. Mr. Amano specializes in the evaluation, validation, and interpretation of environmental testing data. Additional responsibilities include laboratory QA/QC audits, implementation and support of QA/QC programs for engineering firms, environmental lab training, consultation on LIMS data base designs for environmental laboratories, and expert witness litigation support. Mr. Amano has managed and directed several major data validation and QA/QC projects for Army Corps, Navy, and Air Force contracts. The DOD projects include Southwest Division CLEAN 1 (Jacobs Engineering/IT Corporation/CH2M Hill), Southwest Division CLEAN 2 (Bechtel National), Pacific Northwest Division CLEAN (URS Greiner), Southern Division CLEAN (ABB Environmental), Atlantic Division CLEAN (EA Engineering), Southwest Division RAC (OHM Remediation), Pacific Division CLEAN (Earth Tech), AFCEE Mather AFB (Montgomery Watson), AFCEE Pease AFB (Bechtel Environmental), AFCEE England AFB (Law Environmental), Army Corps Travis AFB (CH2M Hill), Army Corps Hawthorne Army Depot (Tetra Tech), Nevada Test Site (IT Corp), and Army Corps Fort Ord (Harding Lawson). He has a thorough knowledge and understanding of EPA CLP, SW-846, EPA 500, EPA 900, and EPA 600 series methods. He additionally has supported attorneys as an expert witness and has taught data integrity and lab ethics courses for several organizations.

Mr. Amano has over 10 years environmental laboratory experience in commercial laboratories supervising or performing the analyses of organic, inorganic, and radiochemical parameters.

- As laboratory director and technical director of Analytical Technologies, Inc, a full service environmental analytical chemistry facility, Mr. Amano was responsible for all facets of operations. These responsibilities include direct technical input for GC, GC/MS, and inorganic operations, personnel selection, assisting in method development, and selection of non-routine analysis. In addition, Mr. Amano was responsible for supervision of the 80 scientists employed at ATI's San Diego laboratory with all group supervisors, quality assurance and safety coordinators reporting directly to him. Mr. Amano has managed numerous analytical testing programs including the North Island Navy Confirmation Study, Miramar Air Force Base Confirmation Study, and investigations at several of the EPA Superfund sites. His environmental expertise focuses on the chemical testing related to hazardous waste investigations, site remediation, and groundwater monitoring programs.

- While at Brown & Caldwell, Mr. Amano's responsibilities encompassed supervision of daily operations of the laboratory, personnel staffing, technical advisor for operation of the gas chromatograph/mass spectrometer (GC/MS) section, maintenance of QA/QC programs, and coordination between engineers, clients, and laboratory analysts. Additionally, he supervised the daily operation of all radiochemistry activities which included alpha, beta, and radium analyses.

- At West Coast Technical Service, Mr. Amano was responsible for daily operation and quality control of the GC/MS group. Mr. Amano was highly involved with the USEPA hazardous waste contracts. Some special projects included dioxin selected ion monitoring analysis, EPA method 624 and 625 validation studies, and low level drinking water evaluations.

TECHNICAL PRESENTATIONS

"Data Integrity and Lab Ethics"
Aerojet Corp, 2005
Florida Society of Environmental Analysts, 2005, 2006

"Understanding the Workings of an Environmental Laboratory"
Southern California Department of Health Services, 1984
Hargis & Associates, Inc, La Jolla, CA, 1987
Hargis & Associates, Inc, Tucson, AZ, 1987
Westec Services, San Diego, CA, 1987
Applied Hydrogeologic, Inc, San Diego, CA 1989

"Data Validation, QA/QC, and Environmental Analysis"
Van, Waters, and Rogers, Seattle, WA, 1990
ERC Environmental, Honolulu, HI, 1991
Harding Lawson Associates, Honolulu, HI, 1991
Pacific Division Naval Engineering Group, Honolulu, HI, 1991
OHM, Irvine, CA, 1996
Southwest Division Naval Engineering Group, San Diego, CA, 1996
Navy Public Works Center, San Diego, CA 1996

"GC versus GC/MS"
J.H. Kleinfelder & Associates, Artesia, CA 1986
Hargis & Associates, Inc, La Jolla, CA 1987

"Analytical Methods and QA/QC Procedures for Environmental Analysis"
County of San Diego Department of Health Services, San Diego, CA 1989
Regional Water Quality Control Board, San Diego, CA 1990
ERC Environmental, San Diego, CA 1990
Mittlehauser Corporation, Laguna Hills, CA 1991

"Hydrocarbon Testing Related to Underground Storage Tanks (UST)"
San Diego County DOHS, San Diego, CA, 1986
J.H. Kleinfelder & Associates, Artesia, CA 1986
Woodward Clyde Consultants, San Diego, CA 1987

Engineering Enterprises, Long Beach, CA 1987

"Quality Control/Quality Assurance in Laboratories"
Assoc of Hazardous Materials Professionals, Anaheim, CA 1986
R.L. Stollar & Associates, Santa Ana, CA 1989

"The Influence of Sample Matrix on Environmental Analysis"
Assoc of Hazardous Materials Professionals, San Diego, CA 1990

"Comparison of Air Sampling Media"
Assoc of Hazardous Materials Professionals, Anaheim, CA 1991

"Building a Second Generation LIMS for Commercial Laboratory Operations"
Pittsburgh Conference, New York, NY, 1990 (Invited Speaker)

"Employment Outlook in Environmental Laboratories"
Southern California American Chemical Society, 1985

"Opportunities in the Environmental Lab in the 1990's"
American Chemical Society, 1990

"Data Validation of Radiochemical Analyses"
Hargis + Associates, La Jolla, CA 1991

"Detection Limits - MDL, PQL, RDL, LOD ?"
Analytical Technologies, Inc., 1991

"Poor QA/QC or Laboratory Fraud: Have labs crossed the fine line?"
Environmental Professionals Organization, Newport Beach, CA 1996

"Electronic Data Deliverables and Automated Data Review/Validation"
Army Corps of Engineers, Sacramento District, Sacramento, CA 1996

"Navy Environmental Data Transfer Standards"
Kleinfelder, San Diego, CA 1997

"Laboratory QA/QC Update for DOD Programs"
ACTLabs, Long Beach, CA 1997

LECTURING AND TEACHING

"Instrumental Analysis of Hazardous Materials"
University of California, San Diego 1988 - 1995

"Field Monitoring & Laboratory Analysis of Hazardous Materials"
University of California, San Diego 1995 - present

California State Fullerton, Guest Lecturer, 1985 & 1990

San Diego State University, Hydrology Department, Guest Lecturer, 1988

"EPA Level 4 Data Validation" Workshop
Applied Geotechnology, Inc., Bellevue, WA, 1993

"Environmental Analyses in the 90's"
National University, Guest Lecturer, 1993

"Data Quality Objectives for Federal Environmental Programs"
University of California, San Diego 1993

"Data Integrity and Data Management for Federal Environmental Programs"
University of California, San Diego 1994

"Laboratory QA/QC and Electronic Data Requirements for DOD Programs"
University of California, San Diego 1995

"Application and Utilization of Department of Defense (DOD) Guidance Documents"
University of California, San Diego 1996

"Laboratory Quality Assurance for Department of Defense Programs"
University of California, San Diego 1997

PUBLICATIONS

"Managing an Environmental Chemistry Laboratory for Profit",
John H. Taylor, Jr and Richard M. Amano,
Journal of Chromatographic Science, 1987

MEMBERSHIPS AND AFFILIATIONS

American Chemical Society
Association of Hazardous Materials Professionals, (Steering Committee 1988-1994)
Association of California Testing Laboratories, (Board Member 1989-1991)
County of San Diego, Site Assessment and Mitigation Technical Forum (1990-2000)
American Society of Mass Spectroscopists
American Society Quality Control

RESUME
ERLINDA T. RAUTO

EDUCATION

B.S. Chemical Engineering 1967
Feati University - Manila, Philippines

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist/QA Officer
1993 to present

Appropriate Technologies, Inc.
Chemist II
1992 to 1993

AECOS Inc.
Laboratory Supervisor
1989 to 1992

PWCSA #4 County Complex
Laboratory Analyst
1986 to 1989

Kalama Specialty Chemical
Chemist
1980 to 1982

REPRESENTATIVE EXPERIENCE

Ms. Rauto has over 20 years combined environmental laboratory, QA/QC, and data validation experience. Her experience includes performance of data validation in the GC, trace metals, and wet chemistry areas for major Federal projects. Her laboratory experience includes hands-on CLP and EPA ICP/GFAA analysis, pesticide/PCBs and wet chemistry analysis.

Specifically, Ms. Rauto has over 11 years organic data validation and assessment experience using USEPA (including Region III) functional guidelines and other applicable documents.

- As a senior chemist with Laboratory Data Consultants, Inc., Ms. Rauto specializes in the data validation and compliance screening of gas chromatography organic analyses. This validation includes EPA CLP, SW-846, and EPA Water and

Wastewater methods. Over the past eight years, Ms. Rauto has performed USEPA Level 3 and Level 4 (including NFESC Level C and D) validation for projects including Southwest Division CLEAN 1 (Jacobs Engineering/IT Corporation/CH2M Hill), Southwest Division CLEAN 2 (Bechtel National), Pacific Northwest Division CLEAN (URS Greiner), Southern Division CLEAN (ABB Environmental), Atlantic Division CLEAN (EA Engineering), Southwest Division RAC (OHM Remediation), Pacific Division CLEAN (Earth Tech), DOE Atomic City (Jacobs Engineering Group), Army Corps of Engineers, Travis AFB (CH2M Hill), Army Corps of Engineers, Camp Navajo (Tetra Tech), AFCEE Mather AFB (Montgomery Watson), AFCEE Pease AFB (Bechtel Environmental), AFCEE England AFB (Law Environmental), Army Corps of Engineers, Hawthorne Army Depot (Tetra Tech), Army Corps of Engineers, Fort Ord (Harding Lawson), Nevada Test Site (IT Corp), and AFCEE Beale AFB (Law/Crandall, Inc.).

Ms. Rauto has organic laboratory experience with over 7 years experience in an environmental laboratory supervising or performing the analyses of organic parameters.

- As a chemist II at Appropriate Technologies, Inc., a hazardous waste disposal facility, Ms. Rauto was responsible for the operation of the gas chromatographs. Organochlorine pesticides and PCBs analysis was the primary method performed. In addition, Ms. Rauto performed ICP analyses for trace metals, as well as, supported engineers in developing waste treatment processes.

- As the laboratory supervisor at AECOS Inc., Ms. Rauto supervised and directed operation of gas chromatography, atomic absorption, and wet chemistry instrumentation. She interfaced with state and federal agencies to maintain certification and developed a written QA/QC plan for the laboratory.

Additionally, Ms. Rauto has 2 years inorganic/conventional analytical experience.

- While employed at the Prince William County laboratory, Ms. Rauto was involved in the analysis of water and wastewater for metals and wet chemistry parameters. This included BOD, COD, nitrate, nitrite, sulfate, chloride, fluoride, TDS, conductivity, pH, cyanide, and phenols analyses. She maintained the QA/QC program to assure compliance with EPA guidelines.

AFFILIATIONS

American Society for Quality Control

RESUME
SCOTT M. DENZER

EDUCATION

B.S. Meteorology (emphasis in Atmospheric Chemistry)
University of Wisconsin, Madison, 1983

CERTIFICATIONS

Laboratory Drinking Water Certification Officer: Organic Chemistry, Inorganic Chemistry and Microbiology, USEPA, 1998

40 Hour OSHA Hazwoper Certification and Annual 8 Hour Refresher Sessions

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Technical Director/Principal Chemist, 2000 to present
QA Director/Principal Chemist, 1995 to 1997
Senior Chemist, 1992 to 1994

Guam Environmental Protection Agency
Laboratory Quality Assurance Officer/Chemist, 1997 to 2000

Analytical Technologies, Inc.
GC Supervisor, 1990 to 1992
GC Pesticide Senior Chemist/Group Leader, 1988 to 1990

Science Applications International Corporation
GC Chemist, 1983 to 1988

University of Wisconsin, Madison – Department of Meteorology
Atmospheric Chemistry Laboratory Assistant, 1982 to 1983

REPRESENTATIVE EXPERIENCE

Mr. Denzer has over 22 years combined experience in environmental sampling, analyses, data validation, quality assurance, laboratory auditing, and software design, implementation and training. Mr. Denzer's experience includes sampling, analysis and data validation in support of Federal and State programs, including the Clean Water Act, the Clean Air Act, CERCLA, RCRA, and NIOSH. He has experience performing sampling and analysis for physical, microbiological, and organic and inorganic chemical parameters in drinking water, groundwater, wastewater, and marine water as well as air, soil, sand, sediment, tissue, and wipe samples. Mr. Denzer has performed data verification, review and data validation for numerous Department of Defense and commercial project and is familiar with program-specific requirements as well as the Uniform Federal Policy for Quality Assurance Project Plans, the EPA Data Quality Objective Process, and requirements of the Safe Drinking Water Act, the National Laboratory Accreditation Program, and quality control requirements of various analytical methods. Mr. Denzer has performed field audits as well as laboratory auditing for the Safe Drinking Water Program, the Navy, and the Government of Hong Kong. He has also installed, customized, implemented laboratory information management systems (LIMS) at the Navy PWC San Diego, Navy PWC Guam and Guam EPA. Mr. Denzer provided training for all laboratory staff at each facility and continues to provide technical support and customization. Mr. Denzer is currently working closely with the USEPA and US Army Corps of Engineers on development of the Staged Electronic Data Deliverable (SEDD) data transmission format and its integration with data review software applications. Mr. Denzer has provided technical support throughout various programs within the Guam Environmental Protection Agency with data quality assessment, data interpretation, document review and preparation of Agency's Quality Assurance Program Plans and Quality Management Plans. Prior to his experience at LDC and the Guam Environmental Protection Agency, Mr. Denzer held laboratory positions including GC Pesticides supervisor, GC chemist, and section leader.

Specifically, Mr. Denzer has over 10 years quality assurance and validation experience on DOD and commercial projects.

- As Technical Director and Principal Chemist with Laboratory Data Consultants, Inc., Mr. Denzer currently oversees special data validation and software development projects and provides technical support to contractors by performing laboratory audits and technical review of Quality Assurance documents under various programs. In addition, he provides technical training and support to a variety of government agencies and contractors with the successfully implement automated environmental data processing systems such as the Automated Data Review (ADR) and Environmental Database Management System (EDMS) software programs. Mr. Denzer is currently performing SEDD and ADR software training at each of the EPA Regional offices for use in the Emergency Response Program. He is experienced in manual and automated data review for major DoD and litigation projects and has provided on-site data management activities for laboratory improper practice investigations. Mr. Denzer has performed on-site data management activities over the course of several months for a contractor providing the US Air Force with large volumes of data in the Air Force ERPIMS transmission format. Mr. Denzer has a thorough knowledge and understanding of methods referenced in EPA CLP, SW-846, EPA 500 and 600, EPA TO Series and Standard Methods documents. Mr. Denzer provided an independent evaluation of a Laboratory Information Management System (LIMS) under contract for a major laboratory. In addition, he has installed, customized and implemented LIMS at the Navy PWC San Diego, the Navy PWC Guam and Guam Environmental Protection Agency. Mr. Denzer maintained constant communication with information technology (IT) staff, laboratory management and laboratory staff to ensure successful implementation of the system. This involved a thorough understanding of management requirements, regulatory program requirements, analytical requirements, IT constraints and efficiency needs.

Mr. Denzer has over 13 years experience in an environmental laboratory supervising or performing environmental analyses.

- While at the Guam EPA, Mr. Denzer served as the Agency Quality Assurance Officer as well as the Laboratory Certification Program Manager and lead auditor of Guam EPA's Laboratory Certification Team. In addition, he performed analyses for microbiological and chemical (organic and inorganic) parameters in drinking water using Safe Drinking Water Act analytical methodology, ensured adherence to quality control requirements of method and Act, performed analyses for microbiological and chemical parameters in marine and fresh water using methodology approved under the Clean Water Act, ensured adherence to quality control requirements of EPA methods, and performed analyses for microbiological and/or chemical parameters in soil, sand, sediment and air as requested by Guam EPA program administrators. Mr. Denzer provided technical support throughout the Agency with data quality assessment, data interpretation, document review and preparation of Agency Quality Assurance Program Plans and Quality Management Plans. He ensured Guam EPA's laboratory certification program was adequately defined and implemented in accordance with federal Safe Drinking Water Act standards and Guam Safe Drinking Water Act Standards, and ensured laboratories certified by Guam EPA were maintaining proficiency testing frequency and performance requirements. Mr. Denzer also served as Co-Chairperson of Guam's 1999 Earth Week program and was a regular participant in Guam EPA's community education outreach programs. He also served as Agency spokesperson to the media (television, radio and newspaper) on several environmental issues.

- While at Analytical Technologies, Inc., Mr. Denzer performed analyses and provided technical support within the laboratory as supervisor for the pesticide section. He was responsible for ensuring the timely and accurate analysis of PCB's, herbicides, triazine pesticides, organochlorine and organophosphorus pesticides in environmental samples. Analysis was accomplished using packed or capillary gas chromatography with electron capture, flame photometric or nitrogen/phosphorus detection. Mr. Denzer was familiar with the preparation, analysis and data reduction phases of frequently utilized analytical protocols including the EPA's SW 846 and CLP protocols. To enhance QA/QC program at ATI, Mr. Denzer implemented and monitored Total Quality Management (TQM) processes.

- At Science Applications International Corporation, Mr. Denzer performed trace organic analysis of a wide variety of sample matrices using liquid and gas chromatography methods with electron capture, flame ionization, photoionization, thermal conductivity, Hall electrolytic conductivity, ultra violet, and fluorescence detectors.

OPERATING SYSTEMS, COMPUTER LANGUAGES

Windows XP, NT, 2000

XML, MS Access, Dbase IV, Fortran

TECHNICAL PRESENTATIONS

"Performing Automated Data Review (ADR) and Data Quality Assessment on Staged Electronic Data Deliverable (SEDD) Files"
Pittsburgh Conference, Orlando, FL, February 2005 (Invited Speaker)

"Using SEDD Deliverables and Automated Data Assessment Software to Meet Project Specific Electronic Data Management Goals"
National Environmental Monitoring Conference, Washington, DC, July 2004 (Invited Speaker)

"SEDD Perspective: Data Review and Data Use"
DoD Environmental Monitoring and Data Quality Workshop, Reno, NV, May 2004

"Automated Review and Management of Analytical Data Using ADAPT and EDMS"
California Department of Toxic Substances Control, Berkeley, CA, April 2004

"Electronic Review of SEDD Files"
Pittsburgh Conference, Chicago, IL, March 2004 (Invited Speaker)

"Performing Automated Data Review and Data Quality Assessment on SEDD Files"
National Environmental Monitoring Conference, Washington, DC, July 2003 (Invited Speaker)
DoE Environmental Management Consolidated Audit Program (EMCAP), Las Vegas, NV, Sept. 2003

"An Effective Automated Data Review Interface with SEDD"
Pittsburgh Conference, Orlando, FL, March 2003 (Invited Speaker)

"An Effective Automated Data Review Interface with the Superfund Electronic Data Deliverable (SEDD)"
Waste Testing and Quality Assurance Conference, Washington, DC, July 2002 (Invited Speaker)

LECTURING AND TEACHING

"SEDD, ADR and Scribe Implementation Training", USEPA Region 8 OEM, Denver, CO, March 2005

"SEDD, ADR and Scribe Implementation Training", USEPA Region 10 OEM, Seattle, WA

"EPA Quality Systems Training"
Aerojet GenCorp, Sacramento, CA 2004

"Instrumental Analysis of Hazardous Materials", Guest Lecturer
University of California, San Diego, CA 1992 - 1993

PUBLICATIONS

"Mathematical Description of the Shape of Plane Hexagonal Snow Crystals", P. Wang and S. Denzer, Journal of the Atmospheric Sciences, April 1983.

MEMBERSHIPS AND AFFILIATIONS

American Chemical Society
Association of Air and Waste Management
American Meteorological Society

RESUME
JILL B HENES

EDUCATION

M.B.A
Duke University, Durham, North Carolina, 1986.

Ph.D. Chemistry
Case Western Reserve University, Cleveland, Ohio, 1976.
- Received DuPont Award for Excellence for Undergraduate Teaching, 1975.

M.S. Chemistry
Case Western Reserve University, Cleveland, Ohio, 1974.

B.S. Chemistry
University of Vermont, Burlington, Vermont, 1972.
- Received Brown Award for Most Outstanding Undergraduate Chemistry Student (1972).
- National Science Foundation Scholarship Grant for Undergraduate Research (1971).

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Principal Chemist
2005

Veridian Environmetal, Inc.
Director of Chemistry
2002 to 2005

Environmental Standards-Limited, Inc.
Director of Chemistry/Quality Assurance Specialist/Principal
2000-2002

Environmental Standards-West, Inc.
Director of Chemistry/Quality Assurance Specialist/Principal
1991-2000

CompuChem Western Division Laboratories
Quality Assurance Director/Technical Services Director
1987-1991

CompuChem Laboratories
Director of GC and Dioxin Programs
1982-1987

Industrial and Environmental Associates
Research Coordinator
1980-1982

Post Doctoral Research Assistant
Yale University
1976-1980

REPRESENTATIVE EXPERIENCE

Dr. Henes has 24 years of analytical/quality assurance experience. Her experience includes 12 years of experience performing analyses of organic and inorganic contaminants, managing GC and Dioxin Programs, managing large projects for industrial clients, and directing research and development activities. In addition, she has 13 years of experience as the Managing Principal of Environmental Standards-West, Inc. in Davis, California, where she directed the technical, business development, and managerial aspects of the operations and 3 years as the Director of Chemistry for Veridian Environmental. She is a recognized expert in the fields of organic and inorganic quality assurance and dioxin/furan analysis. She is the AAS Product Manager for the company.

Specifically, Dr. Henes has over 13 years organic and inorganic data validation experience using USEPA CLP functional guidelines and other applicable documents.

- As principal chemist with Laboratory Data Consultants, Inc., Dr. Henes manages the daily activities of the Automated Audit Software group. She provides technical support in the organic and inorganic areas. Additional responsibilities include laboratory QA/QC audits, implementation and support of QA/QC programs for engineering firms, environmental lab training, and expert witness litigation support. Dr. Henes is well versed in NPDES and other monitoring programs and has a thorough knowledge and understanding of EPA CLP, SW-846, EPA 500, EPA 200, and EPA 600 series methods.

- During the 13 years at Environmental Standards/Veridian Environmental, Dr. Henes conceived, designed, and/or implemented comprehensive quality assurance programs for Fortune 500 companies, environmental laboratories, petroleum condition monitoring laboratories, and environmental remediation and environmental engineering companies. This includes preparing or reviewing Quality Assurance Plans and SOPs, performing audits, submitting and evaluating blind performance evaluation samples, evaluating quality systems, method detection limit studies, and laboratory-generated analytical data, problem resolution, data validation, and general consulting.

Dr. Henes has performed analytical data validation for numerous site investigations to determine analytical data outliers and data quality/usability. She has served as an expert witness providing analytical chemistry support for litigation involving a Fortune 500 companies, major environmental engineering company, and public utilities. She has conducted research on topics in environmental and analytical chemistry, including laboratory contamination, analytical method modifications, fate and transport of aromatic hydrocarbons in groundwater, and iron bacteria.

- Prior to 1992, Dr. Henes was employed by several major CLP laboratories in a variety of positions. As the Quality Assurance Director of one CLP laboratory, she was responsible for conceiving and implementing a comprehensive quality assurance program. This included rewriting the QAPP, writing and/or reviewing SOPs, and implementing quality systems within the laboratory.

  Before assuming the QA Director's responsibilities, Dr. Henes was a Technical Services Director. Responsibilities included project manager for key industrial accounts; research and development director for analytical methodology; and manager for several functional areas within the laboratory. Projects managed involved groundwater monitoring, remedial investigation/feasibility studies, site and waste characterization, and bioremediation.

  Dr. Henes concurrently served on the US EPA Dioxin Work Group and assisted in writing the current CLP protocols for 2,3,7,8-TCDD and PCDD/PCDF analyses. She also served on the US EPA Fast Turnaround Method Work Group, and provided input and critical review of methods used for the current protocols.

  At another CLP laboratory, CompuChem, Dr. Henes was responsible for the GC and Dioxin Programs. She directed development of the analytical, extraction, and clean-up techniques used for sample preparation and analysis of dioxin and furan compounds. Dr Henes served as US EPA dioxin contact to US EPA's Sample Management Office, US EPA regional offices, and US EPA headquarters, and she assisted in writing the 1986 CLP dioxin protocol, Method 8280 (1986), and the CLP SOW DFLM01.1. She also directed work on method development projects and method validation projects for the US EPA Office of Solid Waste SW-846 Methods 8080, 8140, 8150, and 8280.

- Dr. Henes' first position in the environmental industry involved the start-up and subsequent managing of a small on-site laboratory called Industrial and Environmental Associates for monitoring 117 groundwater wells at a Fortune 100 company. The laboratory grew into a multi-facility/multi-million dollar operation.

TECHNICAL PRESENTATIONS

Henes, J. B. and W. G. Kay. "Determination of the Validity of OCDD Results at an Industrial Site." SUPERFUND XV. Washington, DC, 29 November-1 December 1994

PUBLICATIONS

Henes, J. B. and W. G. Kay (J.W. Conrad, editor). “Physics and Chemistry.” The Environmental Science Deskbook. New York, NY: Clark Boardman Callaghan Publishers, West Group, 1998, 1999, 2000, 2001, 2002, 2003, 2004.

Henes, J. B., M. Briggs, S. G. Sligar, and J. S. Fruton. “Fluorescence Energy Transfer Studies on the Active Site of Papain.” Proc. National Academy of Science 77 (1980).

Henes, J. B., J. A. Mattis, and J. S. Fruton. “Fluorescence Studies on the Interaction of Papain with Derivatives of Phenylalanylglycinal.” Proc. National Academy of Science 76 (1979): 1131.

Bodanszky, M., J. B. Henes, S. Natarajan, and R. L. Foltz. “Ring Formation in a Pentapeptide with Alternating L and D Residues: An Analogy to Cyclization in the Biosynthesis of Peptide Antibiotics.” Journal of Antibiotics 30 (1977):856.

Mattis, J. A., J. B. Henes, and J. S. Fruton. “Interaction of Papain with Derivatives of Phenylalanylglycinal.” Journal of Biol. Chem. 252 (1977):6776.

Bodanszky, M., J. B. Henes, A. E. Yiotakis, and S. I. Said. “Synthesis and Pharmacological Properties of the N-Terminal Decapeptide of the Vasoactive Intestinal Peptide (VIP).” Journal of Medical Chemistry 20 (1977):1461.

Henes, J. B. Thesis: “Synthesis and Physical Studies of the Cyclic Pentapeptide Desthiomalformin.” 1976.

Bodanszky, M., J. B. Henes, S. Natarajan, G. L. Stahl, and R. L. Foltz. “High Resolution Mass Spectra of Malformin and Related Cyclic Peptides.” Journal of Antibiotics 29 (1976):549.

Bodanszky, M. and J. B. Henes. “Synthesis and Properties of the Cyclopentapeptide Desthionalformin.” Bioorganic Chemistry 212 (1975).

Bodanszky, M., J. B. Henes, S. Natarajan, and G. L. Stahl. “Cyclic Pentapeptides Related to Malformin.” Polymer Preprints 16 (1975):133.

MEMBERSHIPS AND AFFILIATIONS

American Chemical Society
American Society of Agronomy
American Association of Military Engineers
American Water Works Association
Groundwater Resources Associates
Interagency Steering Committee for Quality Assurance for Environmental Measurements
Math Instructor, University of Phoenix
Paul Harris Fellow – Davis Rotary (Former)
Professional Environmental Marketing Association

RESUME
JULIO PAREDES

EDUCATION

Licenciature in Chemistry (BS equivalent)
University of San Carlos, 1981

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist/Florida Office Manager
1998 to present

Ceimic Corporation
Metals Department Supervisor
1996 to 1998

Analytical Technologies, Inc
Project Manager
Metals Group Supervisor
1985 to 1996

Smith and Smith Environmental Consultants
Chemist
1983 to 1985

REPRESENTATIVE EXPERIENCE

Mr. Paredes has over 19 years combined environmental laboratory, laboratory auditing, and data validation experience. His experience includes performance of data validation in the trace metals and wet chemistry areas for major Federal projects. His laboratory experience includes hands-on and technical expertise in CLP and SW-846 ICP/GFAA analysis, direction of trace metals and inorganic chemistry groups, and overall technical review of CLP data deliverables.

Specifically, Mr. Paredes has over 4 years inorganic data validation experience using USEPA CLP functional guidelines and other applicable documents.

- As senior chemist with Laboratory Data Consultants, Inc., Mr. Paredes specializes in the data validation, QA/QC, and contract compliance screening of inorganic analyses using USEPA functional guidelines or equivalent protocol. He provides technical support for all inorganic data issues. Over the past four years, Mr. Paredes has performed USEPA Level 3 and Level 4 (including NFESC Level C and D) validation for projects including Southwest Division CLEAN 1 (Jacobs

Engineering/IT Corporation/CH2M Hill), Southwest Division CLEAN 2 (Bechtel National), Pacific Northwest Division CLEAN (URS Greiner), Southern Division CLEAN (ABB Environmental), Atlantic Division CLEAN (EA Engineering), Southwest Division RAC (OHM Remediation), Pacific Division CLEAN (Earth Tech), DOE Atomic City (Jacobs Engineering Group), Army Corps of Engineers, Travis AFB (CH2M Hill), AFCEE Mather AFB (Montgomery Watson), AFCEE Pease AFB (Bechtel Environmental), AFCEE England AFB (Law Environmental), Army Corps of Engineers, Hawthorne Army Depot (Tetra Tech), Army Corps of Engineers, Fort Ord (Harding Lawson), and AFCEE Beale AFB (Law/Crandall, Inc.).

Mr. Paredes has over 15 years of environmental laboratory experience in a laboratory supervising or performing the analyses of inorganic parameters.

- As a Metals Department Supervisor at Ceimic, Mr. Paredes was responsible for the management of the department, which included personnel and administration issues, production scheduling, the performance of analytical tasks in water and soil samples, as well as the establishment of Quality Control performance parameters and their enforcement.

- As project manager of Analytical Technologies, Inc., a full service environmental analytical chemistry facility, Mr. Paredes was responsible for managing all aspects of projects such as ensuring complete and correct initiation of analyses, communication with clients regarding project status, and review of final reports. As inorganics supervisor at Analytical Technologies, Inc., Mr. Paredes managed the inorganic chemistry section which performed techniques such as atomic absorption, inductively coupled argon plasma spectrometry, infrared spectroscopy, and ion chromatography. These analyses were performed from methods referenced in EPA CLP, SW-846, and Standard Methods documents.

- While employed at Smith and Smith, Mr. Paredes was involved in the analyses of metals, pesticides/PCB, herbicides and THMs.

RESUME
STELLA V. CUENCO

EDUCATION

B.S. Chemistry, 1991
University of the Philippines (UP)

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist
1996 to present

Ceimic Corporation
GC/MS Chemist
1996

Analytical Technologies, Inc.
GC/MS VOA Group Leader
1992 to 1996

Analytical Technologies, Inc.
GC/MS Chemist
1991 to 1992

Natural Products Research, UP
Research Assistant
1990 to 1991

REPRESENTATIVE EXPERIENCE

Ms. Cuenco has over 14 years combined environmental laboratory and data validation experience. Her experience includes performance of data validation in the GC and GC/MS areas for major Federal projects. Her laboratory experience includes hands-on CLP and EPA analysis of GC and GC/MS volatile organic compounds.

Specifically, Ms. Cuenco has over 10 years organic data validation experience using USEPA (including Region III) functional guidelines and other applicable documents.

- As senior chemist with Laboratory Data Consultants, Inc., Ms. Cuenco specializes in the data validation and contract compliance screening of gas chromatography-mass spectrometry analyses. She has a thorough knowledge and understanding of gas chromatography-mass spectrometry methods referenced in EPA CLP, SW-846, EPA 500 and 600 series documents. She has performed data validation under EPA

Ms. Cuenco has over 5 years experience in an environmental laboratory performing the analysis of organic parameters.

- As GC/MS chemist at Ceimic Corporation, a full service environmental analytical chemistry facility, Ms. Cuenco performed GC and GC/MS volatile analyses. She was responsible for the final reporting of analytical data for this section.

- As GC/MS VOA Group Leader at Analytical Technologies Inc., a full service environmental analytical chemistry facility, Ms. Cuenco was responsible for all GC/MS functions which included overseeing daily operations, training staff, final reporting of analytical data, and compliance with method requirements.

- As research assistant at Natural Products Research, UP, Ms. Cuenco researched chemical literature for plants with known medicinal properties as well as performed microbiological and pharmacological tests on plant extracts.

RESUME
PEI GENG

EDUCATION

M.S. Organic Chemistry, 1989
Sam Houston State University

B.S. Environmental Chemistry, 1983
Nankai University

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist
1997 to present

Ceimic Corporation
GC/MS and GC Chemist
1996 to 1997

PACE Analytical Service Inc.
GC/MS and GC Chemist
1990 to 1996

REPRESENTATIVE EXPERIENCE

Ms. Geng has over 15 years combined environmental laboratory and data validation experience. Her experience includes performance of data validation in the GC and GC/MS areas for major Federal projects. Her laboratory experience includes hands-on CLP and EPA analysis of GC and GC/MS volatile organic compounds.

Specifically, Ms. Geng has over 8 years organic data validation experience using USEPA CLP (including Region III) functional guidelines and other applicable documents.

- As chemist with Laboratory Data Consultants, Inc., Ms. Geng specializes in the data validation and contract compliance screening of gas chromatography-mass spectrometry analyses as well as gas chromatography analyses. She has a thorough knowledge and understanding of gas chromatography and gas chromatography-mass spectrometry methods referenced in EPA CLP, SW-846, EPA 500 and 600 series documents. She has performed data validation under EPA Region IX ESAT.

Ms. Geng has over 7 years experience in an environmental laboratory performing the analysis of organic parameters.

- As both a GC and GC/MS chemist at Ceimic Corporation, a full service environmental analytical chemistry facility, Ms. Geng performed GC and GC/MS volatile and semivolatile analyses.
- As both a GC and GC/MS chemist at PACE Analytical Service Inc., a full service environmental analytical chemistry facility, Ms. Geng performed GC and GC/MS volatile and semivolatile analyses as well as overseeing the final reporting of analytical data, and compliance with method requirements.

RESUME
MING-HWA HWANG

EDUCATION

PHD. Chemistry, 1990
Boston College

BS Chemistry, 1979
National Tsing-Hua University

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist
2000 to present

Analytical Technologies, Inc.
Metals/HPLC Supervisor
1995 to 2000

Analytical Technologies, Inc.
Inorganics Supervisor
1992 to 1995

Monitor Environmental Lab
1992 to 1992
Senior Inorganic Chemist

REPRESENTATIVE EXPERIENCE

Ms. Hwang has over 13 years combined environmental laboratory, QA/QC and data validation experience. Her experience includes performance of data validation in the trace metals and wet chemistry areas for major Federal and commercial projects. Her laboratory experience includes hands-on CLP and SW-846 ICP/GFAA analysis, direction of trace metals and inorganic chemistry groups, and overall technical review of CLP data deliverables.

Specifically, Ms. Hwang has over 5 years inorganic data validation experience using USEPA (including Region III) functional guidelines and other applicable documents.

- As senior chemist with Laboratory Data Consultants, Inc., Ms. Hwang specializes in the data validation and contract compliance screening of inorganic analyses using USEPA functional guidelines or equivalent protocol. She provides technical support for all inorganic data issues. Over the past 3 years, Ms. Hwang has performed

USEPA Level 3 and Level 4 (including NFESC Level C and D) validation for projects including EPA Region IX ESAT, Southwest Division CLEAN 1 (Jacobs Engineering/IT Corporation/CH2M Hill), Southwest Division CLEAN 2 (Bechtel National), Pacific Northwest Division CLEAN (URS Greiner), Southern Division CLEAN (ABB Environmental), Atlantic Division CLEAN (EA Engineering), Southwest Division RAC (OHM Remediation), Pacific Division CLEAN (Earth Tech), DOE Atomic City (Jacobs Engineering Group), Army Corps of Engineers, Travis AFB (CH2M Hill), AFCEE Mather AFB (Montgomery Watson), AFCEE Pease AFB (Bechtel Environmental), AFCEE England AFB (Law Environmental), Army Corps of Engineers, Hawthorne Army Depot (Tetra Tech), Army Corps of Engineers, Fort Ord (Harding Lawson), and AFCEE Beale AFB (Law/Crandall, Inc.).

Mr. Hwang has over 9 years of environmental laboratory experience in a laboratory supervising or performing the analyses of inorganic parameters.

- As metals and HPLC supervisor at Analytical Technologies, Inc., a full service environmental analytical chemistry facility, Ms. Hwang was responsible for managing all aspects of HPLC and trace metal projects such as ensuring complete and correct initiation of analyses, performing analyses, communication with clients regarding project status, QA/QC review, data interpretation, and review of final reports. As inorganic supervisor at Analytical Technologies, Inc., Ms. Hwang managed the inorganic chemistry section which performed techniques such as atomic absorption, inductively coupled argon plasma spectrometry, infrared spectroscopy, and ion chromatography. These analyses were performed from methods referenced in EPA CLP, SW-846, and Standard Methods documents.

- While employed at Monitor Environmental Lab, Ms. Hwang was involved in the analyses of trace metals and classical wet chemistry along with the final interpretation and QA/QC of the final reports.

Data Validation Review Process

The data validation review process will follow the requirements stated in the project's Quality Assurance Project Plan (QAPP). If data validation procedures and criteria are not clearly stated in the QAPP, Laboratory Data Consultants, Inc. will follow internal validation procedures which were developed using Environmental Protection Agency (EPA), Air Force Center for Environmental Excellence (AFCEE), Army Corps, and Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control program guidelines, as applicable. The complete process includes the following steps:

1) **Sample Log-in**

All samples submitted for data validation are entered into the LDC Log-in system. The system generates various spreadsheets for sample tracking, listings of laboratory and client identifications, sampling dates, analysis requested, matrix, and project due date. These tracking documents are distributed to all data validation, QA and project management staff.

2) **Pre-screening**

The pre-screening is performed concurrently with the sample log-in process. This task verifies sample chain-of-custody, data package completeness, and concurrence with the authorized delivery order.

3) **Data Validation**

The data validation review process will follow the requirements stated in the project's QAPP or SOW. Laboratory Data Consultants, Inc. will also follow internal LDC validation procedures which were previously developed, as applicable. The data validation procedures will reference following two documents as a basic guideline along with any other applicable documents:

- "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", October 2004.

- "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", October 1999.

The data package review will be handled in a stepwise fashion. All samples for one analysis will be batched together and evaluated against each individual validation criteria. The validator will document each finding on a Validation Findings form. Along with the finding, the reviewer will document the date of the occurrence, the lab reference identification, the validation criteria, the associated samples, and the qualification of the data. An example of a Validation Findings form is enclosed for review (Attachment I). For EPA Level 4 review, several

recalculations are required. Attachment IIa is an example worksheet for initial calibration recalculations. Attachment IIb is an example worksheet for sample recalculations. As an example, after the criteria for the initial calibration has been reviewed, the Validation Checklist form is marked noting if validation criteria was met or exceeded. Validation Checklists are enclosed for review (Attachment IIIa and Attachment IIIb). Attachment IIIa representing EPA Level 3 validation and Attachment IIIb representing EPA Level 4 validation. These checklists are used as an inventory sheet to assure all samples were reviewed for each criteria. The findings documented on the Validation Findings form will be transcribed into the final summary report.

All initial validation performed by Laboratory Data Consultants, Inc. has a secondary review by senior staff.

4) **First Report Review**

The first review of the typed data validation report verifies that all findings and data qualification has been accurately transferred from the data validation worksheets. All sample identifications, methods, formatting, and general text are reviewed.

5) **Senior Report Review**

The senior review of the typed data validation report verifies that all findings, data qualification, and professional judgments previously integrated into the reports reflect the overall quality of the data. Any additional comments required to enhance the usability of the report will be inserted at this time.

6) **QA Report Review**

A QA check of selected data validation reports within an individual delivery order will be reviewed by the QA department. A formal nonconformance report will be generated for any identified deficiencies. The deficiency will be addressed with the appropriate staff and corrected prior to submittal to senior management for final review and signature.

7) **Senior Management Review**

The program/technical manager will perform a general review of the final reports. He will sign the report cover letter and submit the report to the sample custodian for shipment to the client.

8) Electronic Data Deliverables (EDD)

If EDD is required for a project, this task will be initiated at step 1 with the receipt of disks from the client. After verification of the disk formats and fields, the disks will be prepared for importing of data qualifiers. The importing of qualifiers typically occurs after step 5. If changes are necessary due to steps 6 or 7, the EDD will be modified.

Attachment I

LDC #:________

SDG #:________

VALIDATION FINDINGS WORKSHEET

Initial Calibration

Page:___of

Reviewer:

2nd Reviewer:

METHOD: GC/MS VOA (EPA 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Did the laboratory perform a 5 point calibration prior to sample analysis?

Y N N/A Were all percent relative standard deviations (%RSD) $\leq$ 30% and relative response factors (RRF) $\geq$ 0.05?

#	Date	Standard ID	Compound	Finding %RSD (Limit: $\leq$30.0%)	Finding RRF (Limit: $\geq$0.05)	Associated Samples	Qualifications

A. Chloromethane
B. Bromomethane*
C. Vinyl chloride*
D. Chloroethane
E. Methylene chloride
F. Acetone
G. Carbon disulfide
H. 1,1-Dichloroethene*
I. 1,1-Dichloroethane*
J. 1,2-Dichloroethene
K. Chloroform*
L. 1,2-Dichloroethane*
M. 2-Butanone
N. 1,1,1-Trichloroethane*
O. Carbon tetrachloride*
P. Bromodichloromethane*
Q. 1,2-Dichloropropane
R. cis-1,3-Dichloropropene*
S. Trichloroethene*
T. Dibromochloromethane*
U. 1,1,2-Trichloroethane*
V. Benzene*
W. trans-1,3-Dichloropropene*
X. Bromoform*
Y. 4-Methyl-2-pentanone
Z. 2-Hexanone
AA. Tetrachloroethene*
BB. 1,1,2,2-Tetrachloroethane*
CC. Toluene*
DD. Chlorobenzene*
EE. Ethyl benzene*
FF. Styrene*
GG. Xylene*
HH.
II.
JJ.

LDC #:__________
SDG #:__________

Attachment IIa

VALIDATION FINDINGS WORKSHEET

Continuing Calibration Results Verification

Page:___of
Reviewer:
2nd Reviewer:

METHOD: GC/MS VOA (EPA 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					
2			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					
3			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					
4			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #:__________

SDG #:__________

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page:____of

Reviewer:

2nd reviewer:

METHOD: GC/MS VOA (EPA 8260B)

Compound results for ______________________________reported with a positive detect were recalculated and verified using the following equation:

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample purged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. _________ , _________:

Conc. = $\frac{(\quad)(\quad)(\quad)}{(\quad)(\quad)(\quad)(\quad)}$

=

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note: $MeCL_2$ = Methylene chloride

Attachment IIIa

LDC #:______________
SDG #:______________
Laboratory:____________

VALIDATION COMPLETENESS WORKSHEET

___EPA Level III __EPA Level IV

Date:
Page:___of
Reviewer:
2nd Reviewer:

METHOD: GC/MS VOA (EPA 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times		Sampling dates:
II.	GC/MS Instrument performance check		
III.	Initial calibration		
IV.	Continuing calibration		
V.	Blanks		
VI.	Surrogate spikes		
VII.	Matrix spike/Matrix spike duplicates		
VIII.	Laboratory control samples		
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards		
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data		
XVI.	Field duplicates		
XVII.	Field blanks		

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected D = Duplicate
R = Rinsate
FB = Field blank
TB = Trip blank
EB = Equipment blank

Validated Samples:

1		11		21	
2		12		22	
3		13		23	
4		14		24	
5		15		25	
6		16		26	
7		17		27	
8		18		28	
9		19		29	
10		20		30	

Attachment IIIb

LDC #:______________

SDG #:______________

Laboratory:____________

VALIDATION COMPLETENESS WORKSHEET

___EPA Level IV __ PACDIV Level D

Date:

Page:___of

Reviewer:

2nd Reviewer:

METHOD: GC/MS VOA (EPA 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times		Sampling dates:
II.	GC/MS Instrument performance check		
III.	Initial calibration		
IV.	Continuing calibration		
V.	Blanks		
VI.	Surrogate spikes		
VII.	Matrix spike/Matrix spike duplicates		
VIII.	Laboratory control samples		
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards		
XI.	Target compound identification		
XII.	Compound quantitation/CRQLs		
XIII.	Tentitatively identified compounds (TICs)		
XIV.	System performance		
XV.	Overall assessment of data		
XVI.	Field duplicates		
XVII.	Field blanks		

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected D = Duplicate
R = Rinsate
FB = Field blank
TB = Trip blank
EB = Equipment blank

Validated Samples:

1		11		21	
2		12		22	
3		13		23	
4		14		24	
5		15		25	
6		16		26	
7		17		27	
8		18		28	
9		19		29	
10		20		30	

RESUME
RICHARD M. AMANO
Laboratory Data Consultants, Inc.

EDUCATION

B.S. Biochemistry
University of California, Los Angeles, 1979

A.A. Chemistry
El Camino College, 1977

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
President/Principal Chemist
1991 to present

Analytical Technologies, Inc
Laboratory Director
1986 to 1991

Brown & Caldwell
Laboratory Supervisor
1983 to 1986

West Coast Technical Service
Senior Chemist
1980 to 1983

University of California, Los Angeles
Laboratory Technician
1979 to 1980

REPRESENTATIVE EXPERIENCE

Mr. Amano has over 25 years of combined environmental laboratory, QA/QC, laboratory auditing, and data validation experience. Prior to founding LDC in 1991, he directed to two major laboratories, Analytical Technologies, Inc. (San Diego) and Brown and Caldwell. His experience includes oversight and direction of major QA/QC and data validation efforts for Superfund sites, DOE sites, Navy RI/FS projects, Army Corps of Engineers investigations, and AFCEE projects. He also has overseen several laboratory audits for major analytical testing programs.

Specifically, Mr. Amano has over 15 years experience with the validation of organic, inorganic, and radiochemical analyses using USEPA CLP (including Region III) functional guidelines and other applicable guidance documents.

As principal chemist with Laboratory Data Consultants, Inc., Mr. Amano manages the daily activities of the data validation group. He provides technical support in the organic, inorganic, and radiochemical areas. Acting as project manager for several major QA/QC and data validation programs, he provides a final review of all data validation and assessment reports. Mr. Amano specializes in the evaluation, validation, and interpretation of environmental testing data. Additional responsibilities include laboratory QA/QC audits, implementation and support of QA/QC programs for engineering firms, environmental lab training, consultation on LIMS data base designs for environmental laboratories, and expert witness litigation support. Mr. Amano has managed and directed several major data validation and QA/QC projects for Army Corps, Navy, and Air Force contracts. The DOD projects include Southwest Division CLEAN 1 (Jacobs Engineering/IT Corporation/CH2M Hill), Southwest Division CLEAN 2 (Bechtel National), Pacific Northwest Division CLEAN (URS Greiner), Southern Division CLEAN (ABB Environmental), Atlantic Division CLEAN (EA Engineering), Southwest Division RAC (OHM Remediation), Pacific Division CLEAN (Earth Tech), AFCEE Mather AFB (Montgomery Watson), AFCEE Pease AFB (Bechtel Environmental), AFCEE England AFB (Law Environmental), Army Corps Travis AFB (CH2M Hill), Army Corps Hawthorne Army Depot (Tetra Tech), Nevada Test Site (IT Corp), and Army Corps Fort Ord (Harding Lawson). He has a thorough knowledge and understanding of EPA CLP, SW-846, EPA 500, EPA 900, and EPA 600 series methods. He additionally has supported attorneys as an expert witness and has taught data integrity and lab ethics courses for several organizations.

Mr. Amano has over 10 years environmental laboratory experience in commercial laboratories supervising or performing the analyses of organic, inorganic, and radiochemical parameters.

As laboratory director and technical director of Analytical Technologies, Inc, a full service environmental analytical chemistry facility, Mr. Amano was responsible for all facets of operations. These responsibilities include direct technical input for GC, GC/MS, and inorganic operations, personnel selection, assisting in method development, and selection of non-routine analysis. In addition, Mr. Amano was responsible for supervision of the 80 scientists employed at ATI's San Diego laboratory with all group supervisors, quality assurance and safety coordinators reporting directly to him. Mr. Amano has managed numerous analytical testing programs including the North Island Navy Confirmation Study, Miramar Air Force Base Confirmation Study, and investigations at several of the EPA Superfund sites. His environmental expertise focuses on the chemical testing related to hazardous waste investigations, site remediation, and groundwater monitoring programs.

While at Brown & Caldwell, Mr. Amano's responsibilities encompassed supervision of daily operations of the laboratory, personnel staffing, technical advisor for operation of the gas chromatograph/mass spectrometer (GC/MS) section, maintenance of QA/QC programs, and coordination between engineers, clients, and laboratory analysts. Additionally, he supervised the daily operation of all radiochemistry activities which included alpha, beta, and radium analyses.

At West Coast Technical Service, Mr. Amano was responsible for daily operation and quality control of the GC/MS group. Mr. Amano was highly involved with the USEPA hazardous waste contracts. Some special projects included dioxin selected ion monitoring analysis, EPA method 624 and 625 validation studies, and low level drinking water evaluations.

TECHNICAL PRESENTATIONS

"Understanding the Workings of an Environmental Laboratory"
Southern California Department of Health Services, 1984
Hargis & Associates, Inc, La Jolla, CA, 1987
Hargis & Associates, Inc, Tucson, AZ, 1987
Westec Services, San Diego, CA, 1987
Applied Hydrogeologic, Inc, San Diego, CA 1989

"Data Validation, QA/QC, and Environmental Analysis"
Van, Waters, and Rogers, Seattle, WA, 1990
ERC Environmental, Honolulu, HI, 1991
Harding Lawson Associates, Honolulu, HI, 1991
Pacific Division Naval Engineering Group, Honolulu, HI, 1991

OHM, Irvine, CA, 1996
Southwest Division Naval Engineering Group, San Diego, CA, 1996
Navy Public Works Center, San Diego, CA 1996

"GC versus GC/MS"
J.H. Kleinfelder & Associates, Artesia, CA 1986
Hargis & Associates, Inc, La Jolla, CA 1987

"Analytical Methods and QA/QC Procedures for Environmental Analysis"
County of San Diego Department of Health Services, San Diego, CA 1989
Regional Water Quality Control Board, San Diego, CA 1990
ERC Environmental, San Diego, CA 1990
Mittlehauser Corporation, Laguna Hills, CA 1991

"Hydrocarbon Testing Related to Underground Storage Tanks (UST)"
San Diego County DOHS, San Diego, CA, 1986
J.H. Kleinfelder & Associates, Artesia, CA 1986
Woodward Clyde Consultants, San Diego, CA 1987
Engineering Enterprises, Long Beach, CA 1987

"Quality Control/Quality Assurance in Laboratories"
Assoc of Hazardous Materials Professionals, Anaheim, CA 1986
R.L. Stollar & Associates, Santa Ana, CA 1989

"The Influence of Sample Matrix on Environmental Analysis"
Assoc of Hazardous Materials Professionals, San Diego, CA 1990

"Comparison of Air Sampling Media"
Assoc of Hazardous Materials Professionals, Anaheim, CA 1991

"Building a Second Generation LIMS for Commercial Laboratory Operations"
Pittsburgh Conference, New York, NY, 1990 (Invited Speaker)

"Employment Outlook in Environmental Laboratories"
Southern California American Chemical Society, 1985

"Opportunities in the Environmental Lab in the 1990's"
American Chemical Society, 1990

"Data Validation of Radiochemical Analyses"
Hargis + Associates, La Jolla, CA 1991

"Detection Limits - MDL, PQL, RDL, LOD ?"
Analytical Technologies, Inc., 1991

"Poor QA/QC or Laboratory Fraud: Have labs crossed the fine line?"
Environmental Professionals Organization, Newport Beach, CA 1996

"Electronic Data Deliverables and Automated Data Review/Validation"
Army Corps of Engineers, Sacramento District, Sacramento, CA 1996

"Navy Environmental Data Transfer Standards"
Kleinfelder, San Diego, CA 1997

"Laboratory QA/QC Update for DOD Programs"
ACTLabs, Long Beach, CA 1997

LECTURING AND TEACHING

"Instrumental Analysis of Hazardous Materials"
University of California, San Diego 1988 - 1995

"Field Monitoring & Laboratory Analysis of Hazardous Materials"
University of California, San Diego 1995 - present

California State Fullerton, Guest Lecturer, 1985 & 1990

San Diego State University, Hydrology Department, Guest Lecturer, 1988

"EPA Level 4 Data Validation" Workshop
Applied Geotechnology, Inc., Bellevue, WA, 1993

"Environmental Analyses in the 90's"
National University, Guest Lecturer, 1993

"Data Quality Objectives for Federal Environmental Programs"
University of California, San Diego 1993

"Data Integrity and Data Management for Federal Environmental Programs"
University of California, San Diego 1994
"Laboratory QA/QC and Electronic Data Requirements for DOD Programs"
University of California, San Diego 1995

"Application and Utilization of Department of Defense (DOD) Guidance Documents"
University of California, San Diego 1996

"Laboratory Quality Assurance for Department of Defense Programs"
University of California, San Diego 1997

PUBLICATIONS

"Managing an Environmental Chemistry Laboratory for Profit",
John H. Taylor, Jr and Richard M. Amano,
Journal of Chromatographic Science, 1987

MEMBERSHIPS AND AFFILIATIONS

American Chemical Society
Association of Hazardous Materials Professionals, (Steering Committee 1988-1994)
Water Pollution Control Federation
Association of California Testing Laboratories, (Board Member 1989-1991)
County of San Diego, Site Assessment and Mitigation Technical Forum (Steering Committee 1990-2000)
American Society of Mass Spectroscopists
American Society Quality Control

RESUME
ERLINDA T. RAUTO
Laboratory Data Consultants, Inc.

EDUCATION

B.S. Chemical Engineering 1967
Feati University - Manila, Philippines

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist/QA Officer
1993 to present

Appropriate Technologies, Inc.
Chemist II
1992 to 1993

AECOS Inc.
Laboratory Supervisor
1989 to 1992

PWCSA #4 County Complex
Laboratory Analyst
1986 to 1989

Kalama Specialty Chemical
Chemist
1980 to 1982

REPRESENTATIVE EXPERIENCE

Ms. Rauto has over 20 years combined environmental laboratory, QA/QC, and data validation experience. Her experience includes performance of data validation in the GC, trace metals, and wet chemistry areas for major Federal projects. Her laboratory experience includes hands-on CLP and EPA ICP/GFAA analysis, pesticide/PCBs and wet chemistry analysis.

Specifically, Ms. Rauto has over 11 years organic data validation and assessment experience using USEPA (including Region III) functional guidelines and other applicable documents.

As a senior chemist with Laboratory Data Consultants, Inc., Ms. Rauto specializes in the data validation and compliance screening of gas chromatography organic analyses. This validation includes EPA CLP, SW-846, and EPA Water and Wastewater methods. Over the past eight years, Ms. Rauto has performed USEPA Level 3 and Level 4 (including NFESC Level C and D) validation for projects including Southwest Division CLEAN 1 (Jacobs Engineering/IT Corporation/CH2M Hill), Southwest Division CLEAN 2 (Bechtel National), Pacific Northwest Division CLEAN (URS Greiner), Southern Division CLEAN (ABB Environmental), Atlantic Division CLEAN (EA Engineering), Southwest Division RAC (OHM Remediation), Pacific Division CLEAN (Earth Tech), DOE Atomic City (Jacobs Engineering Group), Army Corps of Engineers, Travis AFB (CH2M Hill), Army Corps of Engineers, Camp Navajo (Tetra Tech), AFCEE Mather AFB (Montgomery Watson), AFCEE Pease AFB (Bechtel Environmental), AFCEE England AFB (Law Environmental), Army Corps of Engineers, Hawthorne Army Depot (Tetra Tech), Army Corps of Engineers, Fort Ord (Harding Lawson), Nevada Test Site (IT Corp), and AFCEE Beale AFB (Law/Crandall, Inc.).

Ms. Rauto has organic laboratory experience with over 7 years experience in an environmental laboratory supervising or performing the analyses of organic parameters.

As a chemist II at Appropriate Technologies, Inc., a hazardous waste disposal facility, Ms. Rauto was responsible for the operation of the gas chromatographs. Organochlorine pesticides and PCBs analysis was the primary method performed. In addition, Ms. Rauto performed ICP analyses for trace metals, as well as, supported engineers in developing waste treatment processes.

As the laboratory supervisor at AECOS Inc., Ms. Rauto supervised and directed operation of gas chromatography, atomic absorption, and wet chemistry instrumentation. She interfaced with state and federal agencies to maintain certification and developed a written QA/QC plan for the laboratory.

As chemist at Kalama Specialty Chemical, Ms. Rauto performed gas chromatography analysis on raw materials and finished products. She worked on the research and development of new chemicals.

Additionally, Ms. Rauto has 2 years inorganic/conventional analytical experience.

While employed at the Prince William County laboratory, Ms. Rauto was involved in the analysis of water and wastewater for metals and wet chemistry parameters. This included BOD, COD, nitrate, nitrite, sulfate, chloride, fluoride, TDS, conductivity, pH, cyanide, and phenols analyses. She maintained the QA/QC program to assure compliance with EPA guidelines.

AFFILIATIONS

American Society for Quality Control

RESUME
JULIO PAREDES
Laboratory Data Consultants, Inc.

EDUCATION

Licenciature in Chemistry (BS equivalent)
University of San Carlos, 1981

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist
1998 to present

Ceimic Corporation
Metals Department Supervisor
1996 to 1998

Analytical Technologies, Inc
Project Manager
Metals Group Supervisor
1985 to 1996

Smith and Smith Environmental Consultants
Chemist
1983 to 1985

REPRESENTATIVE EXPERIENCE

Mr. Paredes has over 19 years combined environmental laboratory, laboratory auditing, and data validation experience. His experience includes performance of data validation in the trace metals and wet chemistry areas for major Federal projects. His laboratory experience includes hands-on and technical expertise in CLP and SW-846 ICP/GFAA analysis, direction of trace metals and inorganic chemistry groups, and overall technical review of CLP data deliverables.

Specifically, Mr. Paredes has over 4 years inorganic data validation experience using USEPA CLP functional guidelines and other applicable documents.

As senior chemist with Laboratory Data Consultants, Inc., Mr. Paredes specializes in the data validation, QA/QC, and contract compliance screening of inorganic analyses using USEPA functional guidelines or equivalent protocol. He provides technical support for all inorganic data issues. Over the past four years, Mr. Paredes has performed USEPA Level 3 and Level 4 (including NFESC Level C and D) validation for projects including Southwest Division CLEAN 1 (Jacobs Engineering/IT Corporation/CH2M Hill), Southwest Division CLEAN 2 (Bechtel National), Pacific Northwest Division CLEAN (URS Greiner), Southern Division CLEAN (ABB Environmental), Atlantic Division CLEAN (EA Engineering), Southwest Division RAC (OHM Remediation), Pacific Division CLEAN (Earth Tech), DOE Atomic City (Jacobs Engineering Group), Army Corps of Engineers, Travis AFB (CH2M Hill), AFCEE Mather AFB (Montgomery Watson), AFCEE Pease AFB (Bechtel Environmental), AFCEE England AFB (Law Environmental), Army Corps of Engineers, Hawthorne Army Depot (Tetra Tech), Army Corps of Engineers, Fort Ord (Harding Lawson), and AFCEE Beale AFB (Law/Crandall, Inc.).

Mr. Paredes has over 15 years of environmental laboratory experience in a laboratory supervising or performing the analyses of inorganic parameters.

As a Metals Department Supervisor at Ceimic, Mr. Paredes was responsible for the management of the department, which included personnel and administration issues, production scheduling, the performance of analytical tasks in water and soil samples, as well as the establishment of Quality Control performance parameters and their enforcement.

As project manager of Analytical Technologies, Inc., a full service environmental analytical chemistry facility, Mr. Paredes was responsible for managing all aspects of projects such as ensuring complete and correct initiation of analyses, communication with clients regarding project status, and review of final reports. As inorganics supervisor at Analytical Technologies, Inc., Mr. Paredes managed the inorganic chemistry section which performed techniques such as atomic absorption, inductively coupled argon plasma spectrometry, infrared spectroscopy, and ion chromatography. These analyses were performed from methods referenced in EPA CLP, SW-846, and Standard Methods documents.

While employed at Smith and Smith, Mr. Paredes was involved in the analyses of metals, pesticides/PCB, herbicides and THMs.

RESUME

STELLA V. CUENCO
Laboratory Data Consultants, Inc.

EDUCATION

B.S. Chemistry, 1991
University of the Philippines (UP)

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist
1996 to present

Ceimic Corporation
GC/MS Chemist
1996

Analytical Technologies, Inc.
GC/MS VOA Group Leader
1992 to 1996

Analytical Technologies, Inc.
GC/MS Chemist
1991 to 1992

Natural Products Research, UP
Research Assistant
1990 to 1991

REPRESENTATIVE EXPERIENCE

Ms. Cuenco has over 14 years combined environmental laboratory and data validation experience. Her experience includes performance of data validation in the GC and GC/MS areas for major Federal projects. Her laboratory experience includes hands-on CLP and EPA analysis of GC and GC/MS volatile organic compounds.

Specifically, Ms. Cuenco has over 10 years organic data validation experience using USEPA (including Region III) functional guidelines and other applicable documents.

As senior chemist with Laboratory Data Consultants, Inc., Ms. Cuenco specializes in the data validation and contract compliance screening of gas chromatography-mass spectrometry analyses. She has a thorough knowledge and understanding of gas chromatography-mass spectrometry methods referenced in EPA CLP, SW-846, EPA 500 and 600 series documents. She has performed data validation under EPA Region IX ESAT.

Ms. Cuenco has over 5 years experience in an environmental laboratory performing the analysis of organic parameters.

As GC/MS chemist at Ceimic Corporation, a full service environmental analytical chemistry facility, Ms. Cuenco performed GC and GC/MS volatile analyses. She was responsible for the final reporting of analytical data for this section.

As GC/MS VOA Group Leader at Analytical Technologies Inc., a full service environmental analytical chemistry facility, Ms. Cuenco was responsible for all GC/MS functions which included overseeing daily operations, training staff, final reporting of analytical data, and compliance with method requirements.

As research assistant at Natural Products Research, UP, Ms. Cuenco researched chemical literature for plants with known medicinal properties as well as performed microbiological and pharmacological tests on plant extracts.

RESUME
PEI GENG
Laboratory Data Consultants, Inc.

EDUCATION

M.S. Organic Chemistry, 1989
Sam Houston State University

B.S. Environmental Chemistry, 1983
Nankai University

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist
1997 to present

Ceimic Corporation
GC/MS and GC Chemist
1996 to 1997

PACE Analytical Service Inc.
GC/MS and GC Chemist
1990 to 1996

REPRESENTATIVE EXPERIENCE

Ms. Geng has over 15 years combined environmental laboratory and data validation experience. Her experience includes performance of data validation in the GC and GC/MS areas for major Federal projects. Her laboratory experience includes hands-on CLP and EPA analysis of GC and GC/MS volatile organic compounds.

Specifically, Ms. Geng has over 8 years organic data validation experience using USEPA CLP (including Region III) functional guidelines and other applicable documents.

As chemist with Laboratory Data Consultants, Inc., Ms. Geng specializes in the data validation and contract compliance screening of gas chromatography-mass spectrometry analyses as well as gas chromatography analyses. She has a thorough knowledge and understanding of gas chromatography and gas chromatography-mass spectrometry methods referenced in EPA CLP, SW-846, EPA 500 and 600 series documents. She has performed data validation under EPA Region IX ESAT.

Ms. Geng has over 7 years experience in an environmental laboratory performing the analysis of organic parameters.

As both a GC and GC/MS chemist at Ceimic Corporation, a full service environmental analytical chemistry facility, Ms. Geng performed GC and GC/MS volatile and semivolatile analyses.
As both a GC and GC/MS chemist at PACE Analytical Service Inc., a full service environmental analytical chemistry facility, Ms. Geng performed GC and GC/MS volatile and semivolatile analyses as well as overseeing the final reporting of analytical data, and compliance with method requirements.

MING-HWA HWANG
Laboratory Data Consultants, Inc.

EDUCATION

PHD. Chemistry, 1990
Boston College

BS Chemistry, 1979
National Tsing-Hua University

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist
2000 to present

Analytical Technologies, Inc.
Metals/HPLC Supervisor
1995 to 2000

Analytical Technologies, Inc.
Inorganics Supervisor
1992 to 1995

Monitor Environmental Lab
1992 to 1992
Senior Inorganic Chemist

REPRESENTATIVE EXPERIENCE

Ms. Hwang has over 13 years combined environmental laboratory, QA/QC and data validation experience. Her experience includes performance of data validation in the trace metals and wet chemistry areas for major Federal and commercial projects. Her laboratory experience includes hands-on CLP and SW-846 ICP/GFAA analysis, direction of trace metals and inorganic chemistry groups, and overall technical review of CLP data deliverables.

Specifically, Ms. Hwang has over 5 years inorganic data validation experience using USEPA (including Region III) functional guidelines and other applicable documents.

As senior chemist with Laboratory Data Consultants, Inc., Ms. Hwang specializes in the data validation and contract compliance screening of inorganic analyses using USEPA functional guidelines or equivalent protocol. She provides technical support for all inorganic data issues. Over the past 3 years, Ms. Hwang has performed USEPA Level 3 and Level 4 (including NFESC Level C and D) validation for projects including EPA Region IX ESAT, Southwest Division CLEAN 1 (Jacobs Engineering/IT Corporation/CH2M Hill), Southwest Division CLEAN 2 (Bechtel National), Pacific Northwest Division CLEAN (URS Greiner), Southern Division CLEAN (ABB Environmental), Atlantic Division CLEAN (EA Engineering), Southwest Division RAC (OHM Remediation), Pacific Division CLEAN (Earth Tech), DOE Atomic City (Jacobs Engineering Group), Army Corps of Engineers, Travis AFB (CH2M Hill), AFCEE Mather AFB (Montgomery Watson), AFCEE Pease AFB (Bechtel Environmental), AFCEE England AFB (Law Environmental), Army Corps of Engineers, Hawthorne Army Depot (Tetra Tech), Army Corps of Engineers, Fort Ord (Harding Lawson), and AFCEE Beale AFB (Law/Crandall, Inc.).

Mr. Hwang has over 9 years of environmental laboratory experience in a laboratory supervising or performing the analyses of inorganic parameters.

As metals and HPLC supervisor at Analytical Technologies, Inc., a full service environmental analytical chemistry facility, Ms. Hwang was responsible for managing all aspects of HPLC and trace metal projects such as ensuring complete and correct initiation of analyses, performing analyses, communication with clients regarding project status, QA/QC review, data interpretation, and review of final reports. As inorganic supervisor at Analytical Technologies, Inc., Ms. Hwang managed the inorganic chemistry section which performed techniques such as atomic absorption, inductively coupled argon plasma spectrometry, infrared spectroscopy, and ion chromatography. These analyses were performed from methods referenced in EPA CLP, SW-846, and Standard Methods documents.

While employed at Monitor Environmental Lab, Ms. Hwang was involved in the analyses of trace metals and classical wet chemistry along with the final interpretation and QA/QC of the final reports.

RESUME
MARK GREGG
Laboratory Data Consultants, Inc.

EDUCATION

B.S. Chemistry, 1985
University of California, San Diego

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Chemist
1999 to present

Pacific Analytical
GC/MS Chemist
1990 to 1999

REPRESENTATIVE EXPERIENCE

Mr. Gregg has over 16 years combined environmental laboratory and data validation experience. His experience includes performance of data validation in the GC/MS, radiochemistry, and inorganic areas for major Federal projects. His laboratory experience includes hands-on CLP and SW-846 analysis of GC and GC/MS volatile and semivolatile organic compounds.

Specifically, Mr. Gregg has over 7 years organic, radiochemistry, and inorganic data validation experience using USEPA CLP functional guidelines and other applicable documents.

As chemist with Laboratory Data Consultants, Inc., Mr. Gregg specializes in the data validation and contract compliance screening of inorganic and radiochemistry analyses. He has a thorough knowledge and understanding of radiochemistry and inorganic methods referenced in EPA CLP, SW-846, DOD, and DOE documents.

He has performed USEPA Level 3 and Level 4 validation for alpha spectroscopy, gamma spectroscopy, gas proportional counting and liquid scintillation methods.

Mr. Gregg has over 9 years experience in an environmental laboratory performing the analysis of organic parameters.

As GC/MS chemist at Ceimic Corporation, a full service environmental analytical chemistry facility, Mr. Gregg performed GC/MS volatile and semivolatile analyses. He was responsible for the final reporting of analytical data for this section.

RESUME
DUNG Q. NGO

EDUCATION

Mesa Community College
1987 to 1990

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Data Analyst/Computer Specialist
1996 to present

Analytical Technologies, Inc.
GC Laboratory Technician
1993 to 1996

Miles, Inc.
Chief Laboratory Technician
1992 to 1993

Miles, Inc.
Laboratory Technician
1990 to 1992

REPRESENTATIVE EXPERIENCE

Mr. Ngo has over 11 years combined environmental laboratory and automated data review experience. His experience includes performance of automated data validation for major Federal and litigation projects. His laboratory experience includes preparation of CLP and SW-846 data deliverable for GC organic methods.

Specifically, Mr. Ngo has over 8 years organic data validation experience using USEPA CLP functional guidelines and other applicable documents.

As senior data analyst with Laboratory Data Consultants, Inc., Mr. Ngo specializes in the automated data review of all analyses. He has a thorough knowledge and understanding of gas chromatography methods referenced in EPA CLP and SW-846 documents.

Mr. Ngo has over 4 years experience in an environmental laboratory performing the analysis of organic parameters.

As GC Pesticides laboratory technician at Analytical Technologies Inc., a full service environmental analytical chemistry facility, Mr. Ngo was responsible for GC Pesticides functions which included standards and sample preparation, final reporting of analytical data, and compliance with method requirements.

RESUME
BECKY J. COAN
Laboratory Data Consultants, Inc.

EDUCATION

B.S. with Distinction in Child Development
San Diego State University - 1973

Data Processing Certificate - Two Year Program
Palomar Community College - 1984

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Database Manager/EDD Supervisor
1994 to present

Analytical Technologies, Inc.
Data Management Supervisor
1989 to 1994

Analytical Technologies, Inc.
Technical Writer
1986 to 1989

REPRESENTATIVE EXPERIENCE

Ms. Coan has over 20 years combined environmental laboratory reporting and EDD deliverables experience.

As database manager/EDD supervisor with Laboratory Data Consultants, Inc., Ms. Coan performs and directs the management and population of electronic data deliverbles (EDD) from the client and all related database activities. All database issues are coordinated through Ms. Coan. Duties include database management, data entry, and data organization. Electronic data deliverable (EDD) work includes adding validation qualification flags and managing client EDDs. She is an expert in the ADR EDD process.

As supervisor of the ATI Data Management department, Ms. Coan was responsible for the data entry, report writing, and electronic data deliverables in the laboratory. She supervised the data entry clerks, report writers, receptionist, database administrator, and systems administrator. Data Management utilizes a Laboratory Information Management System (LIMS) and Novell network.

As technical writer at ATI, Ms. Coan was responsible for the generation and quality of final laboratory reports. This include organization, electronic data disk transfer, and QA/QC tables for the reports.

USACE, Baltimore District

Interim Measures Work Plan for Monitoring Wells 125d and 126d

G-4: Enviroserve

2118151 / BAL

MALCOLM PIRNIE

Permits/Licenses/Registrations Issued to EnviroServe

♦ USDOT RSPA Hazardous Materials Certificate of Registration	051600 005 0171K
♦ USDOT Labpack Exemption	OHD987050564
♦ US EPA Hazardous Waste Transporter Registration Number:	OHD987050564
♦ Ohio P.U.C.O. Hazardous Waste Transporter Registration Number:	77160-HW
♦ Public Utilities Commission Hazardous Materials Uniform Program Credentials	UPW-435216-OH
♦ International Fuel Tax Agreement License:	OH 34165159601
♦ Interstate Commerce Commission Authority	MC 335536
♦ Alabama Hazardous Waste Permit Number:	OHD987050564
♦ Arkansas Hazardous Waste Transportation Permit	H 1216
♦ California Hazardous Waste Permit Number	4387
♦ California Highway Patrol Hazardous Materials Transporter Registration	CA-217676
♦ Canada Provisional Certificate of Approval for a Waste Mgmt. System	A800965
♦ Colorado Hazardous Materials Transportation Permit	HMP-03568
♦ Connecticut Hazardous Waste Transporter Permit Number	CT-HW-730
♦ Delaware Hazardous Waste Transporter Permit	DE-HW-513
♦ Florida Hazardous Waste Transporter Certificate of Approval	OHD987050564
♦ Florida-Broward County Waste Transporter Operating License	HMT-01-20143
♦ Florida-Miami-Dade County Liquid Waste Transporter Operating Permit	LW-000549 (2001/2002)
♦ Georgia Public Service Commission Hazardous Material Permit	14865-14878
♦ Kansas Certificate of Hazardous Waste - Used Oil Transporter Registration Number:	OHD987050564
♦ Kentucky Certificate of Registration for Hazardous Waste Activity	KYU14805
♦ Maine Hazardous Waste Transporter License	ME-HWT-454
♦ Maine Waste Oil Transporter License	ME-WOT-454
♦ Maryland Waste Management Administration Controlled Hazardous Substance Hauler Certificate	HWH 604
♦ Massachusetts Hazardous Waste Transporter License Number	464
♦ Michigan National Uniform Credential Number:	UPW-0435216-OH
♦ Michigan LIW Uniform Program Identification Number	LIW 0435216 MI

Permits/Licenses/Registrations Issued to EnviroServe

♦ Missouri Hazardous Waste Transporter License	H-2276
♦ New Hampshire Hazardous Waste Transportation Registration	TNH-0324
♦ New Jersey Liquid Hazardous Waste Transporter Permit	DEP-50205
♦ New York Waste Transporter Permit	OH-102
♦ North Carolina authority to transport hazardous waste and materials.	OHD987050564
♦ North Dakota Hazardous Permit	WH707
♦ Ontario-Canada Commercial Vehicle Operators Registration	134-281-382
♦ PCB's –Notification of PCB Activity	OHD987050564
♦ Pennsylvania Hazardous Waste Transporter License Number:	PA-AH 0456
♦ Rhode Island Hazardous Waste Transporter Permit	828
♦ South Carolina Hazardous Waste Transporter Permit	OHD987050564
♦ Tennessee Permit to Transport Hazardous Wastes:	OHD98-705-0564
♦ Texas Solid Waste Registration Number	85640
♦ Vermont Hazardous Waste Transporter Permit	OHD987050564
♦ Virginia Hazardous Waste Transporter Permit Number	OHD9870505648
♦ Wisconsin Hazardous License	16355
♦ Quebec-Canada Transporter Registration Number	R-032353-6

ACORD CERTIFICATE OF LIABILITY INSURANCE

OP ID CR
ENVIR-7

DATE (MM/DD/YYYY) 06/09/08

PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.	
Dawson Insurance, Inc. 1340 Depot Street Cleveland OH 44116-1799 Phone: 440-333-9000 Fax: 440-356-2126	INSURERS AFFORDING COVERAGE	NAIC #
INSURED	INSURER A: Greenwich Insurance Company	
Enviroserve, J.V. 5502 Schaaf Road Cleveland, OH 44131	INSURER B: XL Specialty Insurance Co	
	INSURER C: St Paul Travelers	25658
	INSURER D:	
	INSURER E:	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A		GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY CLAIMS MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC	GEC0026504	07/03/08	07/03/09	EACH OCCURRENCE	$ 1,000,000
						DAMAGE TO RENTED PREMISES (Ea occurence)	$ 100,000
						MED EXP (Any one person)	$ 5,000
						PERSONAL & ADV INJURY	$ 1,000,000
						GENERAL AGGREGATE	$ 2,000,000
						PRODUCTS - COMP/OP AGG	$ 2,000,000
B		AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS	AEC0026501	07/03/08	07/03/09	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
						BODILY INJURY (Per person)	$
						BODILY INJURY (Per accident)	$
		X PHYS DAM DEDS $5,000	AEC0026501	07/03/08	07/03/09	PROPERTY DAMAGE (Per accident)	$
		GARAGE LIABILITY ANY AUTO				AUTO ONLY - EA ACCIDENT	$
						OTHER THAN AUTO ONLY: EA ACC	$
						AGG	$
A		EXCESS/UMBRELLA LIABILITY X OCCUR CLAIMS MADE DEDUCTIBLE X RETENTION $ 10,000	UEC0026503	07/03/08	07/03/09	EACH OCCURRENCE	$ 10,000,000
						AGGREGATE	$ 10,000,000
							$
							$
							$
A		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below	GEC0026504 EMPLOYERS LIABILITY	07/03/08	07/03/09	WC STATU-TORY LIMITS X OTH-ER	
						E.L. EACH ACCIDENT	$ 1,000,000
						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
						E.L. DISEASE - POLICY LIMIT	$ 1,000,000
A		OTHER Pollution/Prof Lia $10,000 DED	PEC0026505	07/03/08	07/03/09	EACH LOSS	$5,000,000
						ALL LOSSE	$5,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

CERTIFICATE HOLDER	CANCELLATION
INFOR-1 FOR DISPLAY PURPOSES ONLY	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL XXX DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES. AUTHORIZED REPRESENTATIVE

ENVIROSERVE

Certificate of Completion

This certifies that

Gary Greenawalt

Has successfully completed the

OSHA 8 Hour HAZWOPER Refresher Training Course including Hazardous Waste Operations & Emergency Response, Confined Space Entry, Respirator, Lockout/Tagout, Fire Extinguisher, Department of Transportation HM 181 / 126-215A Training, and other General OSHA Compliance instruction.

Larry Steigerwald
OSHA Out Reach Instructor

March 22, 2008
Date of Completion

ENVIROSERVE

Certificate of Completion

This certifies that

Garry Greenawalt

Has successfully completed the
Department of Transportation Title 49 CFR 172.700~704,
Sub Part H, 49 CFR 177.800~816 (HM 232) Training Course and
specific state requirements of: AR, CT, DE, IL, MA, MD, MA, MI, MO,
NH, NJ, NY, PA, NC, TX, WI, and Canadian Transportation of Dangerous
Goods to include Quebec & Ontario Reg. 347 specifics on drivers
responsibilites, duties and security in the transportation of hazardous
materials.

Larry Steigerwald
OSHA Out Reach Instructor

January 6, 2009
Date of Completion

EnviroServe

Certificate of Completion

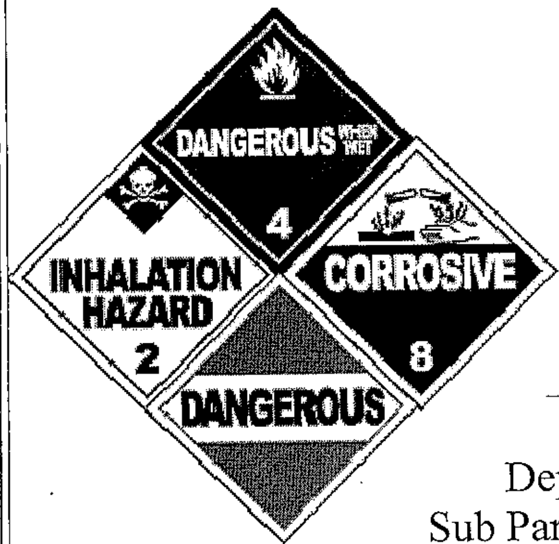
This certifies that

Dave Kamps

Has successfully completed the
OSHA 8 Hour HAZWOPER Refresher Training Course including
Hazardous Waste Operations & Emergency Response, Confined Space Entry,
Respirator, Lockout/Tagout, Fire Extinguisher, Department of Transportation HM 181 / 126-215A Training, and other General OSHA Compliance instruction.

Larry Steigerwald
OSHA Out Reach Instructor

November 4, 2008
Date of Completion



ENVIROSERVE

Certificate of Completion

This certifies that

Dave Kamps

Has successfully completed the
Department of Transportation Title 49 CFR 172.700~704,
Sub Part H, 49 CFR 177.800~816 (HM 232) Training Course and
specific state requirements of: AR, CT, DE, IL, MA, MD, MA, MI, MO,
NH, NJ, NY, PA, NC, TX, WI, and Canadian Transportation of Dangerous
Goods to include Quebec & Ontario Reg. 347 specifics on drivers
responsibilites, duties and security in the transportation of hazardous
materials.

Larry Steigerwald
OSHA Out Reach Instructor

January 14, 2009
Date of Completion

DISCLAIMER

The information and recommendations contained in the instructional program and the associated publications have been compiled from sources believed to be reliable. However, EnviroServe makes no guarantee or warranty, express or implied, and assumes no responsibility as to, the correctness, sufficiency, or completeness of such information and recommendations and is not responsible for errors and omission of information. Furthermore, information and recommendations presented by EnviroServe and it's representatives through instruction, is provided with good intention, however, other additional safety measures may be required under particular circumstances. Trainee agrees to indemnify and hold EnviroServe and it's representatives harmless for any and all damages, claims, demands, losses, costs and lawsuits which relate to or arise from the instructional program.

USACE, Baltimore District
Interim Measures Work Plan for Monitoring Wells 125d and 126d

H: Vapor Intrusion Technical Memorandum

MALCOLM PIRNIE

Vapor Intrusion Technical Memorandum for Monitoring Wells 125d and 126d Fort George G. Meade

MARCH 2009

Prepared for:

UNITED STATES ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT
10 South Howard Street
Baltimore, Maryland 21201

Prepared by:

MALCOLM PIRNIE, INC.
300 East Lombard Street, Suite 1510
Baltimore, Maryland 21202

ACRONYMS

bgs	Below Ground Surface
CCl_4	Carbon Tetrachloride
CSL	Closed Sanitary Landfill
FGGM	Fort George G. Meade Site
MCL	Maximum Contaminant Level
MW	Monitoring Well
PCE	Tetrachloroethylene
PID	Photoionization Detector
RI	Remedial Investigation
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Existing groundwater quality data, soil data, and hydrogeologic data were evaluated to assess potential vapor intrusion risk to residents within the targeted investigation area. The evaluated data included soil boring and well construction logs (for evidence of elevated photoionization detector (PID) readings or staining) from monitoring wells (MW)-123s, -124s, -125d and -126d (show on Figure 1) and groundwater sampling data from these wells and adjacent wells sampled as part of Fort George G. Meade's (FGGM's) historic and ongoing groundwater investigations), as well as published information on the geologic and hydrogeologic features of the subject area.

Based upon this assessment, the vapor intrusion exposure pathway does not appear complete; therefore, there is no apparent vapor intrusion risk to residents within the investigation area based on the following:

Deep Groundwater Impact

- Volatile Organic Compounds (VOCs) (primarily Trichloroethene [TCE], Tetrachloroethylene [PCE], and Carbon Tetrachloride [$CCl_{4]}$) detected in the deep wells MW-125d and -126d (screened in the Lower Patapsco formation) are unlikely to volatilize to the surface and subsequently into indoor spaces based on the depth of the Lower Patapsco formation (i.e., greater than 150 ft. below ground surface) and the presence of overlying clay confining units.[1]. As shown on Figure 2, the Patapsco Formation is divided into an upper, middle, and lower section. All three layers of the Patapsco (upper, middle, and lower) are present at the eastern portion of FGGM, as well as the adjacent area east of FGGM. The thickness of the Middle Patapsco clay layer, as shown in Figure 3, ranges from approximately 35 to 90 ft in the subject area. Groundwater heads measured during previous investigation activities confirm that the Middle Patapsco clay layer acts as a confining layer throughout the area. The presence of this layer eliminates the current vapor migration pathway to the overlying units and any indoor spaces from the VOCs that exist in the Lower Patapsco aquifer.
- According to the current United States Environmental Protection Agency (USEPA) guidance[2], vapor intrusion should be considered a potential exposure pathway if volatile chemicals are present at 100 feet or less in depth or are located in close proximity to current or future buildings. The Lower Patapsco near Odenton lies approximately 150 – 200+ feet below ground surface (bgs).

Shallow Groundwater

- Based on the local topographic high (200+ feet above mean sea level) located in the vicinity of Odenton (see Figure 4), it is unlikely that any potential contamination

[1] EM Federal Corporation. August 2007. *Fort George G. Meade Closed Sanitary Landfill Groundwater Remedial Investigation.*
[2] USEPA. November 2002. *OSWER Draft Guidance for Evaluation of the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.*

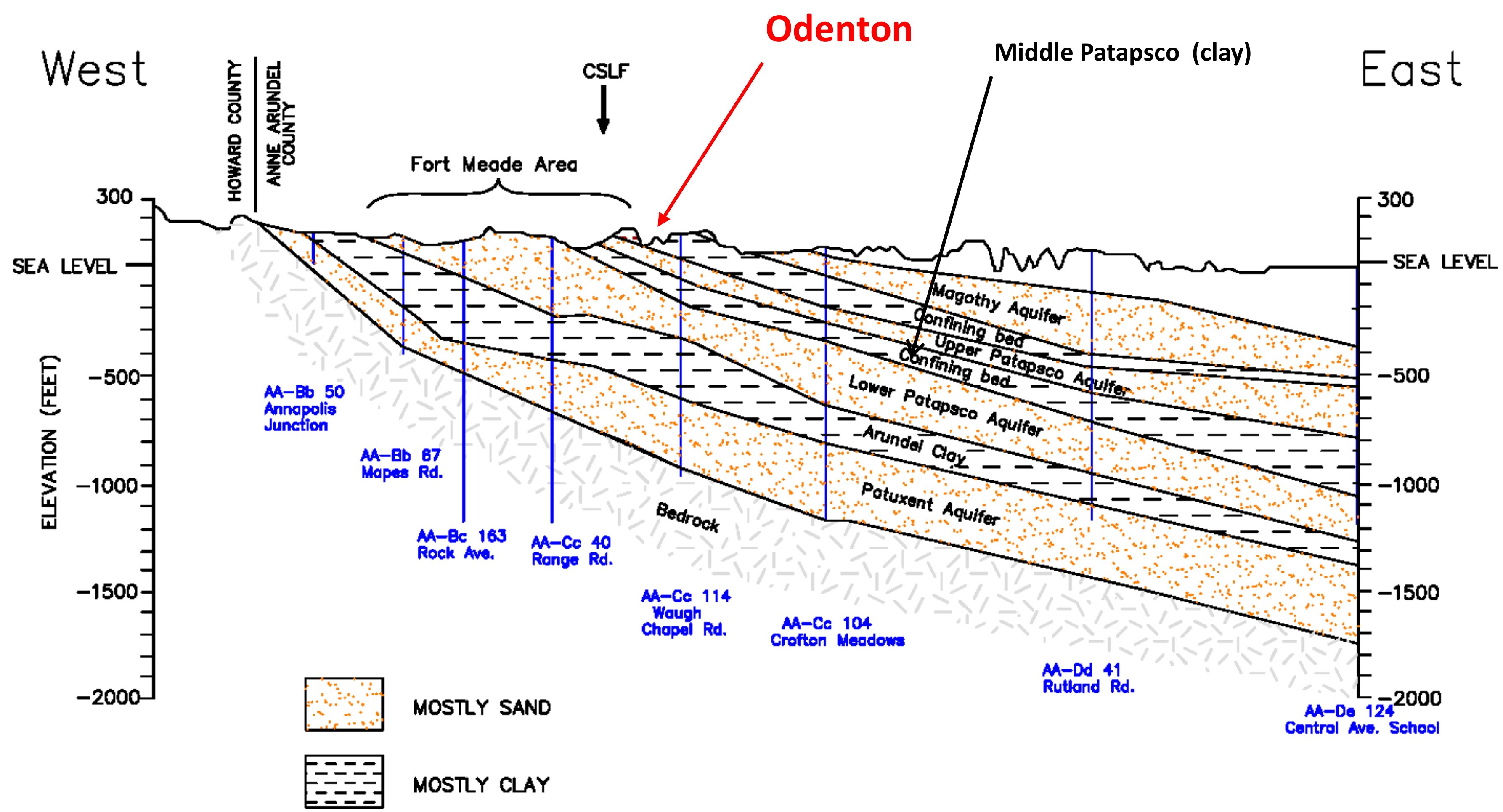
present in the Upper Patapsco on FGGM would flow off-site toward the residences located east of FGGMs reported in the Closed Sanitary landfill (CLS) annual groundwater and surface water monitoring report[3,] groundwater elevations in the Upper Patapsco are strongly influenced by surface drainage which is controlled by the topography and the impervious landfill cap.

  - Also, water level elevations in the Upper Patapsco collected during the CSL Remedial Investigation (RI) indicate that the Amtrak railroad and associated right-of-way (located just north of Waugh Chapel Road) lie in a northeast-southwest trending topographic low which crosses the regional groundwater flow at a high angle. This results in surface water seeps and southerly or southwesterly deflection of unconfined groundwater flow[1] as shown on Figure 5. This demonstrates that shallow groundwater flow (i.e. in Upper Patapsco formation) from FGGM does not migrate into the neighboring area east of FGGM.

- The VOCs identified in the deep groundwater of the Lower Patapsco formation (i.e., MWs- 125d and -126d) have not been detected at concentrations exceeding the USEPA Maximum Contaminant Levels (MCLs) or the USEPA vapor intrusion screening criteria in the shallow aquifer (Wells MW-123s and -124s and other Upper Patapsco wells sampled during the CSL RI and as part of FGGM's ongoing groundwater investigations)As shown in Figure 6, benzene was the only VOC that was detected in the Upper Patapsco above its MCL during the 2004 CSL RI sampling event; however, the benzene detected did not exceed the USEPA vapor intrusion screening criteria[2]. Therefore, there is no complete exposure pathway from VOCs in the Upper Patapsco formation via vapor intrusion.

Source: EM Federal Corporation. August 2007. *Fort George G. Meade Closed Sanitary Landfill Groundwater Remedial Investigation*

MALCOLM PIRNIE	Well Locations Vapor Intrusion Memorandum Fort George G. Meade	FIGURE 1 MARCH 2009

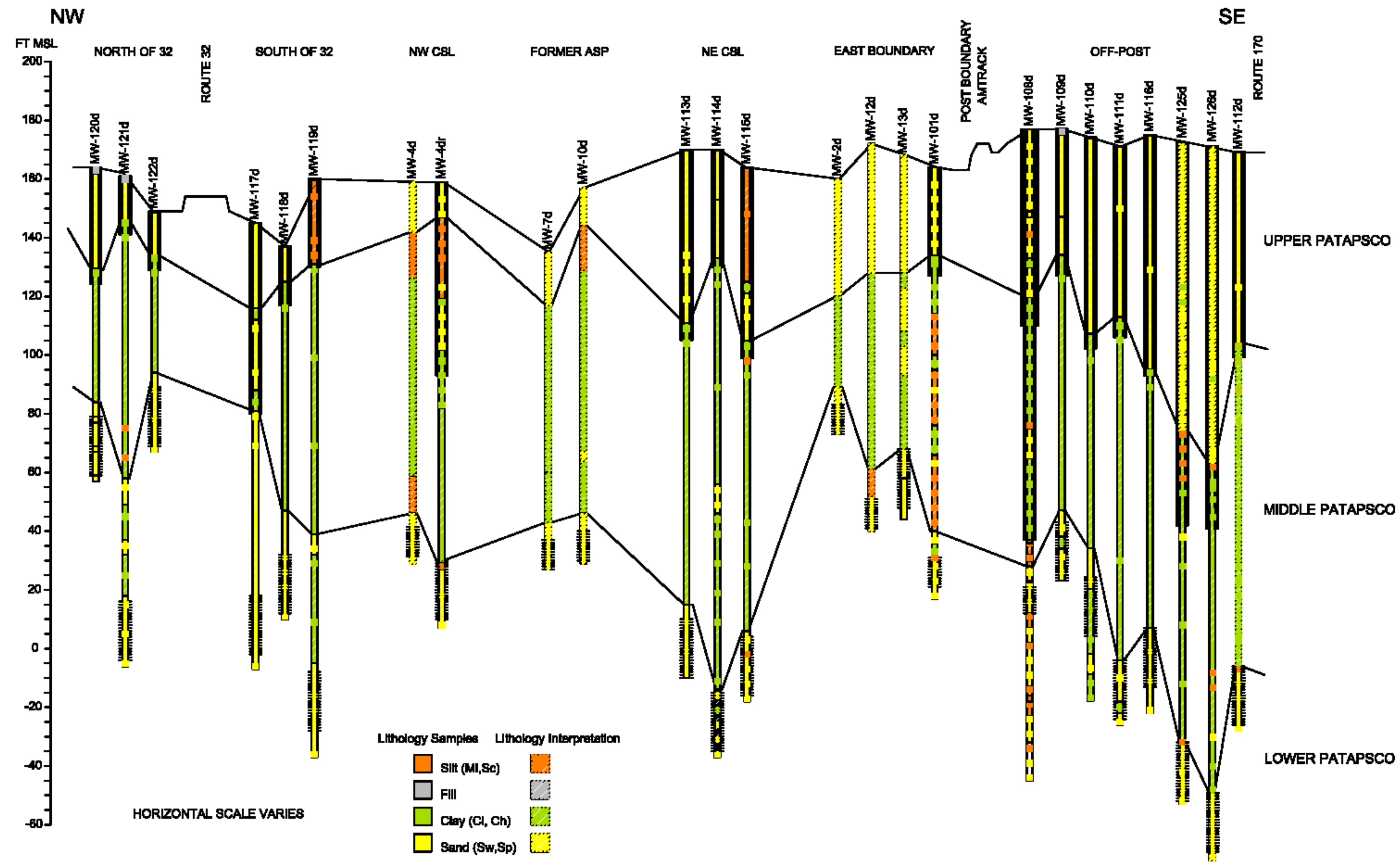


Source: EM Federal Corporation. August 2007. *Fort George G. Meade Closed Sanitary Landfill Groundwater Remedial Investigation*

MALCOLM PIRNIE

Geologic Cross Section
Vapor Intrusion Memorandum
Fort George G. Meade

FIGURE 2
MARCH 2009

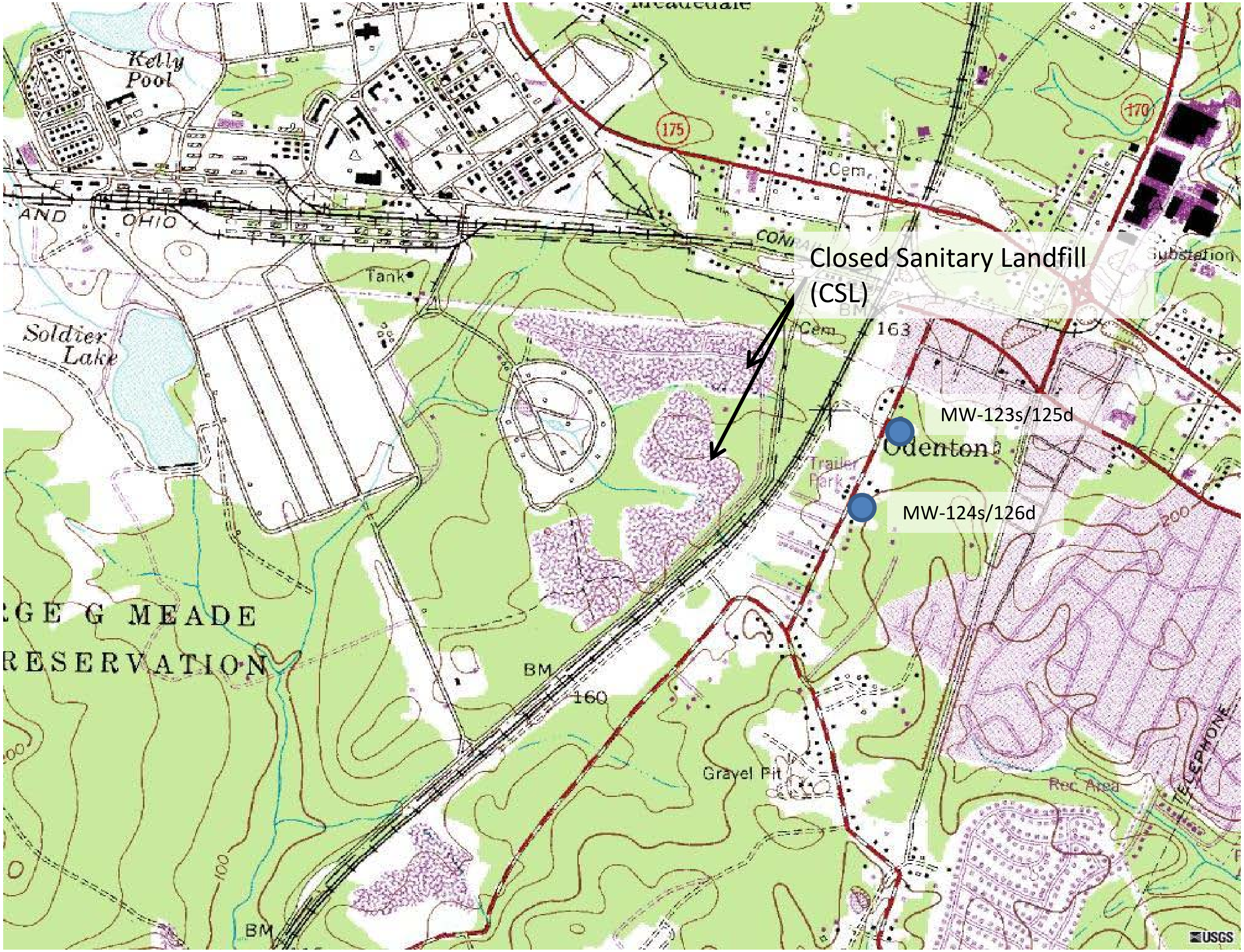


Source: EM Federal Corporation. August 2007. *Fort George G. Meade Closed Sanitary Landfill Groundwater Remedial Investigation*

MALCOLM PIRNIE

Deep Monitoring Well Cross Sections
Vapor Intrusion Memorandum
Fort George G. Meade

FIGURE 3
MARCH 2009



Source: TerraServer USA. 2005. http://terraserver-usa.com

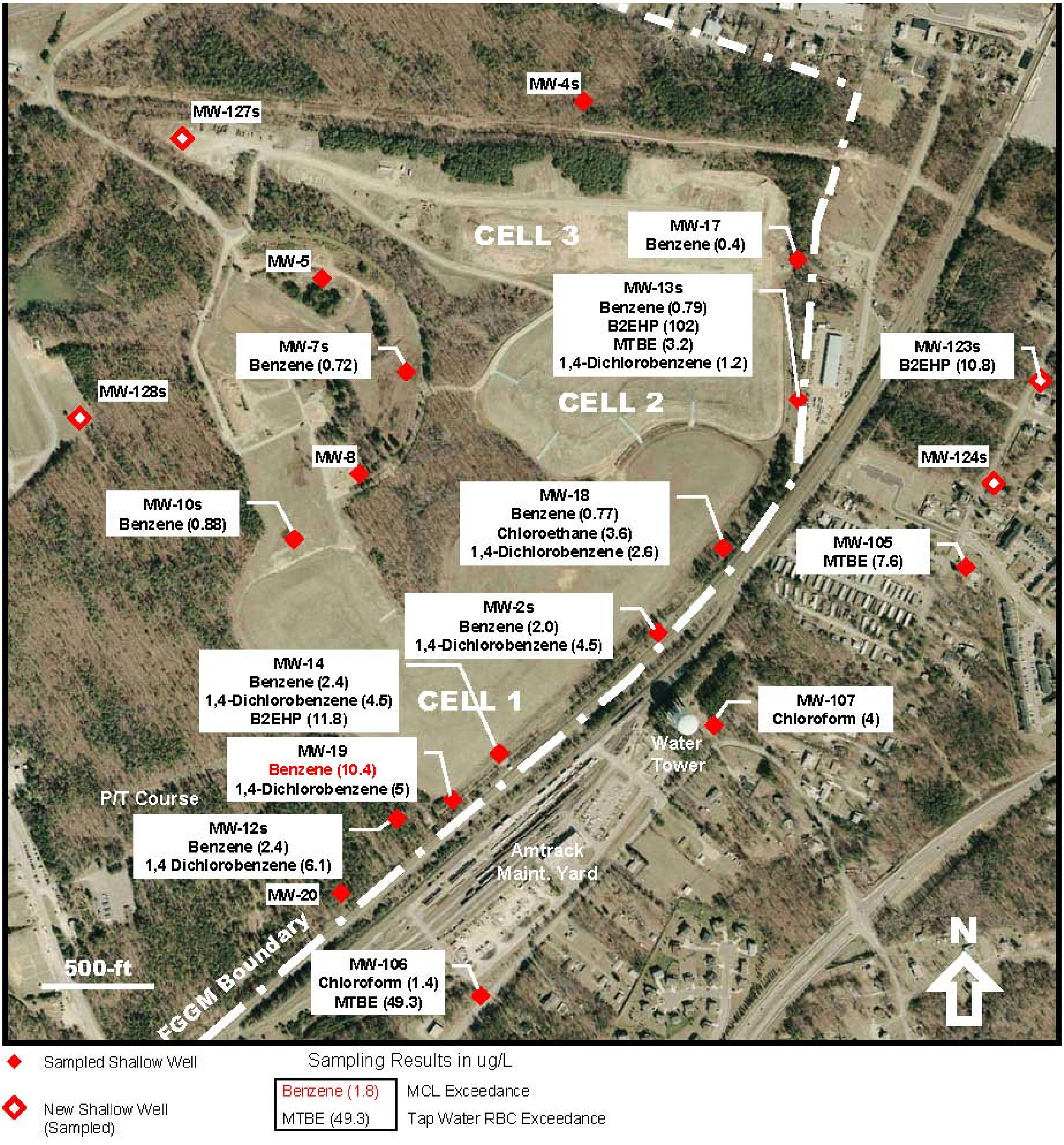
MALCOLM PIRNIE

Topographic Map
Vapor Intrusion Memorandum
Fort George G. Meade

FIGURE 4
MARCH 2009

Source: EM Federal Corporation. August 2007. *Fort George G. Meade Closed Sanitary Landfill Groundwater Remedial Investigation*

MALCOLM PIRNIE	Upper Patapsco Aquifer Potentiometric Surface Vapor Intrusion Memorandum Fort George G. Meade	FIGURE 5 MARCH 2009



Source: EM Federal Corporation. August 2007. *Fort George G. Meade Closed Sanitary Landfill Groundwater Remedial Investigation*

MALCOLM PIRNIE	Organics Detected in the Upper Patapsco Aquifer (2004) Vapor Intrusion Memorandum Fort George G. Meade	FIGURE 6 MARCH 2009