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MALCOLM PIRNIE

ARCS II

CONTRACT NO. 68-W9-0051

LI TUNGSTEN
GLEN COVE, NEW YORK

Work Assignment No. 025-2L4L

RI/FS
DRAFT FINAL QUALITY ASSURANCE PROJECT PLAN
<14> QA PLAN

Remedial Planning Activities at Selected Uncontrolled Hazardous Substance Disposal Sites USEPA Region II (NY, NJ, PR, VI)

Malcolm Pirnie, Inc.
104 Corporate Park Drive
White Plains, New York 10602

July 1996

300357

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MALCOLM PIRNIE

ARCS II CONTRACT NO. 68-W9-0051

WORK ASSIGNMENT # 025-2L4L

SITE NAME: **LI TUNGSTEN**
GLEN COVE, NEW YORK

DRAFT FINAL QUALITY ASSURANCE PROJECT PLAN

JULY 1996

CONTRACTOR QA/QC SIGN-OFF

Malcolm Pirnie, Inc., has reviewed this document in accordance with the contractor's ARCS II Quality Assurance Procedures Manual SOP (MP-PMOQA-006-12/90, Revision 1) and is submitting it to USEPA, Region II under Work Assignment No. 025-2L4L and Contract No. 68-W9-0051.

This document has not been approved by USEPA Region II and is not intended for release to the public.

Dennis G. McGrath SITE MANAGER Date: 17 July 1996	Lisa D. Greco SITE QUALITY ASSURANCE OFFICER Date: 7/10/96
Kris Krishnaswami ARCS II PROGRAM MANAGER Date: July 18, 1996	Alan Greenlaw ARCS II PMO QA MANAGER Date: 7/10/96

LI TUNGSTEN RI/FS
DRAFT FINAL QUALITY ASSURANCE PROJECT PLAN

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1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Sampling and Analysis Plan (SAP) provides the details for the investigative activities described in the RI/FS Work Plan for the Li Tungsten Site (Malcolm Pirnie, 1993). The SAP consists of two documents: this Quality Assurance Project Plan (QAPjP) and the Field Sampling Plan (FSP) which defines in detail the sampling and data gathering methods to be used. This QAPjP is developed in accordance with the Malcolm Pirnie Quality Assurance Program Plan (QAPP). The Malcolm Pirnie QAPP methods comply with OSWER Directive 9355.0-14 and the latest edition of the Region II CERCLA Quality Assurance Manual (USEPA, 1989).

As stated in the RI/FS Work Plan, the chemical quality of the soil, groundwater, and surface water of the area in and around the site, as well as the hydrogeology, are not well defined. The purpose of the field activities proposed for the site is to characterize the nature and extent of contamination in groundwater, surface water, and soil on the site, and to determine the hydrologic properties of the aquifer(s) underlying the site, including groundwater flow directions, flow rates, and migration patterns of existing contamination plume(s). The purpose of this QAPjP is to ensure that all data collected during the RI/FS is technically valid, legally defensible and useful in meeting these goals.

A comprehensive review of site background information needed to design and implement the field investigation is presented in Section 2 and 3 of the RI/FS Work Plan. A summary of the important aspects of that background research is presented here.

1.2 OVERALL ANALYTICAL PLAN

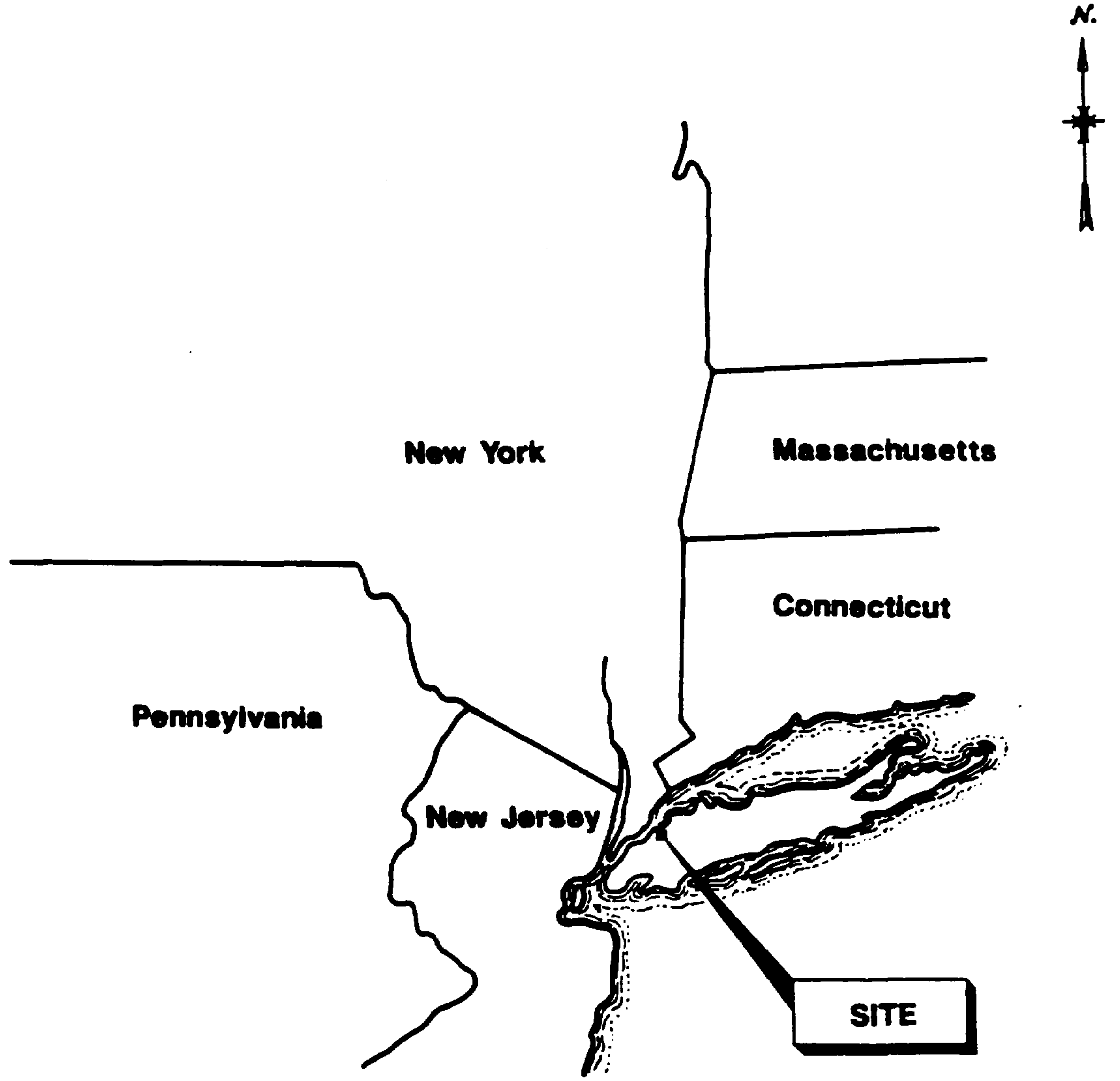
At the time this document was revised, the USEPA's CLP-Special Analytical Services (SAS) program was discontinued. Since the replacement program (non-RAS) has not been finalized and/or implemented, all references made in this Field Sampling Plan (FSP) to laboratory analytical services for any parameter not included in the CLP-Routine Analytical Services (RAS) program (e.g., radiological parameters, pH, TOC, physical properties, TCLP parameters), reflect the procedures and requirements of the former USEPA Special Analytical Services (SAS) program. All non-CLP analytical services are referred to hereinafter as non-RAS.

Malcolm Pirnie will determine through the USEPA WAM whether the USEPA ESD laboratory or ERT laboratory will be able to analyze the samples for non-RAS parameters. If it is not feasible to do so, then the samples will be analyzed through the non-RAS work assignment (WA# 046-2HZZ) or by revision to this work assignment before sampling is done. To control costs, sampling will begin only after all required laboratory support is booked or procured.

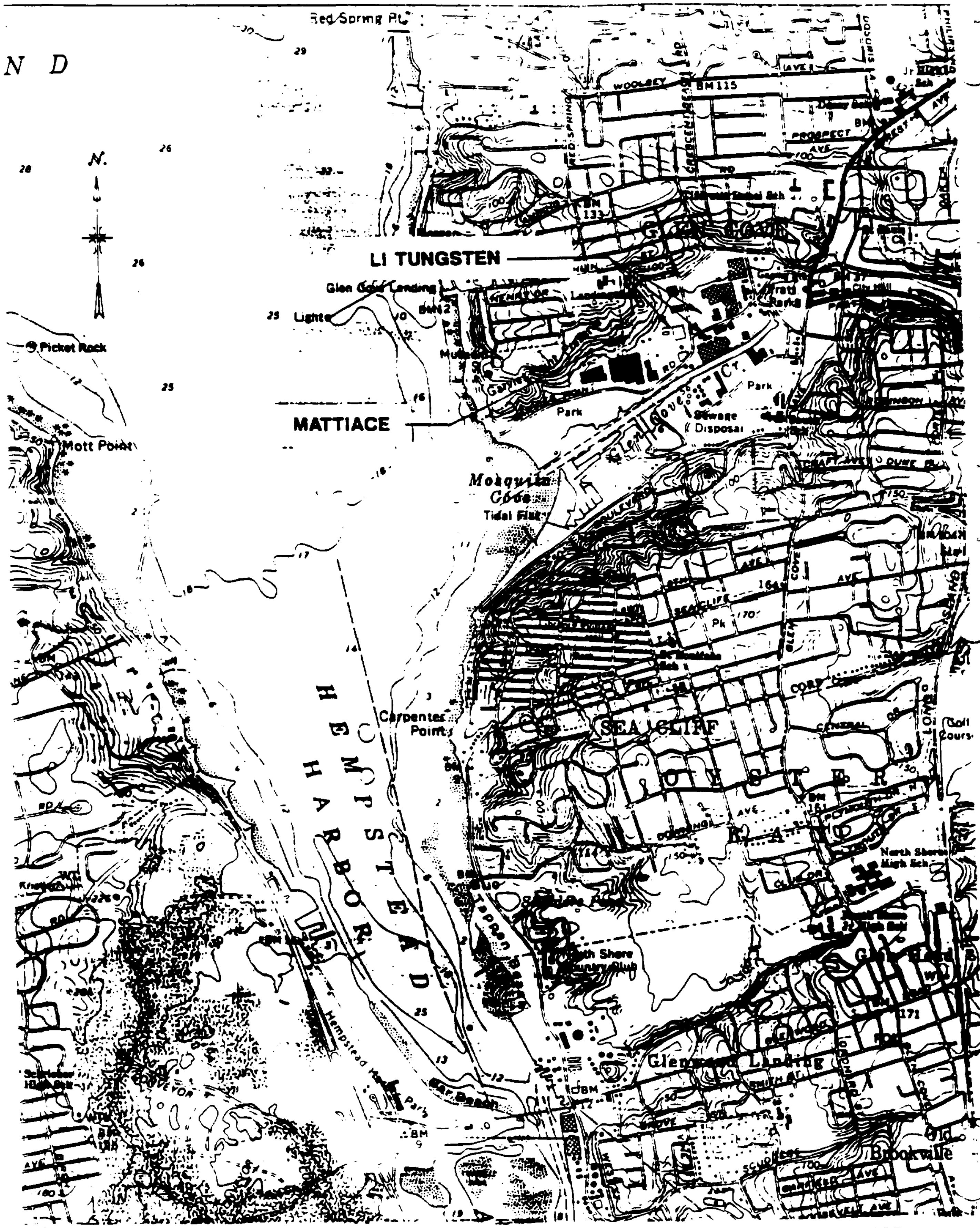
It should be noted that any modifications to this FSP that may be necessary as a result of the non-RAS program will adhere to Malcolm Pirnie's ARCS II QA Program SOP MP-PMOQA-009 1/92 entitled Procedures for Requesting Modification in the Working Documents of a Remedial Investigation/ Feasibility Study (RI/FS) provided as Appendix D.

1.3 SITE DESCRIPTION

The Li Tungsten Site is located at 63 Herb Hill Road in the City of Glen Cove, Nassau County, Long Island, New York. A regional map and a site location map are provided in Figures 1-1 and 1-2, respectively. The site, which is situated on approximately 26 acres, consists of four (4) separate parcels designated A, B, C and C'. For the purpose of the field investigation, the study area is defined as the entire 26 acres. Parcel A (seven acres) served as the main operations center when the site was active. It contains the majority of buildings, structures (e.g., tanks, two surface impoundments) and drums/crates of tungsten ore. It is bounded by Herb Hill Road on the north, Garvies Point Road on the west, an adjoining property on the east, and Glen Cove Creek on the south. Parcel B (six acres) is located due north of Parcel A. Parcel B is bounded by Herb Hill Road on the south, Dickson Lane on the west, The Place on the north, and an adjoining property on the east. The area south of the pond on Parcel B was used primarily as a parking lot when the plant was active; however,



MALCOLM PIRNIE	LI TUNGSTEN CORPORATION REGIONAL LOCATION MAP	Malcolm Pirnie, Inc. FIGURE 1-1



SOURCE: USGS MAP SEA CLIFF, NEW YORK QUAD., 1979

LI TUNGSTEN
GLEN COVE, NEW YORK
SITE LOCATION MAP
SCALE 1"=2000'

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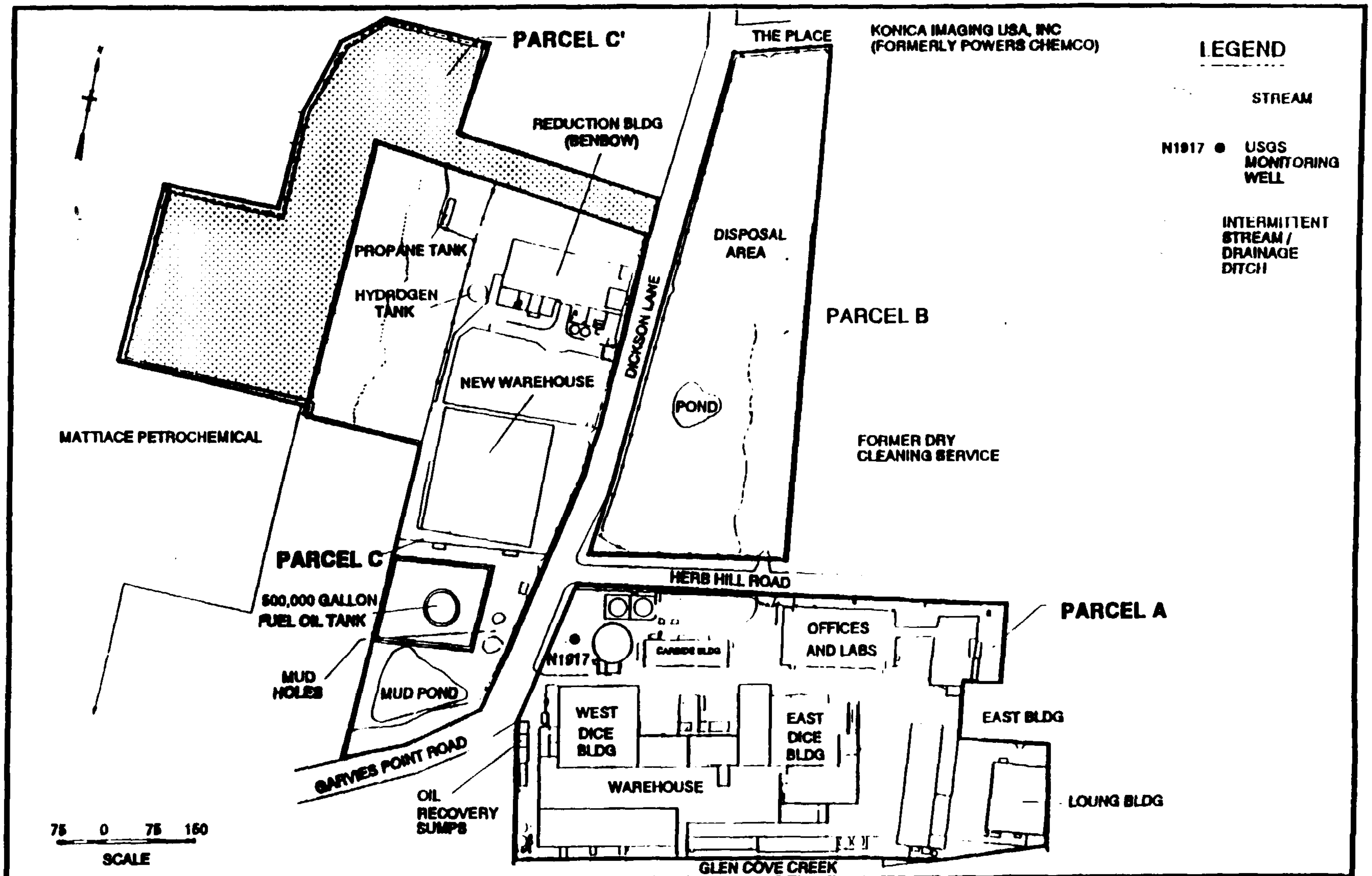
disposal activities are believed to have taken place in the central portion of the parcel. Parcel C is the largest of the three parcels (10 acres); however, not all of this parcel was part of the Li Tungsten property during active site operations. The Glen Cove Development Corporation (GCDC) acquired approximately four acres of undeveloped property, designated Parcel C', sometime after 1984. Parcel C contains several buildings, a 500,000 gallon aboveground fuel oil storage tank, and three surface impoundments (e.g., Mud Pond and two Mud Holes) used to dispose of process waste water. The location of Parcels A, B, C and C' and the significant site features on each parcel are shown on the site plan provided in Figure 1-3.

1.4 SITE HISTORY

From the early 1940's until approximately 1985, tungsten ores and concentrates, imported primarily from mainland China, South America and Canada, were smelted at the Li Tungsten Site for the production of tungsten carbide powder, tungsten wire, and welding rods. In 1985, the company filed for bankruptcy and the facility ceased operation. The facility has a complex history of name and ownership changes, and environmental site assessments, investigations and time-critical removal actions. Specific details pertaining to the operational history of the facility are discussed in Section 2 of the RI/FS Work Plan (Malcolm Pirnie, 1993). A complete site and project description, including the following items, are also included in the RI/FS Work Plan:

* General objectives of the investigation;
* Physical description of the Site;
* Chronological history of the uses of the Site and the investigations that have occurred to date.
* Specific project objectives, including how the data collected will be used to address the objectives.



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LI TUNGSTEN, GLEN COVE, LONG ISLAND, NY

SITE PLAN

MALCOLM PIRNIE, INC

Figure 1-3

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

2.1 GENERAL MANAGEMENT STRUCTURE

The United States Environmental Protection Agency (USEPA) Region II is the lead agency for the Li Tungsten RI/FS activities. They will have the overall responsibility of assuring that the investigations are conducted appropriately and that quality assurance/quality control (QA/QC) measures are observed. Malcolm Pirnie is an Alternative Remedial Contracting Strategy (ARCS) contractor for Superfund sites in USEPA Region II. The Malcolm Pirnie ARCS Project Management Office (PMO) will direct and oversee all RI/FS investigations and has appointed a Site Manager. The Site Manager will be responsible for planning, developing and implementing the RI/FS for the site. Subcontractors will be procured and directed by the USEPA and Malcolm Pirnie to provide site security; to perform soil boring sampling, test pit sampling, and soil gas sampling; to install monitoring wells; to survey locations of RI features and sampling locations; to conduct a geophysical survey; to perform laboratory analytical testing; and to dispose of drill cuttings and purged groundwater.

Project oversight and review will be provided by the USEPA Work Assignment Manager (WAM) in charge of this site. The USEPA WAM and the Malcolm Pirnie PMO QA Manager shall be notified prior to any deviation from the approved Work Plan or FSP. Figure 2-1 presents the overall ARCS PMO structure and the project management and support organization that is followed for an RI/FS.

2.2 CORPORATE AND PROGRAM ORGANIZATION

2.2.1 Overview

A matrix management organization form is used at Malcolm Pirnie, Inc. The President is the Chief Executive Officer of the firm and is responsible for direction of the activities of the firm in accordance with the interest of the Board of Directors. Each of the firm's Vice Presidents is responsible to the President and each staff member is responsible to a Vice President through a Group Leader.

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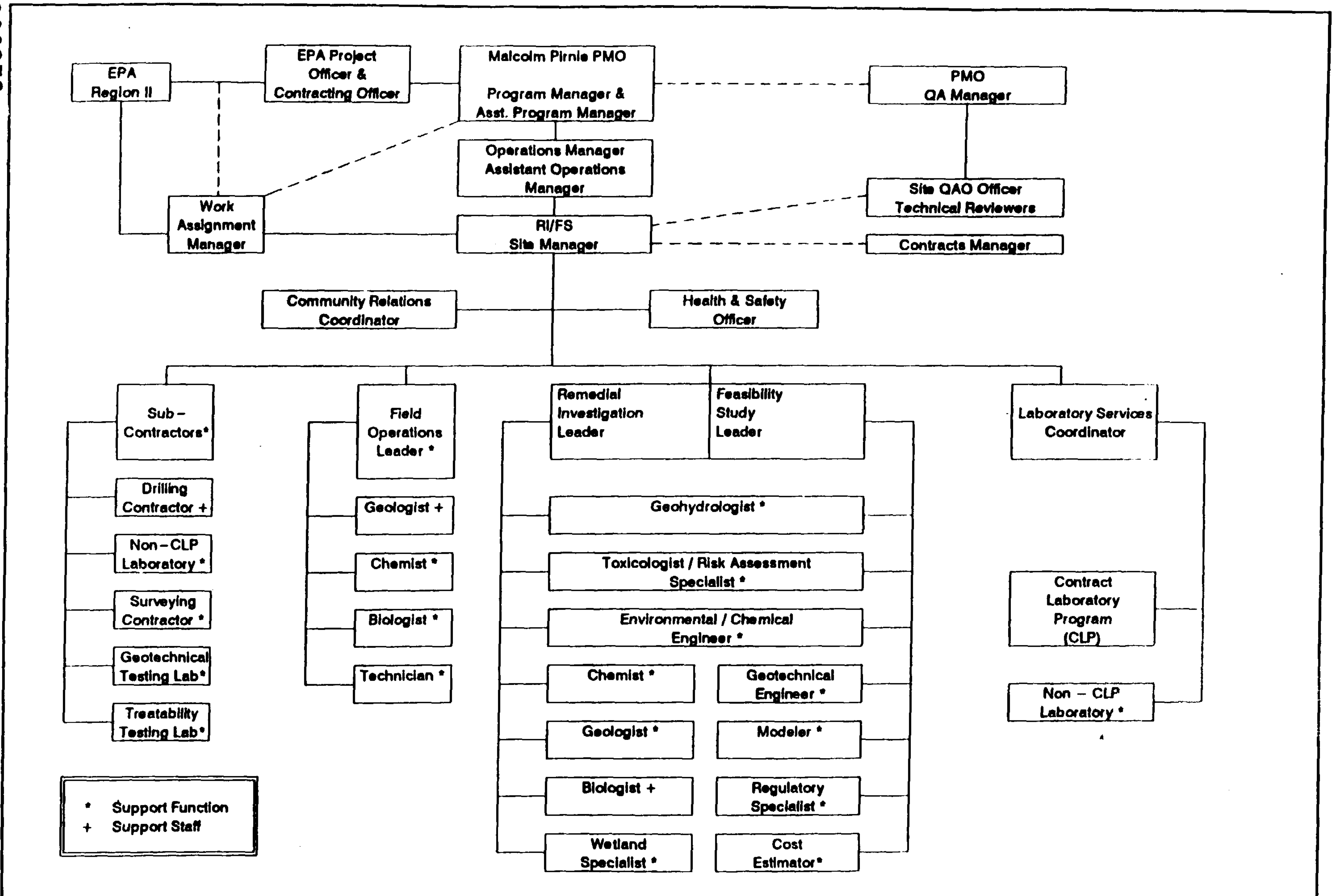

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LI TUNGSTEN SITE
Glen Cove, Long Island, New York

TYPICAL ORGANIZATION FOR AN RI/FS

Malcolm Pirnie, Inc.

FIGURE 2-1

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Corporate management and administrative functions are centralized at the White Plains Office. The quality of technical work is directed and controlled under the Corporate Technical Directors Program. The White Plains Office, as well as regional offices at diverse geographical locations, provide engineering and planning services for clients within their region. Technical expertise as well as management and administrative support is available on a mutually supportive basis from other regional offices and the White Plains Office. Designs, reports, studies and other engineering services are managed and developed on an individual project-by-project basis by interaction of the various environmental services groups at the different offices.

2.2.2 ARCS Program Quality Assurance Management Structure

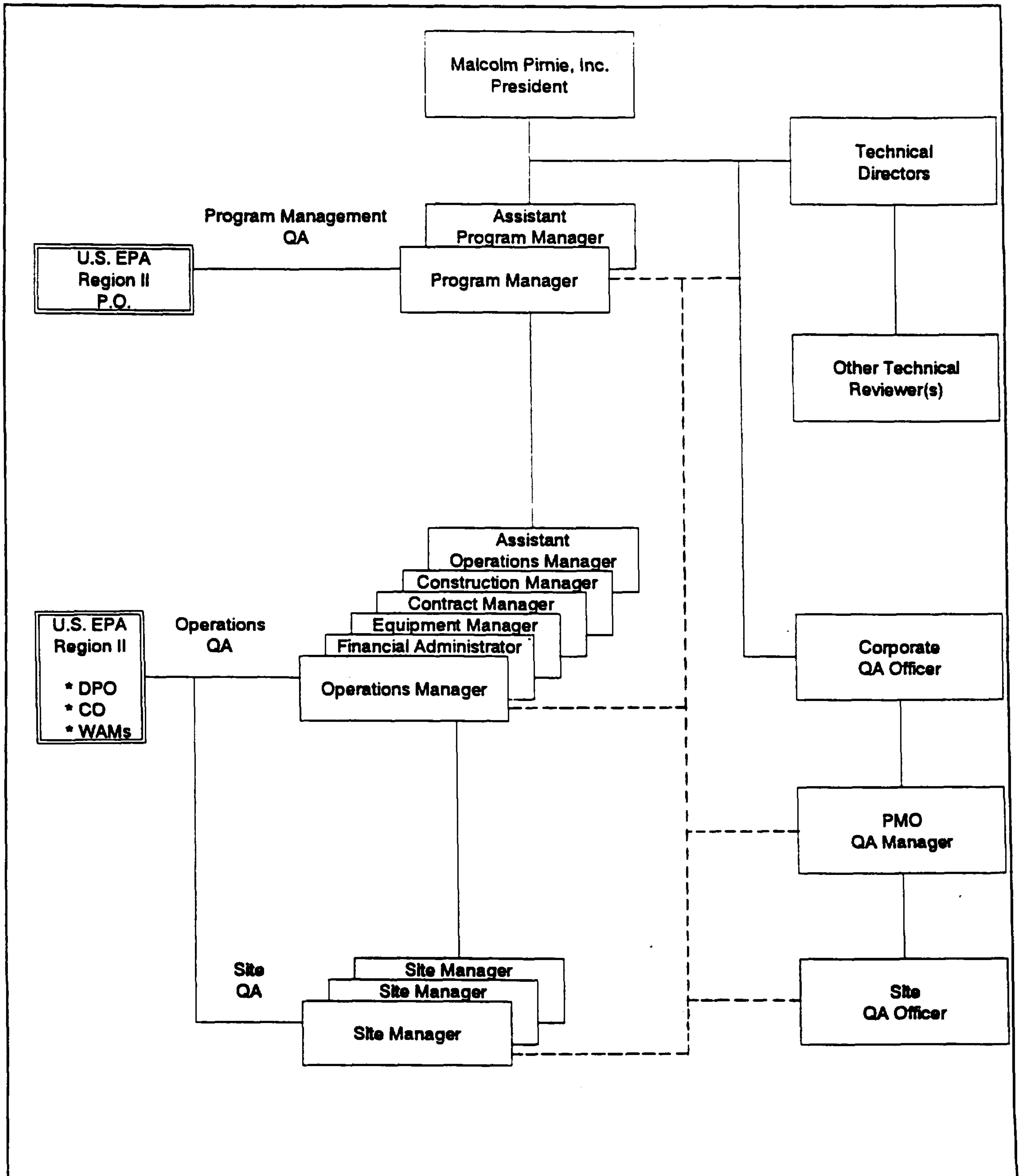
The QA program organization structure of Malcolm Pirnie is presented in Figure 2-2. Key QA personnel are:

- Program Manager;
- Corporate QA Officer;
- Operations Manager;
- PMO QA Manager;
- Construction Manager;
- Site Manager;
- Site QA Officer; and
- Technical Reviewers.

The **Program Manager** has the final responsibility for the quality of work performed under the ARCS contract and will be the primary point of contact with the USEPA Region II.

The **Corporate QA Officer** assures that QA/QC concern's are fully represented at the senior management level. He acts as a senior level troubleshooter for QA/QC issues raised by the PMO QA Manager.

The **Operations Manager** supervises and evaluates the performance of the Site Manager. He oversees technical performance of work assignments and coordinates cross-firm quality assurance reviews with the Team Subcontractor(s). The Operations Manager identifies a Review Team Leader and assures that a Quality Control Review Team is in place for each site.



MALCOLM PIRNIE

LI TUNGSTEN SITE
Glen Cove, Long Island, New York

QUALITY ASSURANCE PROGRAM ORGANIZATION

Malcolm Pirnie, Inc.

FIGURE 2-2

The **PMO QA Manager** oversees the program-wide QA/QC efforts and is responsible for auditing technical activities, including field and file audits. He assures that proper QA/QC documentation is maintained. The PMO QA Manager monitors the activities of the Site QA Officer, Review Team Leader and the Quality Control Review Team (see below). Administratively, the PMO QA Manager reports to the Corporate QA Officer. Functionally, the PMO QA Manager communicates with the Operations Manager and the Program Manager.

The **Site Manager** is responsible for executing all phases of a specific project and for applying the full resources of the project team on the project. The Site Manager has primary responsibility for overseeing quality control and development of the site specific Quality Assurance Project Plan. For construction administration projects, the PMO **Construction Manager** is responsible for overseeing QA/QC activities including: 1) contract document preparation, 2) construction management work plan, 3) shop drawing reviews, 4) inspections and 5) subcontractor performance reviews.

Before substantive work begins on a project, the Site Manager must prepare a Work Plan. The Work Plan provides the technical approach for accomplishing the work, including quality control and review objectives, in addition to other Work Plan requirements. The **Site Manager** is responsible for preparing the site-specific FSP and QAPjP.

The **Site QA Officer** specifies project QA/QC requirements for analytical detection limits, holding times, and for technical activities including, but not limited to the following:

- Field sampling, sample preparation, sample preservation, chain of custody preparation and sample shipment;

- Data quality objectives, including methods specification, detection limits and holding times;

- Analytical quality control requirements where a non-CLP laboratory is used;

- Data validation objectives;

- Conducting a QA Field Sampling Audit;

- Other site-specific QC requirements.

The Site QA Officer is responsible for reviewing the site-specific QAPjP prepared by the Site Manager. He or she will also ensure that CLP data validation is performed by USEPA Region II certified personnel or subcontractor.

2.2.3 Project Management

The project organization is presented in Figure 2-3. In addition to the personnel listed in Figure 2-3, support for the project will be provided as needed by additional personnel located in the Malcolm Pirnie corporate offices at White Plains and other regional offices. The responsibilities of key project staff positions are summarized below:

- Dennis McGrath, Site Manager is responsible primarily for development and implementation of the RI/FS, including coordination among the RI/FS leaders and support staff, maintaining a clear definition of and adherence to EPA-approved scope, schedule and budget. As part of this responsibility, he will:

    1. Provide overall technical direction for preparation of work plans and tasks performed under this contract.

    2. Maintain budgetary and schedule surveillance.

    3. Indicate the types of sampling, field and monitoring QA records to be retained for the project.

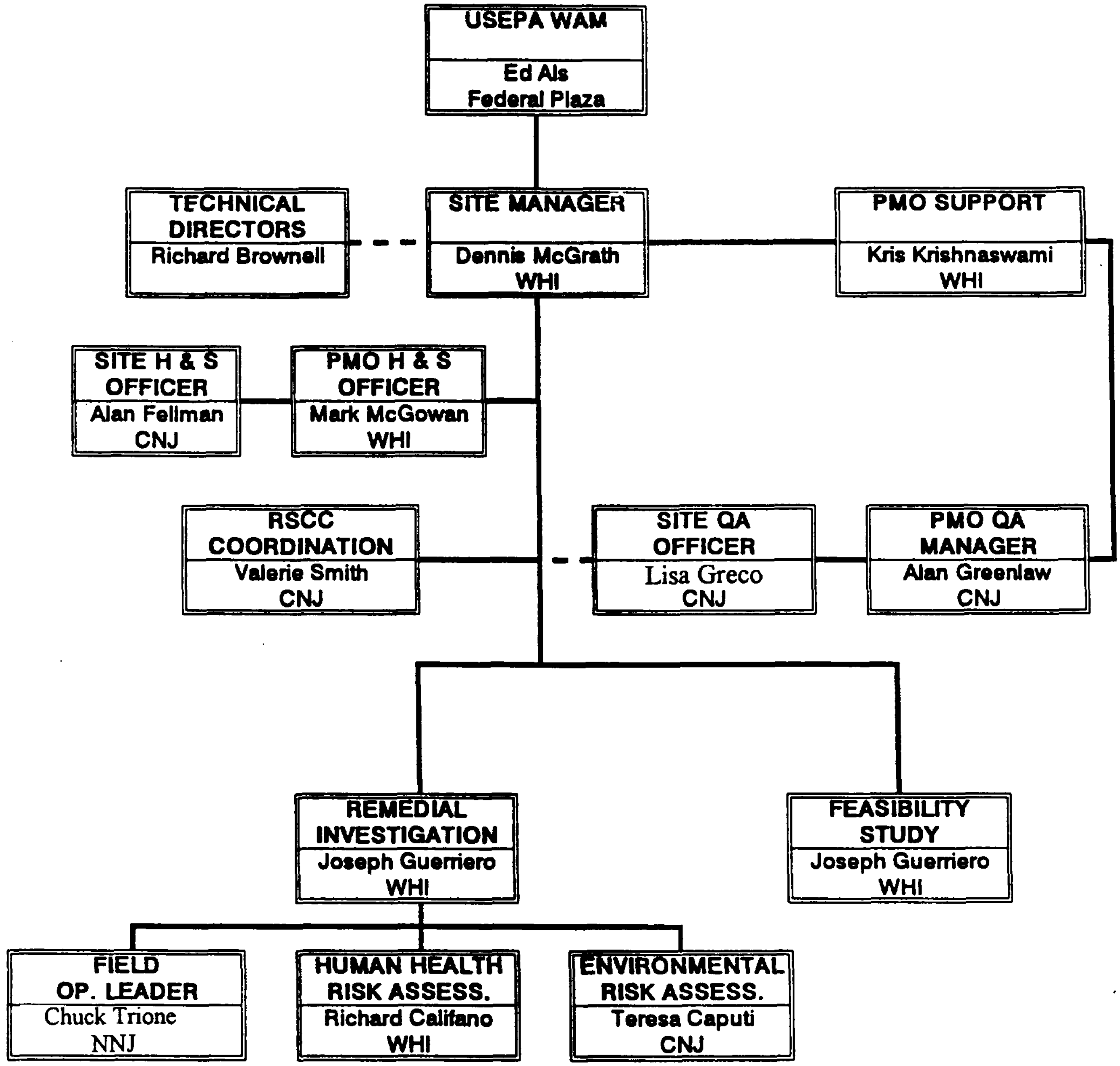
    4. Approve reports and material for release to the USEPA and other external organizations.

    5. Approve task work plans, safety plans and sampling plans.

- Joseph Guerriero, Remedial Investigation Leader reports directly to, and works with, the Site Manager and is responsible for the development and implementation of the field investigation, the analysis of samples, and the interpretation and presentation of data acquired from the site. In addition, the RI Leader will be responsible for the preparation of the RI report. As part of his responsibilities, he will:

    1. Maintain all Quality Assurance policies that pertain to sampling, sample shipment and manifesting, environmental monitoring, field activities and deliverables.

    2. Direct all field activities.



MALCOLM PIRNIE	LI TUNGSTEN CORPORATION RI/FS PROJECT ORGANIZATION	Malcolm Pirnie, Inc. **FIGURE 2-3**

3. Provide for sampling, environmental monitoring and field QA audits.

4. Ensure that health and safety procedures are observed in the field.

- Joseph Guerriero, Feasibility Study Leader is responsible for detailed evaluation of interim remedy alternatives. As part of his responsibilities, he will:

  1. Ensure that the FS generates the proper type and quantity of data for use in the initial screening of interim remedy technologies/alternatives.

  2. Develop requirements for and evaluation of treatability study/pilot testing.

  3. Develop cost analysis of interim remedy alternatives.

  4. Prepare Feasibility Study report.

- Lisa Greco, Site Quality Assurance Officer reports directly to the PMO QA Manager and is responsible for on-going surveillance of project activities to ensure conformance to this plan and to evaluate the effectiveness of its requirements. As QA Officer, The Site Quality Assurance Officer will have access to any personnel or subcontractors, as necessary, to resolve technical problems and has the authority to recommend that work be stopped when that work appears to jeopardize quality. The Site Quality Assurance Officer will audit field activities at least once and will also be available to respond to any QA/QC problem. In addition, the Site QAO will be responsible for ensuring that all corrective actions called for as a result of USEPA on-site field audits are addressed. As part of her responsibilities, she will:

  1. Monitor the correction of quality problems and alert task leaders where similar problems might occur.

  2. Develop and maintain project QA files for the retention of sampling, monitoring and field QA records.

  3. Participate in QA audits and conduct QA Field Sampling Audit.

  4. Recommend changes to the Site Manager to improve the effectiveness of the project in attaining its QA objectives for field, sampling and monitoring activities.

  5. Ensure that QAPjP and FSP are being followed.

  6. Review proposed additions and changes to this QAPjP.

7. Review all deliverables for technical content and quality objectives.

- Alan Fellman, Health and Safety Officer is responsible for identifying and prescribing appropriate protective measures. As part of his responsibilities, he will:

1. Prepare a site-specific Health and Safety Plan (HASP).

2. Ensure that health and safety procedures are observed in the field.

2.2.4 Subcontractors

The following is a list of services to be subcontracted for the Li Tungsten Site RI/FS, under the direction of Malcolm Pirnie. At this point of time in the project, specific contractors have not been selected for the tasks. The selection process will be conducted by competitive bidding and will commence following the approval of this plan.

- Drilling Subcontractor: Environmental Products & Services, Inc.

  Responsibility: Subsurface soil sampling and monitoring well installation.

  Tasks: Drill soil borings, drill, install and develop new monitoring wells, excavate test pits, collect geoprobe sample, abandon existing wells.

  Contact: Mr. Mark Wilder
  315-471-0503

- Soil Gas Subcontractor: PSA Environmental

  Responsibility: Perform soil gas sampling/analysis.

  Tasks: Conduct soil gas survey.

  Contact: Mr. Roger Sense
  816-525-7483

- Surveying Subcontractor: American Geotech, Inc.

  Responsibility: Horizontal and vertical location of RI features.

Tasks: Survey monitoring wells, surface water staff gauges, sampling locations, and other points of interest.

Contact: Mr. Kin Y. C. Chung, Ph.D., P.E.
610-670-9055

- Contractor(s) for laboratory analysis. Laboratory Contractor(s) will be needed for CLP and non-RAS analyses. The CLP laboratories assigned by the USEPA will be responsible for all CLP analyses. Multiple non-RAS laboratories will be required for the following analytical parameters: radiochemistry (^{238}U, ^{230}Th, ^{232}Th, ^{226}Ra and ^{228}Ra), total dissolved solids, total organic carbon, TCLP parameters, physical parameters (hydraulic conductivity, Atterberg limits, moisture content, bulk density, and grain size) - to be determined.

  Responsibility: Laboratory analysis according to USEPA protocols.

  Tasks: Analyze soil, groundwater, surface water, and building and tank material samples for a range of parameters.

  Contact: Mr. David Demorest - Core Laboratories, Inc.,
  307-235-5741

- Contractor for Waste Hauling (To be determined)

  Responsibility: Remove drill cuttings/residuals and purged groundwater from site.

  Tasks: Perform waste hauling services.

  Contact: (To be determined)

2.2.5 Quality Assurance/Quality Control Organization

Project quality assurance will be maintained under the direction of the Site Quality Assurance Officer, in accordance with this QAPjP. As part of the USEPA's effort to maintain the quality of this project, on-site field audits will be conducted by USEPA personnel to monitor the quality of the work. The Site QAO will review the USEPA audit results and be responsible for making sure that any necessary corrective actions are implemented. In addition, the Site QAO will also conduct field audits, as will the PMO QA Manager on occasion. Quality Control for the following tasks will be the responsibility of the individuals and organizations listed below:

General Responsibility	General Tasks	Responsible for Quality Control
Field Sampling	Environmental Sampling (soil, ground water, surface water, and air)	Malcolm Pirnie, Inc. Lisa Greco
Soil Gas Sampling	Field sampling and analysis of air samples	Malcolm Pirnie, Lisa Greco
Hydrogeological Tests	Water Level Measurements, Slug Tests, Pump Test.	Malcolm Pirnie, Inc. Lisa Greco
Geophysical Tests	Borehole logging/ Geophysical Survey	Malcolm Pirnie, Inc. Lisa Greco
Laboratory Analyses (CLP)	Soil Groundwater, and Surface Water Analysis	CLP-RAS Analytical Laboratory Valerie Smith
Laboratory Analyses (Non-CLP)	Radiological, Chemical and Physical Analysis of Soil Groundwater, and Surface Water	Analytical Laboratory Valerie Smith
CLP Data Validation	Validate Laboratory Data using USEPA Region II Guidelines	Valerie Smith EPA Region II Certified Personnel
Non-CLP Data Validation	Validate Laboratory Data using guidelines specified in Work Plan	Valerie Smith and Alan Fellman
CLP Laboratory Audits	Perform Systems and Performance Audits of Laboratory	USEPA-CLP Auditors and Lisa Greco
Non-CLP Laboratory Audits	Perform Systems and Performance Audits of Laboratory	Carole Tomlins
Field Audits	Perform Field Quality Control Audits	Lisa Greco and USEPAPersonnel

The USEPA WAM for the Project and the PMO QA Manager will be notified prior to any deviation from the approved work plan and FSP.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results which are legally defensible in a court of law. Specific procedures for sampling, chain of custody, laboratory instruments calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPjP. In this section, the specific quality assurance objectives that are required for the data collected during the Li Tungsten RI/FS to be useful are developed and specifically identified. This development is accomplished through the process of establishing Data Quality Objectives (DQOs). Establishing DQOs takes into consideration the intended use of the data, the procedures available for laboratory and field analysis, and the resources available. The end result of this process is the development of specific quality requirements, or DQOs, for each data collection activity. Once the DQOs have been established, the analytical methods which are capable of supporting the DQOs are selected. Specific quality assurance objectives for the analytical methods are then determined. Section 4.1 of the RI/FS Work Plan (Malcolm Pirnie, 1993) outlines the specific DQOs for the data to be collected in conjunction with this RI/FS. Table 4-1 of the RI/FS Work Plan summarizes the analytical DQO levels associated with each data collection task. Specific objectives for accuracy, precision, completeness, representativeness, and comparability are presented below.

3.1 LEVEL OF QUALITY CONTROL EFFORT

Field rinse blank, trip blank, duplicate and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling program. Rinsate and trip blanks, prepared from certified analyte-free water, will be submitted to the analytical laboratories to provide the means to assess the quality of the data obtained during field sampling. Rinsate blank samples are analyzed to check for procedural contamination at the site which may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the digestion and measurement methodology. All matrix spikes are performed in duplicate and are hereinafter referred to as MS/MSD samples (MS/MD for inorganics). One matrix spike/matrix spike duplicate will be collected for every 20 or fewer investigative samples. MS/MSD samples are designated/ collected for organic analyses only.

The general level of the QC effort will be one field duplicate for every 20 or fewer investigative samples. One volatile organic analysis (VOA) trip blank consisting of certified analyte-free water will be included along with each shipment of aqueous VOA samples. One rinsate blank will be collected for each type of sampling equipment each day a decontamination event is carried out.

MS/MSD (MS/MD for inorganics) samples are investigative samples. Soil MS/MSD samples require no extra volume for VOCs, extractable organics or inorganics; however, aqueous MS/MSD samples must be collected at triple the volume for VOCs, triple the volume for extractable organics and double the volume for inorganics. One MS/MSD (MS/MD for inorganics) sample will be collected/designated for every 20 or fewer investigative samples per sample matrix (i.e., groundwater, surface water, soil/sediment). The number of duplicate and rinsate blank samples to be collected are listed in Table 3-1. Sampling procedures are specified in the Field Sampling Plan.

The level of QC effort provided by the laboratory will be equivalent to the level of QC effort specified under the CLP program for the Routine Analytical Services (RAS) parameters to be tested. The level of QC effort for testing of inorganics (metals and cyanide) will conform to the protocols of the current SOW/ILM03.0. The level of QC effort for testing of Target Compound List (TCL) organics (Volatiles, Semi-volatiles and Pesticides/PCBs) will conform to the protocols of SOW/OLM01.2 with revisions through 1.9. The level of QC effort for testing of non-RAS parameters will be specified in each laboratory subcontract Statement of Work, and will be based on USEPA Region II's requirements for similar analyses under the former SAS Program.

TABLE 3-1
QC SAMPLE SUMMARY
LI TUNGSTEN RI/FS

MATRIX	ANALYSIS	ESTIMATED NUMBER OF SAMPLES	NUMBER OF FIELD DUPLICATES	NUMBER OF FIELD BLANKS (1)	NUMBER OF TRIP BLANKS (2)	NUMBER OF MS/MSD or MS/MD SAMPLES (3) (4)
Monitoring Well Sampling	TCL Volatiles	69	4	7	14	4
	TCL Semi-Volatiles	68	4	7	N/A	4
	TCL Pesticides/PCBs	68	4	7	N/A	4
	TAL Metals (Total)	69	4	7	N/A	4
	TAL Metals (Dissolved)	69	4	7	N/A	4
	Cyanide	68	4	7	N/A	4
	Radionuclides	68	4	7	N/A	4
	TDS	68	4	N/A	N/A	N/A
Subsurface Soils	TCL Volatiles	109	6	20	N/A	6
	TCL Semi-Volatiles	109	6	20	N/A	6
	TCL Pesticides/PCBs	109	6	20	N/A	6
	TAL Metals	109	6	20	N/A	6
	Cyanide	109	6	20	N/A	6
	Total Organic Carbon	109	6	N/A	N/A	6
	pH	109	6	N/A	N/A	6
	Radionuclides	149	8	20	N/A	8
	Grain Size	26	2	N/A	N/A	N/A
	Moisture Content	26	2	N/A	N/A	N/A
	Bulk Density	26	2	N/A	N/A	N/A
	Atterberg Limits	26	2	N/A	N/A	N/A
	Hydraulic Conductivity	26	2	N/A	N/A	N/A
	TCLP Parameters	7	1	6	N/A	1

TABLE 3-1
QC SAMPLE SUMMARY
LI TUNGSTEN RI/FS

MATRIX	ANALYSIS	ESTIMATED NUMBER OF SAMPLES	NUMBER OF FIELD DUPLICATES	NUMBER OF FIELD BLANKS (1)	NUMBER OF TRIP BLANKS (2)	NUMBER OF MS/MSD or MS/MD SAMPLES (3) (4)
Surface Soils	TCL Volatiles	15	1	2	N/A	1
	TCL Semi-Volatiles	15	1	2	N/A	1
	TCL Pesticides/PCBs	15	1	2	N/A	1
	TAL Metals	15	1	2	N/A	1
	Cyanide	15	1	2	N/A	1
	Radionuclides	15	1	2	N/A	1
Surface Water	TCL Volatiles	9	1	N/A	1	1
	TCL Semi-Volatiles	9	1	N/A	N/A	1
	TCL Pesticides/PCBs	9	1	N/A	N/A	1
	TAL Metals	9	1	N/A	N/A	1
	Cyanide	9	1	N/A	N/A	1
	Radionuclides	9	1	N/A	N/A	1
Sediments	TCL Volatiles	18	1	4	N/A	1
	TCL Semi-Volatiles	18	1	4	N/A	1
	TCL Pesticides/PCBs	18	1	4	N/A	1
	TAL Metals	18	1	4	N/A	1
	Cyanide	18	1	4	N/A	1
	Total Organic Carbon	18	1	N/A	N/A	N/A
	pH	18	1	N/A	N/A	N/A
	Grain Size Distribution	8	1	N/A	N/A	N/A
	Radionuclides	18	1	4	N/A	1

TABLE 3-1
QC SAMPLE SUMMARY
LI TUNGSTEN RI/FS

MATRIX	ANALYSIS	ESTIMATED NUMBER OF SAMPLES	NUMBER OF FIELD DUPLICATES	NUMBER OF FIELD BLANKS (1)	NUMBER OF TRIP BLANKS (2)	NUMBER OF MS/MSD or MS/MD SAMPLES (3) (4)
Surface Alpha	Alpha Particles	(5)	2	N/A	N/A	N/A
Building/Tank Materials	Radionuclides	(5)	2	2	N/A	N/A
Soil Gas Samples	Selected VOCs	50	3	N/A	N/A	N/A

FOOTNOTES:

(1) Number is estimated - actual number of QA/QC samples will depend on the field conditions, equipment availability and program schedule.
(2) Number is estimated - trip blanks are analyzed for VOAs only.
(3) MS/MSD - triple volume is required for one field aqueous sample per 20. No extra volume is required for soil samples.
(4) MS/MD - double volume is required for one field aqueous sample per 20. No extra volume is required for soil samples.
(5) The number of field samples will depend on the field conditions
N/A - Not Applicable

The QC effort for the soil gas survey will consist of six different types of samples including: ambient air samples, analytical method blanks, continuing calibration checks, field system blanks, reagent blanks, and replicate blanks. The ambient air samples are collected at each sampling location prior to sampling by sampling the air onsite and immediately injecting it into the GC. Analytical method blanks are taken to demonstrate that the analytical instrumentation is not contaminated. These are performed once a day by injecting a carrier gas (nitrogen) into the GC with the sampling syringe.

Continuing calibration checks are analyzed on 20 percent of the samples to verify the detector response for the target VOCs. If the response changes more than 25 percent, the GC will be recalibrated and new response factors will be calculated. Field system blanks will be analyzed once per day to check for contamination of the sampling apparatus (e.g., probe and sampling syringe). A sample will be collected using standard sampling procedures, but without putting the probe into the ground. The results will be compared to those obtained from a concurrently analyzed ambient air sample. If field blanks detect target compounds at concentrations that indicate equipment contamination or concentrations that exceed normal background levels (ambient air analysis), corrective actions will be taken. If the problem cannot be corrected, an of-of-control event will be documented in the field log book. Field system blanks will be performed after any probe decontamination event.

A reagent blank on each set of working standards will be analyzed to ensure that the solvent used to dilute the stock standards is not contaminated. Analytical instruments will be calibrated daily using fresh working standards made from National Institute of Sciences and Technology traceable standards and reagents blanked solvents. Quantitative precision will be achieved by replicating analysis of 10 percent of the samples. Replicatc analysis will be performed by subsampling vapors from the same sampling syringe. The injector port septa through which samples will be injected into the GC will be replaced daily to prevent possible gas leaks from the chromatographic column. All sampling and subsampling syringes will be decontaminated after each use and will not be reused until they have been decontaminated by washing in anionic detergent and baked at 90°C.

The QC level of effort for the field measurcment of pH consists of pre-measurement calibration and a post-measurement verification using two standard reference solutions each time as appropriate to the sample pH. This procedure will be performed for each sample tested. The QC effort for field conductivity measurements will include daily calibration of the instrument using standard solutions of known conductivity. The QC effort for the gamma scan/survey, the surface radioactivity scan, and the downhole gamma logging will include daily efficiency checks of the instruments using a check source, and annual calibration of the instruments by the manufacturers. The QC effort for the radon/thoron measurements will include a weekly calibration of the instruments, and the collection of duplicate and blank samples.

3.2 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

To measure and control the quality of analysis, and to ensure that the DQOs are met, certain QA parameters are defined and utilized in data analysis activities in this project. They are defined as follows:

Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a measurement of the variability of a group of measurements compared to their average value. As such, it is extremely important to have a precise analysis. In this project, precision will be as determined by the USEPA-approved analytical methods and measured in terms of relative percent difference (RPD). For USEPA CLP analyses, the RPD control limits are listed in the appropriate contract scope of work (SOW).

Accuracy

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 techniques. In this project, sampling accuracy will be evaluated through the results of field and trip blanks, while analytical accuracy will be assessed through surrogate spike and matrix spike recoveries. Table 3-2 and Table 3-3 provide a summary of quantitative QA objectives.

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Table 3-2

DATA QUALITY REQUIREMENTS AND ASSESSMENTS

AQUEOUS SAMPLES

Parameter	Sample Matrix	Detection Limit	Quantitation Limit (1)	Estimated Accuracy	Accuracy Protocol	Estimated Precision	Precision Protocol
TCL Volatiles	Groundwater/ Surface Water	(2)	10 ug/L	61-145% (3)	CLP (RAS)	<=14 RPD (4)	CLP (RAS)
TCL Semi-Volatiles	Groundwater/ Surface Water	(2)	10-25 ug/L	9-141% (3)	CLP (RAS)	<=50 RPD (4)	CLP (RAS)
TCL Pesticides/PCBs	Groundwater/ Surface Water	(2)	0.05-5 ug/L	38-150% (3)	CLP (RAS)	<=27 RPD (4)	CLP (RAS)
TAL Metals (filtered)	Groundwater	(2)	0.2-5000 ug/L	75-125% (5)	CLP (RAS)	<=20 RPD (4)	CLP (RAS)
TAL Metals (unfiltered)	Groundwater/ Surface Water	(2)	0.2-5000 ug/L	75-125% (5)	CLP (RAS)	<=20 RPD (4)	CLP (RAS)
Cyanide	Groundwater/ Surface Water	(2)	10 ug/L	75-125% (5)	CLP (RAS)	<=20 RPD (4)	CLP (RAS)
Total Dissolved Solids	Groundwater	10 Mg/L	N/A	75-125%	non-RAS	<=25 RPD	non-RAS
Alpha Emitters	Groundwater/ Surface Water	(2)	(6)	70-130%	non-RAS	<=35 RPD	non-RAS
Gamma Emitters	Groundwater/ Surface Water	(2)	(6)	70-130%	non-RAS	<=35 RPD	non-RAS

Notes:

(1) Quantitation limits are based on current CLP SOW requirements, where applicable.

(2) Refers to instrument detection limit. Must be less than quantitation limit.

(3) Estimated accuracy based on matrix spike, surrogates and laboratory control sample recovery limits. Actual limits for these criteria are provided in the CLP SOW (OLM01.2 with revisions through OLM01.9 and ILM03.0).

(4) Estimated precision based on relative percent difference (RPD) of matrix spike pairs and duplicates. Actual limits for these criteria are provided in the CLP SOW (OLM01.2 with revisions through OLM01.9 and ILM03.0).

(5) Estimated accuracy based on CLP matrix spike recovery limits.

(6) To be specified in non-RAS Statement of Work for this parameter.

Table 3-3

DATA QUALITY REQUIREMENTS AND ASSESSMENTS

NON-AQUEOUS SAMPLES

Parameter	Sample Matrix	Detection Limit	Quantitation Limit[1]	Estimated Accuracy	Accuracy Protocol	Estimated Precision	Precision Protocol
TCL Volatiles	Soil Gas	(2)	1.0-2.0 ppbv	90-110 %	(non-RAS)	<=25 RPD[3]	(non-RAS)
TCL Volatiles	Soil/ Sediment	(2)	10 ug/Kg [4]	59-172 % [5]	CLP(RAS)	<=24 RPD[6]	CLP(RAS)
TCL Semi-Volatiles	Soil/ Sediment	(2)	330-800 ug/Kg [4]	18-142 % [5]	CLP(RAS)	<=50 RPD[6]	CLP(RAS)
TCL Pesticides/PCBs	Soil/ Sediment	(2)	1.7-170 ug/Kg [4]	23-150 % [5]	CLP(RAS)	<=50 RPD[6]	CLP(RAS)
TAL Metals	Soil/ Sediment	(2)	.1-1000 mg/Kg [4]	75-125 % [7]	CLP(RAS)	<=20 RPD[6]	CLP(RAS)
Cyanide	Soil/ Sediment	(2)	2.0 mg/Kg [4]	75-125 % [7]	CLP(RAS)	<=20 RPD[6]	CLP(RAS)
Total Organic Carbon	Soil/ Sediment	100 mg/Kg	N/A	75-125 %	non-RAS	<=20 RPD	non-RAS
pH	Soil/ Sediment	N/A	N/A	N/A	non-RAS	<=25 RPD	non-RAS
Hydraulic Conductivity	Soil	N/A	N/A	N/A	non-RAS	<=20 RPD	non-RAS
Atterberg Limits	Soil	N/A	N/A	N/A	non-RAS	<=20 RPD	non-RAS
Moisture Content	Soil	N/A	N/A	N/A	non-RAS	<=20 RPD	non-RAS
Bulk Density	Soil	N/A	N/A	N/A	non-RAS	<=20 RPD	non-RAS
Grain Size	Soil/ Sediment	N/A	N/A	N/A	non-RAS	<=20 RPD	non-RAS
Alpha Emitters	Soil/ Sediment/ Bldg./Tank Samples	(2)	0.3 pCi/g [8]	70-130%	non-RAS	<=35 RPD	non-RAS
Gamma Emitters	Soil/ Sediment/ Bldg./Tank Samples	(2)	0.3 pCi/g [8]	70-130%	non-RAS	<=35 RPD	non-RAS
TCLP	Soil	(2)	100-800 ug/Kg [4]	18-172 % [5]	non-RAS	<=50 RPD[6]	non-RAS

Notes:

(1) Quantitation limits are based on current CLP SOW (OLM01.2 with revisions through OLM01.9 and ILM03.0) requirements, where applicable.
(2) Refers to instrument detection limit. Must be less than quantitation limit.
(3) Estimated precision based on relative percent difference (RPD) of analytical duplicates. Actual limits for these criteria are provided in the CLP SOW (OLM01.2 with revisions through OLM01.9 and ILM03.0) .
(4) Limits are based on wet weight of sample. Actual reported limits, corrected to dry weight will be higher.
(5) Estimated accuracy based on matrix spike, surrogates and laboratory control sample recovery limits. Actual limits for these criteria are provided in the CLP SOW (OLM01.2 with revisions through OLM01.9 and ILM03.0) or the laboratory Statement of Work for non-RAS parameters.
(6) Estimated precision based on relative percent difference (RPD) of matrix spike pairs and duplicates. Actual limits for these criteria are provided in the CLP SOW (OLM01.2 with revisions through OLM01.9 and ILM03.0) or the laboratory Statement of Work for non-RAS parameters.
(7) Estimated accuracy based on CLP matrix spike recovery limits.
(8) Limits are nuclide specific and will vary based on several variables.

Sensitivity

The data generated during the RI will be sensitive enough to meet ARAR criteria. The work plan specifies tasks that will research ARARs and appropriately apply them to the project. Table 3-4 provides the CLP contract required quantitative limits (CRQLs) for organics and contract required detection limits (CRDLs) for inorganics.

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols. The accuracy and precision requirements for CLP-RAS are specified in the current SOW/OLM01.2 with revisions through 1.9 for organics and SOW/ILM03.0 for inorganics. The sensitivities required for CLP analyses will be the detection limits shown in Table 3-4 of this QAPjP. The accuracy, precision, and sensitivity requirements for non-RAS will be specified in each individual laboratory subcontract Statement of Work and will be based on the USEPA Region II's requirements for similar analyses under the former SAS Program. The accuracy and precision of field screening equipment used to perform the soil gas survey will be specified in the statement of work prepared during the subcontractor selection process.

The accuracy and precision of field screening equipment used to measure pH, specific conductance, turbidity, and temperature are outlined in Appendix A. The accuracy of the NaI detector (gamma scan/survey) will be determined by calibrating the detector response with a pressurized ion chamber (PIC). The precision of the radon/thoron measuring equipment will be determined by collecting duplicate samples at the rate of five percent. The accuracy will be measured by monitoring the system performance with reference electrets.

3.3 COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the CLP laboratory will provide data meeting QC acceptance criteria for 90 percent or more for all samples tested. Following completion of the analytical testing, the

TABLE 3-4
TARGET COMPOUND LIST/TARGET ANALYTE LIST
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)[1]

LI TUNGSTEN RI/FS

TCL	CRQL	
Volatiles	Water (ug/l)	Low Soil/Sediment[2] (ug/kg)
Chloromethane	10	10
Bromomethane	10	10
Vinyl Chloride	10	10
Chloroethane	10	10
Methylene Chloride	10	10
Acetone	10	10
1,1-Dichloroethene	10	10
1,1-Dichloroethane	10	10
1,2-Dichloroethene (total)	10	10
Carbon Disulfide	10	10
Chloroform	10	10
1,2-Dichloroethane	10	10
2-Butanone	10	10
1,1,1-Trichloroethane	10	10
Carbon Tetrachloride	10	10
Vinyl Acetate	10	10
Bromodichloromethane	10	10
1,1,2,2-Tetrachlorethane	10	10
1,2-Dichloropropane	10	10
cis-1,3-Dichloropropene	10	10
Trichloroethene	10	10
Dibromochloromethane	10	10
1,1,2-Trichloroethane	10	10
Benzene	10	10
Trans-1,3-Dichloropropene	10	10
Bromoform	10	10
2-Hexanone	10	10
4-Methyl-2-pentanone	10	10
Tetrachloroethene	10	10
Toluene	10	10
Chlorobenzene	10	10
Ethyl Benzene	10	10
Styrene	10	10
Xylenes (Total)	10	10

TABLE 3-4 (Continued)
TARGET COMPOUND LIST/TARGET ANALYTE LIST
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)[1]

LI TUNGSTEN RI/FS

TCL	CRQL	
Semivolatiles	Water (ug/l)	Low Soil/Sediment[2] (ug/kg)
Phenol	10	330
bis(2-Chloroethyl) ether	10	330
2-Chlorophenol	10	330
1,3-Dichlorobenzene	10	330
1,4-Dichlorobenzene	10	330
1,2-Dichlorobenzene	10	330
2-Methylphenol	10	330
2,2'-oxybis (1-Chloropropane)	10	330
4-Methylphenol	10	330
N-Nitroso-di-n-propylamine	10	330
Hexachloroethane	10	330
Nitrobenzene	10	330
Isophorone	10	330
2-Nitrophenol	10	330
2,4-Dimethylphenol	10	330
bis(2-Chloroethyoxy) methane	10	330
2,4-Dichlorophenol	10	800
1,2,4-Trichlorobenzene	10	330
Napthalene	10	330
4-Chloroaniline	10	330
Hexachlorobutadiene	10	330
4-chloro-3-methylphenol	10	330
2-Methylnaphthalene	10	330
Hexachlorocyclopentadiene	10	330
2,4,6-Trichlorophenol	10	330
2,4,5-Trichlorophenol	25	800
2-Chloronaphthalene	10	330
2-Nitroaniline	25	800
Dimethylphthalate	10	330
Acenapthylene	10	800

TABLE 3-4 (Continued)
TARGET COMPOUND LIST/TARGET ANALYTE LIST
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)[1]

LI TUNGSTEN RI/FS

TCL	CRQL	
Semivolatiles (Continued)	Water (ug/l)	Low Soil/Sediments[2] (ug/kg)
2,6-Dinitrotoluene	10	330
3-Nitroaniline	25	800
Acenaphthene	10	330
2,4-Dinitrophenol	25	800
4-Nitrophenol	25	800
Dibenzofuran	10	330
2,4-Dinitrotoluene	10	330
Diethylphthalate	10	330
4-Chlorophenyl Phenyl Ether	10	330
Fluorene	10	330
4-Nitroaniline	25	800
4,6-Dinitro-2-methylphenol	25	800
N-nitrosodiphenylamine	10	330
4-Bromophenyl Phenyl Ether	10	330
Hexachlorobenzene	10	330
Pentachlorophenol	25	800
Phenanthrene	10	330
Anthracene	10	330
Carbazole	10	330
Di-n-butylphthalate	10	330
Fluoranthene	10	330
Pyrene	10	330
Butyl Benzyl Phthalate	10	330
3,3'-Dichlorobenzidine	10	330
Benzo(a)anthracene	10	330
Chrysene	10	330
bis(2-ethylhexyl)phthalate	10	330
Di-n-octyl Phthalate	10	330
Benzo(b)fluoranthene	10	330
Benzo(k)fluoranthene	10	330
Benzo (a) pyrene	10	330
Indeno(1,2,3-cd)pyrene	10	330
Dibenzo(a,h)anthracene	10	330
Benzo(g,h,i)perylene	10	330
	10	330

TABLE 3-4 (Continued)
TARGET COMPOUND LIST/TARGET ANALYTE LIST
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)[1]

LI TUNGSTEN RI/FS

TCL	CRQL	
Pesticides/PCBs	Water (ug/l)	Low Soil/Sediment[2] (ug/kg)
alpha-BHC	0.05	1.7
beta-BHC	0.05	1.7
delta-BHC	0.05	1.7
gamma-BHC (Lindane)	0.05	1.7
Heptachlor	0.05	1.7
Aldrin	0.05	1.7
Heptachlor Epoxide	0.05	1.7
Endosulfan I	0.05	1.7
Dieldrin	0.10	3.3
4,4'-DDE	0.10	3.3
Endrin	0.10	3.3
Endosulfan II	0.10	3.3
4-4'-DDD	0.10	3.3
Endosulfan Sulfate	0.10	3.3
4,4'-DDT	0.10	3.3
Methoxychlor	0.50	17.0
Endrin Ketone	0.10	3.3
Endrin Aldehyde	0.10	3.3
alpha-chlordane	0.05	1.7
gamma-chlordane	0.05	1.7
Toxaphene	5.00	
Aroclor-1016	1.0	170.0
Aroclor-1221	2.0	33.0
Aroclor-1232	1.0	67.0
Aroclor-1242	1.0	33.0
Aroclor-1248	1.0	33.0
Aroclor-1254	1.0	33.0
Aroclor-1260	1.0	33.0

TABLE 3-4 (Continued) TARGET COMPOUND LIST/TARGET ANALYTE LIST CONTRACT REQUIRED DETECTION LIMITS (CRDL)[1] LI TUNGSTEN RI/FS	
TAL	CRDL
Inorganics	Contract Required[3] Detection Level (ug/l)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	3
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

TABLE 3-4 (Continued)
TARGET COMPOUND LIST/TARGET ANALYTE LIST
CONTRACT REQUIRED QUANTITATION/DETECTION LIMITS (CRQL/CRDL)[1]

LI TUNGSTEN RI/FS

Notes:

(1) Specific quantitation/detection limits are highly matrix dependent. The quantitation/detection limits listed herein are provided for guidance and may not always be achievable.

(2) Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the contract, will be higher.

(4) These CRDL are the instrument detection limits obtained in pure water. The detection limits for samples may be considerably higher depending on the sample matrix.

percent completeness will be calculated by the following equations:

$$\text{completeness (\%)} := \frac{\text{(number of valid data)}}{\text{(number of sample collected for each parameter analyzed)}} \times 100$$

Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of site conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, physical setting and processes, and constraints inherent to the Superfund program. The rationale of the sampling network is discussed in detail in the FSP. Representativeness will be satisfied by insuring that the FSP is followed, proper sampling techniques are used, proper analytical procedures are followed and holding times of the samples are not exceeded in the laboratory. Representativeness will be assessed by the analysis of field duplicated samples.

Comparability

Comparability expresses the confidence with which one data set can be compared with 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, as documented in the QAPjP, are expected to provide comparable data. These new analytical data, however, may not be directly comparable to existing data because of difference in procedures and QA objectives.

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4.0 SAMPLE COLLECTION PROCEDURES

4.1 INTRODUCTION

Project sampling procedures and field documentation procedures are provided in detail in the Li Tungsten Field Sampling Plan provided as a separately bound document. The purpose of the FSP is to ensure that samples are collected, handled and documented correctly prior to analysis. The FSP relies on the USEPA documents A Compendium of Superfund Field Operations Methods (USEPA, 1987b), Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988a), and the Region II CERCLA Quality Assurance Manual, Revision 1 (USEPA, 1989) for guidance. The FSP also uses Malcolm Pirnie Standard Operating Procedures (SOPs) and USEPA accepted practices to assure that representative samples are delivered to the laboratory.

Environmental sampling includes the collection of soil, groundwater, surface water, sediment, and building/tank material samples. In addition, air monitoring, geophysical testing and hydraulic conductivity testing will be conducted. The purpose of sampling is twofold. First, the nature and extent of contamination at the site will be determined (RI/FS). Second, the data generated from the sampling and analysis will be used to quantify the risk that may be present to human health and the environment (RA).

4.2 SAMPLING PROGRAM OVERVIEW

The following field investigation tasks will be conducted during the Li Tungsten RI/FS:

- Surface and Subsurface Features Investigation
- Air Monitoring
- Soil Gas Survey
- Surface Soil Sampling
- Soil Boring Sampling
- Test Pit Sampling
- Monitoring Well Installation
- Evaluation of Existing On-Site Wells

- Water Level Measurements
- Groundwater Sampling
- Hydraulic Conductivity Testing
- Surface Water Sampling
- Sediment Sampling
- Ecological Assessment
- Gamma Exposure Rate Scan/Survey
- Short-Term Radon/Thoron Measurements
- Surface Contamination Survey
- Building Materials Sampling
- Downhole Gamma Logging
- Tank Residue Sampling

The objectives of each field investigation task are discussed in the FSP, as are the specific sampling procedures to be employed. See Section 4.0 of the FSP for listings of sampling activities, media to be sampled, types of analyses to be performed, the numbers of media samples to be collected, and groundwater, soil, surface water, and sediment sampling locations.

4.3 SAMPLING TECHNIQUES

Samples of soil, groundwater, surface water, sediment, and building/tank materials will be collected in accordance with procedures generally described in Section 4.0 of the FSP; more specifically described in Section 6.0 of the FSP; and described in detail in the Malcolm Pirnie Standard Operating Procedures (SOPs) included as Appendix C to the FSP. Where specific procedures are not described, sampling will be in accordance with the USEPA publication A Compendium of Superfund Field Operations (USEPA, 1987b).

4.4 FIELD MEASUREMENT OF PHYSICAL PARAMETERS

Field measurement of physical parameters will be conducted in accordance with the SOPs provided in the RI/FS FSP. Due to the wide variety and case-specific application of these types of instrumentation, each procedure may require amendment to include manufacturer's instructions for specific instrument operation and maintenance procedures. These tests shall be performed and documented so that a second party can reproduce and check findings from the recorded data.

5.0 SAMPLE CUSTODY

5.1 OVERVIEW

Sample custody procedures ensure the timely, correct, and complete analysis of each sample for all parameters requested. A sample or evidence file is considered to be in your custody if it:

- is in your possession;
- is in your view, after being in your possession;
- is in your possession and you place them in a secured location; or
- is in a designated secure area.

Sample custody documentation provides a written record of sample collection and analysis and is required evidence in any enforcement actions against potentially responsible parties (PRPs). The sample custody procedures provide for specific identification of samples associated with an exact location, the recording of pertinent information associated with the sample, the time of sample collection and any preservation techniques, and provide for a written chain of custody record which serves as physical evidence of sample custody. Custody procedures will adhere to the procedures outlined in the USEPA documents User's Guide to the Contract Laboratory Program (USEPA, 1991) and Samplers Guide to the Contract Laboratory Program (USEPA, 1990a). The chain of custody 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 for three areas; sample collection, laboratory analysis, and final evidence files, which are described below.

5.2 FIELD RECORDS AND SAMPLE COLLECTION

Chain-of-custody procedures document pertinent sampling data and all transfers of custody until the sample reaches the analytical laboratory. The chain-of-custody procedures assure that all samples are uniquely identified, correctly analyzed and traceable to their source. The documentation and custody requirements for field monitoring and samples collected for field analysis are different from samples collected for laboratory analysis. The sample packaging and shipment procedures summarized below will insure that the samples will arrive at the laboratory with the chain of custody intact. The protocol for specific sample numbering using case numbers and traffic report numbers if applicable and other sample designations are included in the FSP.

5.2.1 Field Procedures

(a) The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As FEW people as possible should handle the samples. An MPI Sample Management Officer will be designated in the FSP.

(b) All bottles will be tagged with sample numbers and locations. The Sample Management Office (SMO) number and stickers will be affixed.

(c) Sample tags are to be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because the ballpoint pen would not function in freezing weather.

(d) The Remedial Project Manager (RPM) will review all field activities to determine whether proper custody procedures were followed during the field work and decide if additional samples are required.

5.2.2 Field Records

The field logbook will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the site can re-construct a particular situation without reliance on memory. The field logbook serves as the permanent record of all analyses conducted in the field. The field log book will be a bound field survey book or notebook. All in-field analytical results will be recorded in the field logbook. Logbooks will be assigned to field personnel, but will stored in the document control center when not in use. Each logbook will be identified by the project-specific document number. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned.
- Logbook number.
- Project name.
- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each day, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook. The field technicians will sign and date each field logbook page.

All pertinent information regarding measurements made and samples collected will be recorded. This information may include:

1. Field analytical equipment (include serial number)
2. Other measuring equipment (include serial number)
3. Calculations
4. Results
5. Calibration data for equipment

All entries will be made in ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark and the cross-out signed and dated. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station, which includes compass and distance measurements, shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in the FSP. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. Observations such as sampling conditions or any problems will also be recorded. Sample identification numbers will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

5.2.3 Sample Identification

The documentation system for laboratory samples is based on the sample documentation system described in USEPA guidance documents (USEPA, 1991; 1990a). Sample identification procedures are also described in Section 4.5 of the FSP. All samples collected will have a label that contains the following information:

1. Project name and number
2. Field ID or sample station number
3. Date and time of collection
4. Designation of sample as grab or composite
5. Sample matrix
6. Sample preservation notes
7. Analytical parameters
8. Signature of Sampler

CLP samples will have a sample tag affixed to each container with the same information. All sample tags and labels will be completed in waterproof ink by the sampler. The sample labels will be protected with clear tape before shipping.

The project number is used instead of the site name in order to preserve the anonymity of the site. The bottles will be pre-numbered according to the numbering scheme presented in Section 4.5 of the FSP.

5.2.4 Sample Traffic Reports

Sample Traffic Reports will be filled out for all CLP-RAS analyses in accordance with the procedures given in USEPA guidance documents (USEPA, 1991; 1990a). Sample traffic reports are now combined with the chain-of-custody form and copies of the organic and inorganic forms are provided in Appendix B.

5.2.5 Chain of Custody Procedures

At the time of sampling, a chain of custody form shall be filled out for each sample or group of samples. Appendix B provides copies of both a Malcolm Pirnie ARCS chain of custody form and a USEPA chain of custody form and in MPI Sample Management SOP #16. These forms now combine both a chain of custody record and a sample traffic report. The following information will be recorded on the Traffic Report/Chain-of-Custody form:

1. Project name
2. Signature of samplers
3. Sampling station number
4. Date and time of collection
5. Grab or composite sample designation
6. Sample matrix with brief description
7. Sampling location description
8. Field identification number
9. Analyses requested
10. Preservation technique
11. Signatures and dates for transfers of custody
12. Air express/shipper's bill of lading identification numbers

The Traffic Report/Chain-of-Custody form serves as an official communication to the laboratory of the particular analyses required for each sample. The chain of custody record will accompany the samples from the time of sampling through all transfers of custody and kept on file at the laboratory where samples are analyzed and archived. The form is filled out in quadruplicate; one copy is retained by the Site Manager, two are sent to the laboratory, and the fourth will be submitted to the USEPA Sample Management Office. The sampler completes a chain-of-custody record to accompany each shipment from the field to the laboratory. Separate chain-of-custody records are filled out for split samples. Errors must be crossed through with a single line, initialed and dated. The completed chain of custody record is put in a zipper-lock bag and taped to the inside cover of the sample shipping container. The container is then sealed with custody seals and custody is transferred to the laboratory.

5.2.6 Non-RAS Analytical Services

Analytical services will be procured for this project that are outside of the CLP Program (non-RAS). The procedures for requesting services and shipping and documenting are provided in Malcolm Pirnie's Draft Implementation Plan for the non-RAS Program (Malcolm Pirnie, 1994). Prior to procuring a non-RAS laboratory, Malcolm Pirnie will determine through the USEPA WAM whether the USEPA ESD laboratory or the ERT laboratory will be able to analyze the samples for the non-RAS parameters. If it is not feasible to do so, then the samples will be analyzed through the non-RAS program. The non-RAS Packing List is completed in the field and sent to the laboratory with the samples. An example of the non-RAS combined Packing List/Chain-of-Custody form is provided in Appendix B.

5.3 TRANSFER OF CUSTODY AND SHIPMENT

The custody of the samples must be maintained from the time of sampling, through shipment and relinquishment to the laboratory. The majority of samples are required to be analyzed by the Contract Lab Program and therefore will be shipped according to procedures in USEPA guidance documents (USEPA, 1991; 1990a). Instructions for transferring custody are given below.

(1) Samples are accompanied by a Chain-of-Custody Record shown in Appendix B. When transferring the custody of samples, the individuals relinquishing and receiving will sign, date, and note the time on the Record. This Record documents sample custody transfer from the sampler, through the shipper, to the analytical laboratory. A shipper will sign the Record. A common carrier will usually not accept the responsibility for handling chain-of-custody forms. In this case, the name of the carrier is entered under "Received by", the bill-of-lading number is recorded under "Remarks", and the Record is placed in a zipper-lock plastic bag and taped to the inside lid of shipping cooler.

(2) Samples will be packaged properly for shipment and dispatched to the appropriate laboratory via overnight delivery service for analysis, with a separate Chain-of-Custody Record accompanying each shipment. Samples are to be shipped within 24 hours of collection. Shipping containers will be sealed for shipment to the laboratory. A custody seal will be applied to each cooler to document that the container was properly sealed and to determine if the container was tampered with during shipment. CLP samples will be shipped in coolers sealed with USEPA custody seals in such a manner that the custody seal would be broken if the cooler were opened.

(3) The original Chain-of-Custody Record will accompany the shipment. The copy will be retained by the Field Operations Leader.

(4) If sent by overnight mail, the package will be registered with return receipt requested. If sent by common carrier or air freight, proper documentation must be maintained, for example, bill of lading.

(5) If samples are split with a source or government agency, a separate Chain-of-Custody Record is prepared for the split samples and marked to indicate the samples are being split. If a representative is unavailable to sign the Record, the Field Operation Leader will note it in the field log.

5.4 LABORATORY CUSTODY PROCEDURES

Laboratory custody procedures will be equivalent to those described in the latest edition of CLP-IFB Statement of Work. The following items will be addressed in the written laboratory custody SOPs:

(1) A designated sample custodian accepts custody of the samples and verifies that the information on the sample labels matches that on the Chain-of-Custody Records. The sample custodian will document any discrepancies. The sample custodian will sign and date all appropriate receiving documents.

(2) Once the samples have been accepted by the laboratory, checked and logged in, they must be maintained in accordance with laboratory custody and security requirements.

(3) To assure traceability of samples while in the possession of the laboratory, a method for sample identification that has been documented in a laboratory SOP will be used to assign sample numbers.

(4) The following stages of analysis must be documented by the laboratory:

1) Sample Extraction/Preparation
2) Sample Analysis
3) Data Reduction
4) Data Reporting

(5) Laboratory personnel are responsible for the custody of the samples until they are returned to the sample custodian.

(6) When sample analyses and quality assurance checks have been completed in the laboratory, the unused portion of the sample must be stored or disposed of in accordance with CLP protocols. Identifying tags, labels, data sheets, chain-of-custody and laboratory records will be retained until analyses and quality assurance checks are completed in accordance with CLP protocols.

5.5 FINAL EVIDENCE FILES

This is the final phase of sample custody. The actual physical sample is stored by the laboratory until the USEPA allows its disposal. The chain of custody record and sample analysis request form copies held by the laboratory and site manager are archived by both in their respective project files for possible use as evidence in enforcement actions. Laboratory custody forms, sample preparation and analysis logbooks, and data packages shall become part of the laboratory final evidence file. Other relevant documentation including records, reports, correspondence, logs, field logbooks, pictures, and data review reports will be archived by MPI for possible use as evidence in enforcement actions.

6.0 CALIBRATION PROCEDURES AND FREQUENCY

6.1 INTRODUCTION

Instruments must be properly calibrated to produce technically valid data. Documented calibration and calibration check results verify that the instruments used for measurement are in proper working order and the data produced is reliable. The calibration requirements described or referenced in this section are necessary to support the data quality objectives for this project. When calibration requirements are met, the data will support the RI/FS decisions regarding evaluation of interim remedy alternatives. In the event that the data is used in court, documented calibrations are necessary to ensure that the data is legally defensible.

6.2 CALIBRATION PROCEDURES FOR FIELD EQUIPMENT

6.2.1 Field Equipment

The following table provides a list of the tasks that will require field equipment and the specific field instruments that will be used for each task.

Task	Field Instrument
Field Reconnaissance	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
	MIE, Inc. Miniram Model PDM-3
	Ludlum micro-R Detector
Air Monitoring	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector MIE, Inc. Miniram Model PDM-3

Task	Field Instrument
Air Monitoring (con't)	Ludlum micro-R Detector
	MSA Model 261 Combustible Gas Meter
Subsurface Features Investigation	EG&G Model G-856 Proton Magnetometer
	Geonics EM 34-3
Soil Gas Survey	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
Soil Boring/Sampling	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
	Ludlum Model 43-9 Geiger Mueller (GM) Pancake Detector
Test Pit Sampling	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
	Ludlum Model 43-9 GM Pancake Detector
Surface Soil Sampling	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
	Ludlum Model 43-9 GM Pancake Detector

Task	Field Instrument
Monitoring Well Development	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
	Ludlum Model 43-9 GM Pancake Detector
	Portable Turbidimeter
	Orion Model SA 250 pH Meter
	YSI Model 33 Temperature-Specific Conductivity meter
Groundwater Sampling	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
	Portable Turbidimeter
	Orion Model SA 250 pH Meter
	YSI Model 33 Temperature-Specific Conductivity meter
Slug Testing	HNu Model PI-101 Photoionization Detector
	Data Logger with Pressure Transducer, or equivalent
Surface Water Sampling	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector

Task	Field Instrument
Surface Water Sampling (cont'd)	Orion Model SA 250 pH Meter
	YSI Model 33 Temperature-Specific Conductivity meter
Sediment Sampling	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
	Ludlum Model 43-9 GM Pancake Detector
Ecological Assessment	HNu Model PI-101 Photoionization Detector
	Foxboro Model OVA 128 Flame Ionization Detector
	Ludlum Model 43-9 GM Pancake Detector
Gamma Exposure Rate Scan/Survey	Ludlum Model 4 1" X 1" Sodium Iodide (NaI) Detector
	Ludlum Model 12 Ratemeter
	Ludlum Model 43-9 GM Pancake Detector
	Eberline Pic 6-A Pressurized Ion Chamber (PIC), or equivalent
Short-Term Radon/Thoron Measurements	Electrets and Ion Chambers
	Voltage Meter
Surface Contamination Survey	Ludlum Model 43-5 Alpha Scintillation Detector
	Ludlum Model 44-2 NaI Detector

Task	Field Instrument
Surface Contamination Survey (cont'd)	Ludlum Model 43-9 GM Pancake Detector
	Ludlum Model 12 Ratemeter
	Ludlum Model 43-10 Alpha Sample Counter
	Ludlum Model 2221 Portable Ratemeter/scaler
Downhole Gamma Logging	Ludlum Model 2221 Portable Ratemeter/scaler
	Ludlum Model 44-10 2" x 2" NaI Detector

6.2.2 General Procedures

The operation and maintenance of the majority of the field equipment to be used during the air monitoring, subsurface features investigation, soil gas survey, soil sampling (subsurface and surface), groundwater sampling and development, slug testing, surface water sampling, sediment sampling, and radiation survey tasks are provided in the Malcolm Pirnie SOPs in Appendix A. Specific calibration procedures for all the non-radiological instruments (except the data logger) and all the radiological instruments are described in this section. No calibration is required for the data logger. General calibration procedures and requirements for the non-radiological equipment are detailed below.

- All instruments will be calibrated at least once a month.

- All instruments will have the calibrations checked at a minimum at the start of each day before measurements are made.

- The calibration and calibration checks will indicate that the sensitivity of the instrument (practical detection limit) is adequate to meet project needs and that the instrument is accurate over the working range.

- All calibration information will be recorded in the field log book. This includes date and time, technician signature, calibration procedure, calibration results, calibration problems, recalibration and maintenance, and instrument serial numbers.

- All calibration standards will be of National Institute of Standards and Technology quality and their sources listed and documented so that standards are traceable. In addition, only technicians trained in the use of the field instruments will operate them. If the instrument readings are incorrect at the time of the initial calibration, the instrument will either be calibrated by the technician or returned to the manufacturer for calibration. If the instrument readings are incorrect after a continuing calibration check, the preceding sample results will be reviewed for validity and reanalyzed if necessary.

General calibration procedures and requirements for the radiation equipment are detailed below.

- All instruments will be calibrated annually by the manufacturer (or other qualified individual).

- All instruments will have a daily check source, a daily battery check, and a daily background check at the start of each day before measurements are made.

- All daily check information will be recorded in the field log book. This includes date and time, technician signature, check procedure, check results, problems, and instrument serial numbers.

6.3 LABORATORY CALIBRATION PROCEDURES

All samples analyzed according to the USEPA CLP will follow the procedures described in the SOW. The calibration procedures and frequency are specifically described for each analysis contained in the SOW. All calibration results will be recorded and kept on file and it will be verified by Malcolm Pirnie as part of data validation.

Laboratory analyses not covered in the USEPA SOW will follow the laboratory's calibration SOP for each analysis. Each instrument will be calibrated at least once each day according to the laboratory Standard Quality Procedure (SQP). The calibration will be checked with a check standard prior to the analysis of any sample. The standards used for calibrations will be of National Institute of Standards and Technology quality, with the preparation and square information recorded in a log book. The calibration will be recorded in the laboratory notebook for that analysis, and any printouts, chromatograms, etc., kept on file.

7.0 ANALYTICAL PROCEDURES

7.1 LABORATORY ANALYSIS

Aqueous and non-aqueous samples collected during field sampling activities for the Li Tungsten Site RI/FS will be analyzed either through the USEPA CLP-RAS program or the non-RAS program. For the analysis of Target Compound List (TCL) and Target Analyte List (TAL) parameters by CLP-RAS protocols, the laboratory will follow methods detailed in the CLP Statement of Work for organic analyses (SOW/OLM01.2 with revisions through 1.9) and the CLP Statement of Work for inorganic analyses (SOW/ILM03.0). Tentatively Identified Compounds (TIC) will require Gas Chromatograph/Mass Spectrometer (GC/MS) methods. Table 7-1 summarizes the analyte groups and USEPA methods to be used for chemical analysis.

7.2 FIELD SCREENING ANALYTICAL PROTOCOLS

The procedures for the use and maintenence of the equipment required for the field measurement of pH, specific conductivity, turbidity, and temperature are described in the SOPs in Appendix B of the FSP. The procedures for the use and maintenence of the equipment required for the field measurement of gamma radiation, alpha activity, and radon/thoron are described in Sections 5.16 through 5.20 of the FSP.

TABLE 7-1
ANALYTICAL PROCEDURES
LI TUNGSTEN SITE

MATRIX	ANALYSIS	PROCEDURE
Aqueous	TCL Volatiles	CLP (1)
	TCL Semi-Volatiles	CLP (1)
	TCL Pesticide/PCBs	CLP (1)
	TAL Metals (filtered and unfiltered)	CLP (2)
	Cyanide	CLP (2)
	Total Dissolved Solids	US EPA 160.2 (3)
	Alpha Emitters	HASL-300 (4)
	Gamma Emitters	HASL-300 (4)
Non-Aqueous	TCL Volatiles	CLP (1)
	TCL Semi-Volatiles	CLP (1)
	TCL Pesticide/PCBs	CLP (1)
	TAL Metals	CLP (2)
	Cyanide	CLP (2)
	Total Organic Carbon (TOC)	USEPA II (5)
	pH	USEPA 9045A (6)
	Hydraulic Conductivity	ASTM D 5084-90 (7)
	Atterberg Limits	ASTM D 4318-84 (7)
	Moisture Content	ASTM D 2216-92 (7)
	Bulk Density:	
	Maximum Index	ASTM D 4253-91 (7)
	Minimum Index	ASTM D 4254-91 (7)
	Grain Size	ASTM D 422-63 (7)
	Alpha Emitters	HASL-300 (4)
	Gamma Emitters	HASL-300 (4)
	TCLP	USEPA-1311 (6)

(1) USEPA Contract Laboratory Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, OLM01.2, with revisions through OLM01.9.

(2) USEPA Contract Laboratory Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, ILM03.0.

(3) All conventional extraction and analytical methods are taken from "Methods for Chemical Analysis of Water and Wastes", March 1983 rev., USEPA 600/4-79-020

(4) Radionuclides will be analyzed according to the methods described in the Environmental Measurements Laboratory (EML) Procedures Manual U. S. Department of Energy, 27th Edition, Volume 1, February 1992.

(5) "Determination of Total Organic Carbon in Sediment", July 27, 1988, by L. Kahn of the USEPA.

(6) All conventional extraction and analytical methods are taken from "Test Methods for Evaluating Solid Waste", SW-846.

(7) Method taken from the American Society for Testing and Materials, Standards Section for Construction, Volume 4.08, 1992.

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8.0 INTERNAL QUALITY CONTROL CHECKS

8.1 INTRODUCTION

In order to monitor the quality of all data generated for this RI/FS, an appropriate number of quality control (QC) procedures shall be employed for each measurement. QC procedures shall be employed for all field and laboratory measurement systems. The employment of QC procedures permits the validation of the field or laboratory method and provides a measure of the ability of the particular system being used to meet the DQOs prior to the beginning of measurement or analysis. Once the measurement and analysis has begun, the employment of QC procedures permits the monitoring of the system output for quality. The QC results, presented along with the reported data, allows the data to be assessed for quality and, with other factors, a determination on how well the data has met the DQOs.

Laboratory generated data is used to accurately identify and quantify hazardous substances, while field generated data is used in conjunction with the laboratory data for further investigating and delineating the contamination at the site. Both laboratory and field internal QC procedures include steps to assure the data are reliable for the extent they will be used in the RI/FS. In general, laboratory QC programs are more rigorous than field QC programs.

8.2 FIELD QUALITY CONTROL

The intended data uses have been identified and the DQOs established for all field measurement activities in Section 3 of this QAPjP and Section 4 of the RI/FS Work Plan. The field measurements required and the instruments to be used are given in both documents of the SAP. The FSP describes the use and calibration of the field instruments. SOPs for the use of these instruments are also provided in Appendix A.

QC procedures will be used to demonstrate that the instruments are producing reliable data. The QC checks employed for field instruments are as follows:

QC Procedure	Purpose	Frequency
Calibration Check	Insures proper working order of instrument. Measures instrument accuracy and sensitivity.	Daily
Background Measurement	Provides measure of instrument reliability.	Daily (air and radiological instruments only)
Replicates	Measures precision of field measurement.	Multiple readings of each field measurement

The QC check procedures will be performed by the field personnel during sample collection and the results are recorded in field notebooks. The calibration checks and background samples will be analyzed daily. Replicate readings will be taken for each field measurement that is made. The calibration check verifies that the instrument is capable of accurately identifying and quantifying contaminants of concern. The replicates provide a quantitative measurement of the precision of the instrument. Background samples are similar to blanks and provide an idea of instrument reliability. The information will be recorded in field notebooks.

The results of these QC procedures will be used by the field personnel to monitor the instrument at the time of the analysis. If QC results indicate a problem with the instrument, corrective action will be taken and, if necessary, the samples will be reanalyzed. Because field measurements are generally easy to repeat, measurements should be repeated as necessary so the data is as complete as possible. The QC results are used when the data is being reviewed as an indication of data quality and reliability.

QC samples will also be used to check field sample collection methods and provide a basis for evaluating the quality of the data collected. The following QC samples will be used to check field collection methods:

QC Sample	Purpose	Frequency
Trip Blank	Provides measure of potential volatile organic contamination from sample transport, the environment and/or shipping.	Minimum of 1 per daily shipment of aqueous volatile samples
Field Rinse Blank	Measures potential contamination due to improper or inadequate decontamination of sample collection equipment.	One per equipment type each day a decontamination event is carried out
Field Duplicate Sample	Checks field sampling precision.	1 per 20 samples

The QC samples are analyzed by the laboratory at the same time as the environmental samples. The number of QC samples to be collected is detailed in Section 3.0, Table 3.1.

8.3 LABORATORY QUALITY CONTROL

8.3.1 CLP Samples

The scope and description of QC samples and QC methods are well detailed in the CLP SOW for the particular analysis. CLP RAS samples are characterized by rigorous QC and documentation. The SOWs for organic and inorganic analysis contain the type of QC samples and QC methods required and the frequency required. QC limits have been established for standards, blanks, duplicates, matrix spikes, surrogates and others and are contained in the SOWs. QC data will be reviewed by Malcolm Pirnie personnel to assess the validity of the data and determine if the DQOs have been met.

8.3.2 Non-RAS Quality Control

All non-RAS analyses that are conducted for this RI/FS shall include the following QC procedures, if applicable:

		Frequency
1.	Calibration	As required
2.	Standards	Daily
3.	Method Blanks	Daily
4.	Duplicates	5%
5.	Matrix Spikes	5%
6.	Surrogates	Each sample
7.	QC Check Samples	Daily

8.3.3 Non-RAS Quality Control Checks

The specific laboratory QC procedures will be similar to the procedures outlined in the specific CLP-IFB SOW whenever possible. For analyses where CLP QC procedures cannot be adapted to the analysis, a written procedure of quality control checks will be developed, referencing appropriate USEPA documents such as SW-846. Malcolm Pirnie will be responsible for ensuring that QA/QC objectives are equivalent to CLP objectives when possible. Data validation and review by Malcolm Pirnie personnel will be the same as data validation for CLP data whenever possible. The validation process should ensure that quality assurance objectives have been met by the QC procedures. The laboratory internal QC checks may include the following:

(1) Duplicates;
(2) Matrix Spikes, Matrix Spike Duplicates;
(3) Control Charts;
(4) Blanks;
(5) Internal Standards;
(6) Quality Control Samples; and
(7) Surrogate Standards.
(8) TCLP Extraction Blanks
(9) TCLP Leachate Blanks
(10) Soil Gas Lot Container Blanks

9.0 DATA REDUCTION, VALIDATION AND REPORTING

9.1 INTRODUCTION

The purpose of this section is to ensure that the large amounts of data produced by the laboratory are presented in a clear and useable format. In addition, data quality and technical validity must be verified prior to its use. Samples collected at this site will be analyzed for parameters according to the CLP protocols, in which data reduction and reporting schemes are well developed and clearly defined. Additional non-RAS parameters will be analyzed for which there are no CLP protocols. Analysis of these parameters will follow the procedures for the analytical methods listed in Table 7-1. Data reporting will follow CLP format. The employment of these methods ensures comparability with other similarly analyzed environmental samples.

9.2 DATA REDUCTION

Data reduction is the process by which raw analytical data generated from the analytical laboratory instrument systems is converted into useable concentrations. The raw data, which takes the form of area counts or instrument responses, is processed by the laboratory and converted into concentrations expressed in terms of parts per million or parts per billion. These concentrations are the standard method for expressing the level of contamination present in environmental samples.

9.2.1 Field Measurements and Sample Collection

Raw data from field measurements and sample collection activities will be appropriately recorded in the field log book. If the data are to be used in the project reports, they will be reduced, summarized, and the method of reduction will be documented in the report.

9.2.2 Laboratory Services

The process used to convert the instrument output into useable concentrations is clearly defined in the USEPA CLP-SOW. The SOW presents in detail all information, equations and calculations used. Data resulting from non-RAS analyses will be reduced, evaluated and reported as described above unless special procedures are given in the actual non-RAS request. Following data evaluation and reduction, the data will be sent to USEPA, Region II. The resulting concentrations are comparable to other environmental samples in general and will be comparable to data previously collected or collected in the future for the Li Tungsten Site.

9.3 DATA VALIDATION

Validation will be accomplished by comparing the contents of the data packages and QA/QC results to the requirements contained in both RAS and non-RAS methods. Raw data such as GC/MS Total Ion Current (TIC) chromatograms, GC chromatograms, and mass spectra, Inductively Coupled Argon Plasma (ICAP) and Furnace Atomic Absorption (FAA) data reports, and data station printouts will be examined to ensure that reported results are accurate. All CLP-RAS data validation will be performed by USEPA Region II certified data validators (USEPA/ESAT) in accordance with USEPA Region II protocols. The protocols for RAS analyte data validation are presented in:

* USEPA Contract Laboratory Program (CLP) National Functional Guidelines For Organic Data Review, Multi-Media, Multi-Concentration (OLM01.0) and Low Concentration Water, December, 1990, Revised June, 1991, for data prepared under USEPA CLP SOW for Organic Analysis Multi-Media, Multi-Concentration, Doc. No. OLM01.2 through revision OLM01.9.

* Laboratory Data Validation Functional Guidelines For Evaluating Inorganic Analysis, October 1989 Revision for Data Prepared Under USEPA CLP SOW for Inorganic Analysis, Multi-Media, Multi-Concentration, Doc. No. ILM03.0.

* USEPA Region II Standard Operating Procedures and Checklists for Inorganic Analysis (SOP HW-2, Revision 11 of 1/92), Organic Analysis (SOP HW-6 Revision 8 of 1/92), and Low Level Organic Analysis (SOP HW-13, Revision 1 of 6/91).

The protocols for non-RAS analyte data validation that will be performed by Malcolm Pirnie personnel, are taken from the above-referenced documents as well as the analytical methods referenced in each non-RAS request. In addition, data validation protocols for radiological non-RAS analytes are provided in Appendix C of the RI/FS Work Plan (Malcolm Pirnie, 1993).

9.4 DATA REPORTING

The laboratory will report data consistent with CLP reporting requirements and will include the following (as applicable):

1. Narrative including statement of samples received, description of any deviations from RAS or non-RAS standard procedures, explanation of qualifications regarding data quality, and any other significant problems encountered during analysis.

2. Up to 20 extractable organic compounds not included in the RAS analytes, tentatively identified and quantified against the nearest internal standard.

3. An organic QA/QC report including Forms I to X,, surrogate spike results for each sample, matrix spike and matrix spike duplicate results, method blank results, and initial and continuing calibration checks.

4. An inorganic QA/QC report including Forms I to XIII spike and duplicate results, method blank results, and initial and continuing calibration checks.

5. Field and laboratory chain-of-custody documentation pertaining to each sample delivery group analyzed.

One copy of the data package will be delivered to Malcolm Pirnie for data assessment. The data package will contain the case narrative. One copy of the data validation report and data usability report will be submitted to USEPA. This package will include the sampling analysis and summary forms. Section 12.0 provides greater details on the reporting requests for data assessment and validation.

The QA reporting for data packages will consist of the following precision and accuracy protocols as performed on the appropriate QA samples:
For precision, the relative percent difference (RPD) will be calculated:

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100$$

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RPD = Relative Percent Difference
D_1 = First Sample Value
D_2 = Second Sample Value (Duplicate)

For accuracy, the percent recovery (%R) of spikes will be calculated:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

SSR = Spike Sample Results
SR = Sample Results
SA = Spike Added from Spiking Mix

Field sample precision will be assessed through analysis of duplication samples and the above RPD equation. Accuracy will be assessed through the analysis of check standards and the above percent recovery equation. Field data will also be assessed in relation to specific project needs.

10.0 QUALITY ASSURANCE AUDITS

10.1 INTRODUCTION

To monitor the capability and performance of all RI/FS activities, several types of audits will be performed. Technical systems audits (TSAs) or field audits monitor the field techniques, procedures, and overall implementation of the RI/FS Work Plan and SAP. These audits will be conducted by the Site QAO. Performance audits (PAs) of non-CLP laboratories are conducted to measure the accuracy of operating measurement systems and will only be performed if authorized by the USEPA. Data quality audits (DQAs) are conducted to determine if the data generated by the sampling and analysis satisfies the predetermined DQOs. In addition, the EPA Region II may conduct audits of Malcolm Pirnie's RI/FS activities as part of their quality assurance effort.

The PMO QA Manager will provide oversight of the project QAO efforts to review whether QA objectives are being met.

10.2 TECHNICAL SYSTEMS AUDITS

Technical systems audits consist of evaluation and review of all components of a measurement system to determine its capability to meet project quality goals and to determine if the procedures of the system are being properly followed.

The following components of each measurement system will be reviewed, with other items added as necessary:

1. Sample collection and analytical activities,
2. Equipment calibration techniques and records,
3. Decontamination and equipment cleaning,
4. Equipment suitability and maintenance/repair,
5. Background and training of personnel,
6. Sample containers, preservation techniques and chain of custody,
7. Data log books and

8. Monitor siting.

TSAs are conducted initially, prior to the operation of each measurement system, to determine if the system is capable of producing data that will meet the DQOs. This initial audit includes a careful evaluation of both field and laboratory QC procedures. Once the system is approved by the Site QAO and shortly after it becomes operational, a TSA is conducted to monitor the performance of the measurement activities. This includes an audit of field procedures to determine if the appropriate SOPs are being followed. In addition, TSAs will determine if this QAPjP is being implemented in the field.

Following the initial audits, TSAs will be conducted on a regularly scheduled basis. Field audit forms are provided in Appendix C. Any minor deficiencies that are noted during the field audit will be corrected in the field as they occur. If major deficiencies are noted during the field audit (those that cannot be immediately corrected in the field), a Stop-Work Order will be issued until appropriate measures can be taken to correct the problem. A written report of the QA audits will be prepared by the Site QAO and submitted to the Site Manager and the PMO QA 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 field audit report will also recommend appropriate corrective actions for any major deficiency noted. The PMO QA Manager will assist with corrective action and maintain an on-going log of the audit activities. Follow-up reports describing corrective actions which have been completed in addressing major deficiencies will be submitted by the Site Manager to the PMO QA Manager.

A minimum of four field audits will be conducted by the Site QAO during the Li Tungsten RI/FS, one for each type of environmental sampling to be performed (i.e., soil borings, groundwater sampling, surface water sampling, & sediment sampling). These audits will take place during the first day each type of sampling is performed. As long as the field team demonstrates proficiency in the sampling procedures being audited, a second audit of this procedure will not be required; however, a follow-up audit will be required for any audit that indicates a corrective action is necessary.

10.3 PERFORMANCE AUDITS

A performance audit (PA) is conducted on all CLP laboratories by the USEPA by sending them a performance evaluation (PE) sample for analysis. The PE sample is a sample of known concentration that is analyzed by the laboratory and the analytical results are compared with the actual concentration. The results provide a measure of laboratory performance that is used along with other QA criteria to monitor laboratory capability. The USEPA administers required PAs to CLP laboratories every six months. If non-CLP laboratory solicitations are required during the Li Tungsten RI/FS, PAs of these laboratories will be conducted according to the procedures described in the Draft Implementation Plan (Malcolm Pirnie, 1994).

10.4 DATA QUALITY AUDITS

Data Quality Audits (DQAs) are conducted to determine if the data is adequate to support the DQOs and to determine the cause of deficiencies in the event that the data quality is not adequate. This audit will be conducted by the Site QAO after the data has been fully validated. The Site QAO will first determine to what extent the data can be used to support the decision-making process. Secondly, the Site QAO will identify the cause of any deficiencies in the data, whether technical, managerial, or both. Finally, the Site QAO will submit a written report concerning the DQA to the Site Manager and the PMO QA Manager.

11.0 PREVENTATIVE MAINTENANCE

11.1 PURPOSE

The purpose of the preventative maintenance program is to keep the sampling, field testing and analytical equipment working properly and thereby assure proper performance, avoid erroneous results and minimize equipment downtime. The preventive maintenance program also provides for the documentation of all maintenance to be used as evidence of instrument maintenance and for scheduling future maintenance. This section describes the equipment maintenance program for field equipment and those responsible for implementation of the program at the Li Tungsten Site. The specific equipment maintenance procedures are given in the equipment SOPs and the preventative maintenance SOPs presented in Appendix A. The laboratory preventative maintenance program is the responsibility of the laboratory and only the minimum requirements are mentioned here.

11.2 RESPONSIBILITIES

Title	Responsibilities
Field Operations Leader	Keeping all maintenance records. Development and implementation of maintenance program.
Equipment Manager	Maintaining the store of equipment within the Malcolm Pirnie ARCS inventory. Carrying out all maintenance according to schedule. Informing field team members of specific maintenance requirements. Keeping records of all maintenance done under his care. Sending out equipment for service/repair. Maintaining adequate supply of spare parts.

Field Personnel	Maintenance of all equipment located on-site on a regular basis and after each use. Keeping supply of spare parts on-hand.

11.3 PREVENTIVE MAINTENANCE PROGRAM

The preventive maintenance program consists of three parts: normal upkeep, service and repair, and formal recordkeeping. Normal upkeep consists of daily procedures that include cleaning, lubrication and checking the batteries of the equipment. The following is a partial list of normal upkeep procedures and a partial list of important spare parts.

Normal upkeep for environmental monitoring equipment performed daily or after each use:

1) Cleaning
2) Lubrication of moving parts
3) Check/charge battery
4) Inspect for damage
5) Check for operation problems
6) Inspect all hoses and lines

Partial list of important spare parts for environmental monitoring instruments planned for use at the Li Tungsten Site:

1) Fuses
2) HNU-UV 10.2 eV lamp
3) Probes
4) Spare battery
5) Calibration gas refills
6) Septa
7) OVA - Ignitor
   - Particle filters
   - Filter cup

The normal upkeep is done daily after each use and includes inspecting for damage, signs of problems, and charging the batteries if necessary. Equipment specific normal upkeep procedures are described in the SOPs found in Appendix A.

Minor service and repair will be done by the Equipment Manager who is trained in the service and repair of field instruments. Equipment in need of major or more complex repair and service will be sent to the manufacturer.

All maintenance, servicing and repair of equipment shall be recorded and kept on file. Field personnel shall record maintenance and instrument problems in the instrument or field log books. These will ultimately be held on file by the Field Operations Leader. The Equipment Manager shall keep a record of all equipment released to the field and a record of all maintenance and service on file.

11.4 LABORATORY INSTRUMENT MAINTENANCE

For all CLP laboratories, preventive maintenance procedures will be clearly defined and written for each measurement system and required support equipment. Maintenance activity, preventive or repair, will be documented on standard forms maintained in log books. Written procedures will include maintenance schedules, problem identification procedures, space for describing problems and repair notes, and failure analysis protocols. Service contracts and regularly scheduled in-house maintenance will be included, along with a list of critical spare parts.

11.5 RENTAL EQUIPMENT

If the use of rental equipment is nesessary in conjunction with the Li Tungsten RI/FS field activities, it must be demonstrated that the rented equipment will be able to meet the DQOs of the data collection activity for which the equipment is being used. As a result, the equipment supplier will be required to provide adequate documentation of the accuracy, maintenance, and upkeep of the rented equipment that will enable the DQOs to be met.

12.0 DATA ASSESSMENT

12.1 INTRODUCTION

All analytical data received from the analytical laboratories will be assessed to determine to what extent the data can be used in making sound project decisions. The goal of data assessment is to characterize the data so that project decisions are made using data that is of a sufficient quality to support those decisions. The different levels of quality needed to support the various project decisions have been stated in the form of the DQOs. Where the DQOs are met, the data is useful in making necessary decisions. The extent that the DQOs have been met determines the extent that the data is useful.

In order to determine how well the DQOs have been met, all CLP and non-RAS data received from the analytical laboratories will be reviewed and validated by either USEPA/ESAT personnel (CLP-RAS data) or by Malcolm Pirnie personnel (non-RAS data) who have received certification through the USEPA Region II data validation courses. The CLP data packages will be validated in accordance with the USEPA documents, CLP Organics Data Review and Preliminary Review (USEPA, 1992a) and Evaluation of Metals Data for the Contract Laboratory Program (USEPA, 1992). The protocols for non-RAS analyte data validation will be taken from USEPA documents as well as the analytical methods referenced in each non-RAS request. Data validation protocols for radiological non-RAS analytes are provided in Appendix C of the RI/FS Work Plan (Malcolm Pirnie, 1993). The data will be reviewed and validated, using the intended data uses and DQOs being used to aid in decisions regarding data usefulness.

The data obtained through the CLP RAS and non-RAS program, Level IV and Level V, respectively, will be subjected to rigorous review according to the above protocols and SOPs. The uses of Level IV and Level V data require this rigorous review so that the quality is known. All other levels of data will be validated to a lesser extent to develop a more general idea of the quality of the data. When possible, the above protocols and SOPs will be used as guidelines.

12.2 DATA ASSESSMENT

12.2.1 Field Measurements

Field data will be assessed by the Site Quality Assurance Officer (Site QAO). The Site QAO will review the field results for compliance with the established QC criteria that are specified in the QAPjP and FSP. Accuracy of the field measurements will be assessed using daily instrument calibration, calibration check, and analysis of blanks. Precision will be assessed on the basis of reproducibility by multiple reading of a single sample. Data completeness will be calculated using Equation 12-1.

$$\text{Completeness} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100 \qquad \text{Equation 12-1}$$

12.2.2 Laboratory Data

Laboratory results will be assessed for compliance with required precision, accuracy, completeness and sensitivity as follows:

Precision

Precision of laboratory analysis will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate (MS/MSD) for organic analysis, and laboratory duplicate analyses for inorganic analysis. The relative percent difference (%RPD) will be calculated for each pair of duplicate analysis using Equation 12-2.

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100 \qquad \text{Equation 12-2}$$

RPD = Relative Percent Difference
D_1 = First Sample Value
D_2 = Second Sample Value (Duplicate)

Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria that are described in Section 3.0 of the QAPjP using the analytical results of method blanks, reagent/preparation blank, matrix spike/matrix spike duplicate samples, rinsate blanks, and trip blanks. The percent recovery (%R) of matrix spike samples will be calculated using Equation 12-3.

$$\%R = \frac{SSR - SR}{SA} \times 100 \qquad \text{Equation 12-3}$$

SSR = Spike Sample Results
SR = Sample Results
SA = Spike Added from Spiking Mix

Completeness

The data completeness of laboratory analyses results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using Equation 12-1.

Sensitivity

The achievement of method detection limits depend on instrumental sensitivity and matrix effects. Therefore it is important to monitor the instrumental sensitivity to ensure the data quality through constant instrument performance. The instrumental sensitivity will be monitored through the analysis of method blank, calibration check sample, and laboratory control samples, etc., in accordance with SW-846 methodology or SOPs approved by U.S. EPA for hazardous constituents/parameters that cannot be analyzed using SW-846 methods.

13.0 CORRECTIVE ACTION

13.1 NON-CONFORMANCE REPORTS

Corrective action will be undertaken when a non-conforming condition is identified. A non-conforming condition occurs when QA objectives for precision, accuracy, completeness, representativeness or comparability are not met, or when procedural practices or other conditions are not acceptable.

When a non-conforming condition occurs, it will be investigated by the site QAO, who will then prepare a non-conformance report on the condition. The non-conformance report will be reviewed by the PMO QA Manager, and the approved report will be issued to the Site Manager, the Program Manager, the USEPA WAM, and, if necessary, a responsible officer of the involved laboratory. The non-conformance report will describe the unacceptable condition and the nature of corrective measures recommended. A schedule for compliance will also be provided. An example of the non-conformance form is given in Figure 13-1.

13.2 CORRECTIVE ACTION

The non-conformance report will be transmitted to a responsible officer of the CLP or non-CLP laboratory, the USEPA WAM, the Program Manager, PMO QA Manager, and the Site Manager. The non-conformance report will specify in writing the corrective action recommended to be taken, including measures to prevent a recurrence of the original deficiency. Appropriate documentation of corrective action will also be prepared. The Site QA Officer will monitor implementation of the corrective action and provide written record as to whether the original problem has been resolved.

13.3 STOP-WORK ORDER

A Stop-Work Order may be issued upon authorization by the Site QAO if corrective action does not adequately address a problem or if no resolution can be reached. To issue a Stop-Work Order, written authorization is required from the Site

NONCONFORMANCE REPORT FORM

NONCONFORMANCE REPORT			
NCR NO.:	INITIATING OFFICE:	DATE:	TYPE NCR:
NONCONFORMANCE DESCRIPTION (*Attach Additional Pages as Required*):			
REPORTED BY (*Name*):	TITLE:	DATE:	
CONCURRENCE (*Cognizant Manager*):			
RECOMMENDED DISPOSITION (*Attach Additional Pages as Required*): ☐ REPERFORM PER PROCEDURE/ INSTRUCTION NO. ________ ☐ REJECT ☐ ACCEPT-AS-IS ☐ OTHER (*Explain Below*)			
NAME/TITLE:		DATE:	
ACTION ASSIGNED TO (*Name*):	TITLE:	DATE;	
ACTION TAKEN:			
EVALUATED/ACCEPTED BY (*Manager*):		DATE:	
CORRECTIVE ACTION REQUIRED:			
CORRECTIVE ACTION DETERMINATION BY (*Name*):	TITLE:	DATE:	
QUALITY ASSURANCE CLOSEOUT (*Name*):		DATE:	

FIGURE 13-1

Manager and the USEPA WAM. If disagreement occurs among these individuals, it will be brought before successively higher levels of management until the issue is resolved.

13.4 DOCUMENTATION OF THE STOP-WORK ORDER

The conditions and need for a Stop-Work Order will be documented in sufficient detail to permit evaluation of the deficiency and determination of proper corrective action. Pertinent communications will be attached to the Stop-Work Order and referenced in the appropriate spaces. Such communications include discussions, correspondences or telephone conversations which pertain to evaluation of the problem and potential solutions and implementation of the preferred solution.

13.5 RESUMPTION OF WORK

In order for work to resume following a Stop-Work Order, the Site Manager and the USEPA WAM must rescind it in writing.

13.6 COURSE AND ACTION TO PREVENT RECURRENCE

The Site QA Officer is responsible for tracking non-conforming conditions, evaluating the effectiveness of corrective measures and assuring that the necessary steps have been taken to prevent recurrence of the original problem.

13.7 FIELD CHANGES

The Site Manager is responsible for all site activities. In this capacity, the Site Manager will at times be required to modify site programs in response to changing site conditions. At such times, the responsible Field Operations Leader will notify the Site Manager of the anticipated change, obtain the approval of the Site Manager and implement the necessary changes. The Site Manager will notify in writing the Site QA Officer, the Operations Manager, and the USEPA WAM. A copy of the notification will be attached to the file copy of the affected document. If an unapproved action has been taken during a period of deviation, the action will be evaluated to determine the significance of any departure from established procedures.

Changes in the program will be documented on a field change request which is signed by the Field Operations Leader and the Site Manager. The Site Manager will maintain a log for the control of field change requests.

The Site Manager is responsible for controlling, tracking and implementing the identified changes. Completed field change requests are distributed to affected parties which will include as a minimum: PMO Operations Manager, Site Manager, Site QA Officer, Field Operations Leader and the USEPA WAM. The process for requesting a variance in the working documents of an RI/FS is outlined the Standard Operating Procedure presented in Appendix D.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

14.1 FREQUENCY

At regular (perferably monthly) intervals, the PMO QA Manager will submit a Quality Assurance report to the Program Manager and the Operations Manager on the performance of the quality assurance program for each site assignment. Problems or issues which arise between regular reporting periods may be identified to program management at any time.

14.2 CONTENTS

The monthly Quality Assurance reports will contain:

- Results of field audits conducted during the period;
- An assessment of the measurement data, including accuracy, precision, completeness, representativeness, and comparability;
- A listing of the non-conformance reports including stop-work orders issued during the period, related corrective actions undertaken, and an assessment of the results of these actions; and
- Identification of significant quality assurance problems and recommended solutions.

15.0 REFERENCES

Malcolm Pirnie, 1994. DAS-SAS Draft Implementation Plan, Work Assignment No. 025-2L4L, August 1994.

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MALCOLM PIRNIE

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APPENDIX

APPENDIX A

EQUIPMENT CALIBRATION AND MAINTENANCE PROCEDURES

EQUIPMENT CALIBRATION AND MAINTENANCE PROCEDURES

Calibration and maintenance procedures for the equipment identified below are presented in this Appendix.

- HNu Model PI-101 Photoionization Analyzer
- Foxboro Model OVA 128 Flame Ionization Detector
- Miniram Model PDM-3 Respirable Dust Meter
- Ludlum Model 12S Micro R Meter
- Hach Model 16800 Portable Turbidimeter
- Orion Model SA250 pH Meter
- Platinum Eh Electrode
- YSI Model 33 S-C-T Meter
- Glass-Mercury Thermometer
- YSI Model 51B Dissolved Oxygen Meter
- In-Situ Model SE1000B Hermit Data Logger
- Solinst Model 121 Interface Meter

CALIBRATION AND MAINTENANCE OF HNu PHOTOIONIZATION ANALYZER

Accuracy

The HNu PI-101 is temperature compensated so that a 20 degrees Celsius change in temperature corresponds to a change in reading of less than two percent full-scale at maximum sensitivity. The useful range of the instrument is from 0.2 to 2000 ppm. Response time is less than three seconds to 90 percent of full-scale.

Calibration

Prior to use, the HNu meter will be checked using a pressurized cylinder of isobutylene. The isobutylene will be certified by HNu Systems Inc. to be 100 ppm of isobutylene in air. The HNu meter is calibrated to benzene at the manufacturer. Thus, the 100 ppm of isobutylene check gas should deflect to 63 ppm on the meter scale.

Maintenance

1. If any of the following conditions occur, consult the troubleshooting guide provided in the Instruction Manual:

   a. No meter response in any switch position (including BATT CHK).
   b. Meter response in BATT CHK, but reads zero or near zero for all others.
   c. Instrument reads correctly in BATT CHK and STBY, but not in measuring mode.
   d. Instrument responds in all positions, but signal is lower than expected.
   e. Erratic meter movement occurs.
   f. Instrument response slow or irreproducible.
   g. Low battery indicator.

   Should the troubleshooting techniques fail to resolve the problem, send the instrument to the manufacturer for repair and maintenance.

2. The light source window will be cleaned at a minimum of every two weeks. Cleaning frequency will be based on meter performance when checked against 100 ppm of isobutylene in air.

3. The meter battery will be checked at the beginning and end of each day. If the needle is not within or above the green battery arc on the scale-plate, the battery will be recharged prior to making any measurements.

Data Validation

A daily log will be kept to document equipment and standards utilized. Recorded information for the equipment will include the name, model number, and data of calibration. Standards used in calibration of equipment will be documented by trade name, lot number and expiration date. Any unusual readings and routine maintenance procedures will also be documented.

CALIBRATION AND MAINTENANCE OF OVA FLAME IONIZATION DETECTOR

Foxboro Flame Ionization Detector/Organic Vapor Analyzer (OVA)

Primary calibration of the Organic Vapor Analyzer is accomplished at the factory using methane of known concentrations in air and making adjustments to the four potentiometers located on the circuit board inside the instrument. This primary adjustment is relatively stable over time and should not concern field operators. The primary calibration may be checked during factory maintenance procedures which will be required for each unit. Maintenance schedules will be established by the Project Manager.

All OVAs will be calibrated to methane, and records kept on file to document the procedure. A 5 liter gas sampling bag is filled with "clean" air. One cubic centimeter (cc) of a pure methane gas from a calibration cylinder is injected through the septum of the gas sampling bag. The sampling bag is then agitated to ensure complete diffusion of the sample. The concentration in parts per million (ppm) (volume/volume) will be equal to the sample size in cubic centimeters divided by the volume of the bag in cubic centimeters, times 1,000,000. Therefore,

$$\frac{1\ cc}{5{,}000\ cc} \times 1{,}000{,}000 = 200\ ppm$$

Note: 1 liter = 1,000 cc

The outlet of the sampling bag is connected to the air sampling line of the OVA. The GAS SELECT knob is then adjusted until the meter reading on the OVA is 200 ppm.

Since the instrument is calibrated to methane, the concentration read for other compounds must be expressed as "methane equivalent" concentrations. It is possible to calibrate the instrument with other gases by adjusting the GAS SELECT knob on the Sidepack control panel. However, this requires a supply of the gas of interest at a known concentration. Cylinders of various gases are commercially available and should be requested with the gas of interest and the balance as air. The calibration gas should be withdrawn from the cylinder and placed in a sample bag of known volume from which it may be drawn into the OVA. By making the appropriate calculations, samples of known concentration can be prepared. As the OVA draws in the sample, the GAS SELECT knob is turned until the calibrated concentration of the sample is read on the meter. The instrument is now calibrated to directly read the concentration of the compound of interest.

CALIBRATION AND MAINTENANCE OF RESPIRABLE DUST METER

The Miniram Model PDG-3 has been factory-calibrated using a representative dust, but the user may change the calibration constant of the instrument for a specific type of aerosol if he wishes. Such a calibration should be performed by obtaining a concurrent filter collection (e.g., by means of a personal filter sampler), sampling from the same environment within which the Miniram is placed. The average concentration obtained by the Miniram at the end of the test should be compared with the filter-gravimetric-determined concentration. The ratio of the two concentration values can then be used to correct the Miniram calibration. The comparison run should be replicated several times (to minimize errors) to obtain an average ratio.

To change the Miniram calibration, proceed as follows:

1. Place Miniram in a clean environment (e.g., air conditioned office).
2. Remove battery pack.
3. Disconnect battery connector (remember that all stored data will thus be lost/erased from Miniram memory).
4. While leaving battery pack lying next to Miniram, re-connect the two units (i.e., plug in connector).
5. Immediately observe Miniram display. It will be performing a slow segment-by-segment display checkout. As soon as it displays ".00," press OFF, thus interrupting the initial automatic zero checkout. Wait until the display indicates "OFF" and then press MEAS and wait approximately 36 seconds.
6. Observe 10-second readings (typically in the range of 1 to 3 mg/m^3) and record manually a few consecutive readings. Calculate the average of these values.
7. Identify small potentiometer screw (visible through an opening in the foil shield of the open Miniram) opposite the digital output jack. Adjust this potentiometer,

using a fine screw driver, until the average Miniram is increased or decreased (with respect to the average obtained in step 6) by the desired ratio (e.g., as determined by previous gravimetric comparison runs).

8. Shut off Miniram, reposition and secure battery pack, and re-zero instrument. All subsequent concentration readings are now corrected by the desired ratio.

CALIBRATION AND MAINTENANCE OF LUDLUM MODEL 12S MICRO R METER

Description

The Ludlum Model 12S Micro R Meter utilizes an internally mounted 1" x 1" NaI scintillator for counting low level gamma radiation.

Range Multiplier Selector Switch is a 6-position switch marked OFF, BAT, X1000, X100, X10, X1. Turning the range selector switch from OFF to BAT position provides the operator with a battery check of the instrument. A BAT check scale on the meter provides a visual means of checking the battery-charge status. Moving the range selector switch to one of the range multiplier positions (X1000, X100, X10, X1) provides the operator with an overall range of 0 to 3000 Micro R/hr. Multiply the scale reading by the multiplier for determining the actual scale reading.

AUDIO ON-OFF Toggle Switch in the ON position operates the unimorph speaker, located on the left side of the instrument. The frequency of the clicks is relative to the rate of the incoming pulses. The higher the rate, the higher the audio frequency. The audio should be turned OFF when not required to reduce battery drain.

Fast-Slow Toggle Switch provides meter response selection. Selecting the "F" position of the toggle switch provides 90% of the final meter reading in 4 seconds. In "S" position, 90% of the final meter reading takes 22 seconds. Set on "F" for fast response and larger meter deviation. "S" position should be used for slow response and damped meter deviation.

RES Button, when depressed, provides a rapid means to drive the meter to zero.

Range Calibration Adjustments are recessed potentiometers located under the calibration cover on the right side of the front panel. These adjustment controls allow individual calibration for each range multiplier.

DIS Adjustment allows the input sensitivity to be adjusted from 30 to 100 millivolts. The gain is normally set for 40 millivolts at the factory.

Operating Procedures

- Install two "D" size batteries
- Switch range to BAT. Meter should deflect to the battery check portion of the scale.
- Turn instrument range switch to X1000. Expose detector to check source.
- Check calibration.
- Depress RES switch. Meter should zero.

Calibration

The meter should be calibrated annually by either the manufacturer or by a calibration facility.

Calibration controls are located on the front of the instrument under the calibration cover. The controls may be adjusted with an 1/8-inch blade screwdriver.

The high voltage should be set at the minimum value. Connect pulses (negative 40 millivolt pulse) to meter. Set gain for 40 millivolt sensitivity.

NOTE: Measure High Voltage with a Model 500 Pulser or a High Impedance voltmeter with a high meg probe. If one of these instruments is not available, use a voltmeter with a minimum of 1000 megohm input resistance.

A. CPM Calibration

- Provide 360,000 counts per minute (CPM) with meter set on X1000 scale.
- Calibrate meter to read 2 micro R/hr.
- Decrease counts by factors of 10; calibrate X100, X10, and X1 scales to read 2 micro R/hr.
- Turn up high voltage in 50 volt increments.
- Plot HV vs. count rate until detector voltage rating is reached.
- Expose detector to Am-241 source and repeat above procedure.
- Compare both sets of data; select operating voltage to correspond with maximum source count and minimum background count.

B. Cesium Calibration

- Set instrument to X1000 scale.
- Expose to Cs-137 source at 2 Micro R/hr point.
- Adjust calibration pot so that meter reads 2000 Micro R /hr.
- Repeat for each scale at 200, 20 and 2 Micro R/hr.

Maintenance

NEVER STORE THE INSTRUMENT OVER 30 DAYS WITHOUT REMOVING THE BATTERIES. ALTHOUGH THIS INSTRUMENT WILL OPERATE AT VERY HIGH AMBIENT TEMPERATURES, BATTERY SEAL FAILURE CAN OCCUR AT TEMPERATURES AS LOW AS 100 $^{\circ}$F. NEGLECTED BATTERY SEAL FAILURE WILL SURELY CAUSE ONE AWFUL MESS.

Instrument maintenance consists of keeping the instrument clean and periodically checking the batteries and calibration.

At three month intervals, the batteries should be removed and the battery contacts cleaned of any corrosion. If the instrument has been exposed to a very dusty or corrosive atmosphere, more frequent battery servicing should be used.

Use a spanner wrench to unscrew the battery contact insulators, exposing the internal contacts and the battery springs. Removing the handle will facilitate access to these contacts.

CALIBRATION AND MAINTENANCE OF TURBIDIMETER

Accuracy

A Hach Model 16800 Portable Turbidimeter will be used for all turbidity measurement. The Hach 16800 will be operated in the range of 0 to 100 nephelometric turbidity units (NTU). A nickel/cadmium battery with approximately ten hours operating time per change built into the 16800 meter. Readings are repeatable to within $\pm 1\%$ of full scale.

Calibration and Operation

To ensure consistently accurate results, perform standardization before each set of tests.

1. Turn the instrument off and check the mechanical zero setting. Adjust the screwdriver adjustment control on the meter face if necessary to obtain a zero-NTU reading.

2. Press the power switch to ON and perform a battery check by pressing the BATT CHECK switch and verifying that the meter indicates in the BATTERY CHECK area. If not, charge the battery pack.

3. Place the focusing template into the cell holder. The focusing template will block all light from reaching the detector and allow the instrument to be zeroed electronically in Steps 4 and 5.

4. Press the 1.0 range switch and adjust the ZERO control for a reading of zero NTU.

5. Press the 10 range switch and verify that the meter still indicates zero NTU. Readjust the ZERO control if necessary.

6. Remove the focusing template and the 90-NTU turbidity standard into the cell holder. Use the black dot on the standard vial to orient the vessel in the same position each time, thereby eliminating variations due to rotation.

7. Place the light shield over the turbidity standard and allow the meter to stabilize.

8. Adjust the SPAN control for a reading of 90 NTU. Remove the light shield and turbidity standard. The instrument is now ready for use.

Taking the Turbidity Measurement

1. Press the appropriate range switch. Select the range that will exceed the expected turbidity of the sample under test.

2. Place the focusing template into the cell holder and adjust the ZERO control for a reading of zero NTU. Remove the focusing template. In the 100 range, place the cell riser into the cell holder before inserting the test sample.

3. Fill a clean sample cell to the white line with the sample to be measured and placed it into the cell holder. Use the white dot on the sample cell to orient the cell in the same position each time. Cover the sample cell with the light shield and allow the meter to stabilize. Read the turbidity of the sample.

Operational Notes

1. The sample size for all turbidity measurements should be 18 ml. Use the line on the sample cell as a level indicator. Variations in sample volume can affect the accuracy of the determinations.

2. When operating the instrument under bright ambient light conditions, protect the detector between measurements by inserting the focusing template or covering the cell holder with the light shield.

Maintenance

1. The battery pack will be recharged overnight subsequent to its use in the field.

2. Broken or highly scratched sample cells will be replaced. Small, slight scratches may be covered with a light coat of silicone oil. Cells with a build up of matter which cannot be removed will be discarded.

3. Lamp and focusing adjustments are not considered routine maintenance and will be performed only when the instrument readings are suspect.

Data Validation

All instrument calibrations will be documented, indicating the meter readings before and after the meter has been adjusted.

CALIBRATION AND MAINTENANCE OF THE ORION SA 250 pH METER

Accuracy

An Orion SA 250 pH meter will be used for on-site pH and temperature measurement. The SA 250 meter will be equipped with a suitable combination pH electrode and automatic temperature compensation (ATC) probe. Temperature differential between the pH buffer standards and samples is automatically compensated for by the meter. The SA 250 meter has resolution capability to 0.1 or 0.01 standard pH units. Department of Transportation and Mil specifications have been met or exceeded for shock, vibration and moisture.

Check Out Procedure and Calibration

Prior to initial daily use, the SA 250 meter will be checked according to the following procedure.

Meter Check Out Procedure

1. Slide power switch to ON position. Attach BNC Shorting Plug to BNC connector on top of meter. Refer to Figure B-6.1.
2. If LO BAT indicator on LCD remains on, the battery must be replaced.
3. Slide mode switch to mV. Display should read 0 + 0.3.
4. Slide mode switch to temp. Display should read 25.0. If 25.0 is not displayed, using , , and X10 keys, until 25.0 is displayed and press enter.
5. Slide mode switch to pH .01. Press iso. Display should read the letters ISO then a value of 7.00. If 7.00 is not displayed, scroll until 7.00 is displayed and press enter.
6. Press slope. Display should read the letters SLP then a value of 100.0. If 100.0 is not displayed, scroll until 100.0 is displayed and press enter.
7. Press sample. Observe the letters pH then a steady reading of 7.00 + 0.02 should be obtained. If not, press cal and scroll until 7.00 is displayed and press enter. Press sample and observe a reading of 7.00.

8. Remove the shorting plug. After a successful completion of steps 1-8 the meter is ready to use with an electrode.

Electrode Connections

1. Attach electrodes with BNC connectors to sensor input by sliding connector onto input, pushing down and turning clockwise to lock into position. Connect reference electrodes with pin tip connectors by pushing connector straight into reference input.

   NOTE: If using a combination electrode with a BNC connector, the reference pin-tip jack is not used.

Calibration

Calibration of the SA 250 meter will be performed using two standard buffer solutions of pH = 7.00 s.u. and pH = 4.01 s.u. Buffer solutions are standardized at 28 degrees Celsius against National Bureau of Standards certified pH = 6.88 and pH = 9.18 reference samples prior to measuring the pH of any sample. The following procedure used for calibrations:

1. Connect electrode(s) to meter. Slide the mode switch to pH.1 4.01.

2. Place electrode(s) into pH_2, 7.00 buffer.

3. Press cal. The display will alternate between .1. and the pH value of the buffer, indicating this is the first buffer and a value has not been entered. Wait for a stable pH display and press enter. The correct display will freeze for 3 seconds then advance to .2. indicating the meter is ready for the second buffer.

4. Rinse electrode(s) and place into pH = 4.01 buffer. Wait for a stable pH display and press enter .

   After the second buffer value has been entered the letters PH will be displayed. The meter is now calibrated and automatically advances to sample mode.

5. Rinse electrode(s), place into sample. Record pH directly from the meter's display.

The use of the ATC probe eliminate the need for temperature calibration.

Maintenance

1. When not in use or between measurements, the pH probe will be kept immersed in or moist with pH = 7.000 buffer solution.

2. The battery will be placed when the "LO BAT" indicator remains on during the instrument check out.

3. The pH electrode will be replaced whenever the probe is cracked or irremovable deposits build up on the junction.

4. If response time or stability problems develop and cannot be corrected the meter will be sent to the manufacturer for maintenance.

Data Validation

All instrument calibrations will be documented, indicating the meter readings before and after the meter has been adjusted. The pH buffers used to calibrate the meter will also be documented. This is important, not only for data validation, but also to establish maintenance schedules and component replacement.

CALIBRATION AND MAINTENANCE OF ORION PLATINUM Eh ELECTRODE

Accuracy

An Orion platinum Eh electrode and the Orion SA 250 PH meter will be used for on-site oxidation-reduction potential (redox) measurement. The SA 250 meter has resolution capability to 1 mV. Refer to previous section for the calibration and maintenance of the SA 250.

Check Out Procedure and Calibration

Checking the electrode is necessary only when there is evidence of malfunction that cannot be traced to other causes. Fill the electrode with ORION Cat. No. 900011 filling solution for checking procedure.

1. Prepare solution A (0.1 M potassium ferrocyanide and 0.05 M potassium ferricyanide): weigh out 4.22 g reagent-grade $K_4Fe(CN)_6 \bullet 3H_2O$ and 1.65 g reagent-grade $K_3Fe(CN)_6$. Place in a 100 ml volumetric flask. Add about 50 ml distilled water and swirl to dissolve solids. Dilute to volume with distilled water.

2. Prepare solution B (0.01 M potassium ferrocyanide, 0.05 M potassium ferricyanide, and 0.36 M potassium fluoride): weight out 0.42 g reagent-grade $K_4FE(CN)_6$, 1.65 g reagent-grade $K_3FE(CN)_6$, and 3.39 g reagent-grade $KF \bullet 2\ H_2O$. Place in a 100 ml volumetric flask. Add 50 ml distilled water and swirl to dissolve solids. Dilute to volume with distilled water.

3. Transfer solution A to a 150 ml beaker. Place electrode in the solution and wait until the reading stabilizes. The potential should be about 234 mV.

4. Rinse electrode and repeat the measurement with solution B. The potential should be about 66 mV greater in solution B than in solution A.

Maintenance

1. When not in use the electrode may be kept in water or air. If left in air, remove salt crystals on the outside of the electrode sleeve by rinsing with distilled water, drain filling solution from chamber, flush out with distilled water, store dry. See cleaning procedure.

2. The electrode can be routinely cleaned without disassembling. To remove precipitate that forms on the outside wall or tip of the electrode, rinse with distilled water. If sample or precipitate clogs the space between the electrode sleeve and the inner cone, clean the chamber by flushing out the filling solution. To do this, invert the electrode to moisten the O-ring. Holding the electrode by the cap with one hand, push the outer sleeve up into the cap with the other hand, allowing filling solution to drain from the chamber. If

the chamber is not completely clean, repeat. Fill with filling solution.

3. To remove salt deposits formed inside the electrode:
   - Fill wash bottle to half with distilled water.
   - Invert electrode so that glass membrane points up.
   - Invert the wash bottle so that its bottom points up.
   - Insert nozzle of wash bottle into electrode filling hole and squeeze bottle. Filling solution will drain out of chamber.
   - Fill chamber with distilled water from wash bottle. Repeat steps 2-4.
   - Continue to repeat steps 2-5 until all salts have been removed.

4. To change the filling solution in the reference chamber, simply clean the electrode and fill with the new solution, using the following procedure:
   - Tip the electrode to moisten the O-ring. Holding the electrode by the cap with one hand, push the sleeve up into the cap with the other hand allowing solution to drain from the chamber.

   - Fill the electrode with distilled water and then drain the reference chamber by retracting the sleeve, as explained above. Now perform this filling and draining procedure twice with the new filling solution.

   - Fill the electrode with the new solution. Although the electrode is ready for use, readings may drift slightly for about a half hour while the electrode equilibrates with the new solution.

Data Validation

All instrument calibrations will be documented, indicating the meter readings before and after the meter has been adjusted. The electrode filling solutions used to calibrate the meter will also be documented. This is important, not only for data validation, but also to establish maintenance schedules and component replacement.

CALIBRATION AND MAINTENANCE OF SPECIFIC CONDUCTANCE METER

Accuracy

The calibrated accuracy of the specific-conductance meter (YSI, Inc. Model 33 S-C-T Meter) ± 4.5 percent; this represents the worst-case error resulting from errors in the instrument and probe combined. Instrument error alone ranges from ± 2.5 to $\pm 3.0\%$.

Calibration

The specific-conductance meter will be calibrated by turning the MODE control to REDLINE and adjusting the REDLINE control so the meter needle lines up with the redline on the meter face. If this cannot be accomplished, the batteries must be replaced. Recalibration should be done at the factory.

Maintenance

The only maintenance required is battery replacement. Two "D" size alkaline flashlight cells, such as Eveready E95 or equivalent, will provide 200 hours of operation. Accuracy will not be maintained if zinc-carbon "D" cells are used. Battery replacement is indicated when the redline adjustment cannot be accomplished.

Replace batteries every six months to reduce the danger of corrosion due to leaky batteries. To replace batteries, remove the screws from the rear cover. The batter holders are color coded. The positive end must contact the red holder.

Data Validation

All instrument calibrations will be documented, indicating the meter readings before and after the meter has been adjusted. This is important, not only for data validation, but also to establish maintenance schedules and component replacement.

CALIBRATION AND MAINTENANCE OF GLASS-MERCURY THERMOMETER

To check the glass-mercury thermometer, both the thermometer and the YSI temperature probe should be immersed into the same beaker of water. Any differences in temperature should be noted and recorded in the field log. The thermometer should be kept clean and protected from breakage in a hard tube or case.

CALIBRATION AND MAINTENANCE OF DISSOLVED OXYGEN METER

Accuracy

The calibrated accuracy of the dissolved oxygen meter (YSI Model 51B Dissolved Oxygen Meter) will be better than ±0.2 mg/l when calibrated within ±5°C of actual sample temperature. Temperature which can also be measured with this instrument, has an accuracy of ±0.7°C over the full scale temperature range of -5 °C to +45 °C.

Calibration

1) Switch instrument to OFF and adjust meter mechanical zero.

2) Switch to ZERO and adjust to "O" on mg/l scale.

3) Switch to FULL SCALE and adjust to "15" on mg/l scale.

4) Prepare probe for operation, plug into instrument, wait up to 15 minutes for probe to stabilize. Probe can be located in calibration chamber or ambient air.

5) Switch to CALIB O_2 and adjust CALIB control until meter indicates local altitude on short scale in upper right corner of meter.

NOTE: It is desirable to calibrate probe in a high humidity environment. See instruction manual for more detail on calibration and other instrument and probe characteristics.

Maintenance

1) When not in use or between measurements, keep the dissolved oxygen probe immersed in or moist with deionized water.

2) Replace batteries after 1000 hours of operating or if full scale adjustment cannot be made. Use Eveready 935 "C" size or equal.

3) Membranes will last indefinitely depending on use. Average replacement is 2-4 weeks. Probe should be stored in humid environment to prevent drying out.

4) Calibrate daily.

Data Validation

All instrument calibrations will be documented, indicating the meter readings before and after the meter has been adjusted. Each preparation of probe and method of calibration will also be documented. This is important, not only for data validation, but also to establish maintenance schedules and component replacement.

CALIBRATION AND MAINTENANCE OF THE IN-SITU HERMIT ENVIRONMENTAL DATA LOGGER

Description

An In-Situ HERMIT Environmental Data Logger, Model SE1000B or equivalent, will be used on site in conjunction with an In-situ pressure transducer (PXD-260, PTX-160D or PTX-161D), to record water level changes during pump testing.

The front panel controls of the HERMIT consist of a five digit liquid crystal display and an eight key keypad. The keys are divided into two groups: the white keys for basic operations and the blue keys for data entry and modification. Basic operations include CLOCK, XD (short for transducer) and DATA; each of which can be accessed with a single keystroke. Data modifying operations such as START, STOP and changing test parameters require a sequence of keystrokes to prevent their accidental use.

Maintenance

There are no customer serviceable parts inside the SE1000B. The unit should require no calibration or periodic maintenance during its service life. It should not be necessary to clean the connectors or cable contacts. The action of installing the cables is normally sufficient to clean contamination from the contacts. The front panel may be wiped clean with a soft, damp cloth.

Battery Replacement

The battery pack used in the SE1000B is of special design, requiring that the unit be returned to In-situ's customer service facility for replacement. Permanent damage to the unit can result from improper replacement packs and procedures. When the low battery indicator appears in the display, the unit has approximately ten hours of "wake" time left. External power may be used to supplement battery power until the unit can be returned for a replacement pack.

Service

The SE1000B may need to be returned for service if any of the following symptoms appear:

1. A display of the form "Err.20" indicates that the unit does not pass its internal self tests. The unit will not permit itself to be used for data collection, and data already stored in the unit are inaccessible (upon walking up, the unit will display the error and immediately go back to sleep).

2. An unusually high number of watchdog counts may indicate an intermittent problem. The unit may be used for data collection but should be returned for a checkup as soon as possible.

3. A low battery indication in the display. The unit can probably finish the current test and dump the data. Long term tests should not be started when the unit is in this condition.

If symptoms other than these are apparent, check the cable interconnections and the programming of the SE1000B before requesting service on the unit. One incorrect scale factor or coefficient setting can cause data to appear way off.

CALIBRATION AND MAINTENANCE OF THE SOLINST INTERFACE METER

General Operation

The Solinst Model 121 Interface Meter works with an infra-red circuit that detects the presence of a liquid. A conductivity circuit differentiates between conductive liquid (water) and non-conductive liquid (LNAPL or DNAPL product).

Before commencing any measurements, carry out the following electronics and battery condition checks.

1. Turn the main switch on (Main switch is a toggle switch on reel faceplate). The steady tone and two lights will be activated (as long as the probe switch is off, but the main switch is on).

2. Remove the probe from the holder and turn the probe switch on (Probe switch is the knurled ring at the top of the probe). Steady tone and two lights activate.

3. The infra-red circuit is checked by inserting the cleaning brush into the base of the probe until it reaches the zero measurements point (The zero measurement point is the junction between the stainless steel body of the probe and the brown Teflon/Delrin base plug). This cuts the infra-red beam causing the steady tone and two lights to activate.

4. The conductivity circuit is checked by inserting the probe into normal tap water, as far as the measurement zero point. This causes a single light and intermittent tone to activate.

General Operation

After each use, the tape should be wiped clean and carefully rewound onto the reel. The probe should be cleaned as follows:

1. Wash probe thoroughly with alconox detergent;

2. Use a cleaning brush through the side and base holes to remove all product from the inner part of the probe;

3. Use steel wool to scrub the bottom pin;

4. Rinse the probe thoroughly with distilled water and wipe dry; and

5. Return the probe to the holder, ensuring that both switches are turned off.

NOTES:

- Battery will drain rapidly if probe is left on
- Do not drop probe; damage to probe tip may result
- O-ring seals may be affected by the use of cleaning fluids other than detergent and water.

<u>To replace batter inside reel:</u>

1. Remove three screws in faceplate and carefully lift to one side to prevent damage to wiring.
2. Replace with specified battery, noting proper polarity.
3. Replace faceplate and three screws, being careful to keep all wires within the hub.

<u>To replace probe battery:</u>

1. Remove three screws (Phillips type) at top of probe.
2. Gently pull body apart to expose the battery holder.
3. Remove and replace battery with type specified.
4. Ensure correct polarity.
5. Check O-rings for damage and replace if necessary.
6. Lubricate O-rings lightly with non-petroleum based lubricant prior to reassembly and push probe body back together ensuring that the three wire connector is placed below the battery in the slot provided prior to reassembly of the probe.
7. Replace Phillips screws but do not over-tighten.

WARNING: LOW BATTERY IN PROBE CAN RESULT IN WATER LIGHT STAYING "ON"

NOTE: ALWAYS REPLACE BOTH BATTERIES AT THE SAME TIME.

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APPENDIX

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Sample Tags

A sample tag must accompany each sample container. Information provided on the sample tag must include the following:

1. Project Code
2. Sample Number (Station No.): This is the MPI-designated sample number. It is associated with the sample source location on a site map.
3. Date: Indicate the month, day, and year the sample was collected.
4. Type of Sample: Grab/Composite; Water, soil or sediment.
5. Station Location (optional) - more detailed description of the sample location.
6. Samplers Signature
7. The type of analysis requested.
8. The type of preservation performed in the field.
9. The Case Number
10. The organic or inorganic CLP Number assigned, whichever is applicable.
11. A sample Tag Number (this is preprinted on each tag).

Note: The sample containers can be labeled and much of the sample tag information can be filled out prior to the sampling event, saving time during the actual field event.

QA/QC Samples

Trip Blanks

- One trip blank is required for each day that aqueous environmental samples are collected for volatile analysis.
- Trip blanks are only necessary for aqueous environmental samples. If rinsates are the only aqueous samples collected, then a trip blank is not necessary.
- Trip blanks consist of two 40 mL septum vials into which 4-5 drops of 1:1 hydrochloric acid (HCl) is introduced prior to filling them with demonstrated analyte-free water.
- Trip blanks are prepared in, and carried to, the field where aqueous sampling occurs.
- Trip blanks are treated as separate aqueous samples and the appropriate paperwork must be completed. The trip blank is described as No. 4 "Rinsate" in Column A of the Organic Traffic Report/Chain-of-Custody (OTR/COC) and the words "trip blank" should appear in Column K (see Attachment A - OTR/COC).
- The trip blank must be stored away from solvents and must be preserved, packaged, cooled to 4-6°C and shipped to the laboratory with the other aqueous samples.

Rinsate Blanks

- Rinsate blanks should be collected for each type of equipment used each day a decontamination event is carried out. It is permissible to use the same aliquot of water on all equipment associated to a particular matrix for analysis of semi-volatile organics, pesticides, PCBs and inorganics. The rinse must be performed sequentially on all sampling equipment. However, a separate field rinse blank must be collected for each piece of equipment associated to a particular sample matrix which will be analyzed for volatile organics.

- Rinsate blanks consist of pouring demonstrated analyte-free water over clean equipment and collecting it into sample containers to be analyzed for the analytes of concern.

- For full TCL/TAL analysis the rinsate will have the same volume as a low concentration aqueous environmental sample and the sample containers are filled in the following order: VOA vials, BNA/Pest./PCB bottles, total metals and Cyanide (if applicable) containers.

- The rinsate blank is described as No. 4 "Rinsate" in Column A or the Organic and Inorganic Traffic Report/Chain-of-Custody (OTR/COC and ITR/COC). The type of equipment that is rinsed is written in Column K on both the OTR/COC and ITR/COC (see Attachment A - ITR/COC).

- Rinsate blanks are preserved, packaged, and shipped in the same manner as low concentration aqueous environmental samples.

Environmental Duplicates

- Samples for duplicate analysis are collected in the field, for each matrix sampled at a frequency of a minimum of 1 in 20 samples per matrix.

- Sufficient quantity of matrix must be collected from the same sample location to fill a duplicate set of sample containers. The duplicate volume is shipped to the laboratory under a separate CLP sample number.

- The volatile organic fraction is collected first for the aqueous environmental sample and then the duplicate sample, next the extractable organic fraction is collected in the same order, followed by the inorganic fraction, then the Cyanide fraction (if applicable).

  For soil/sediment samples the volatile organic fraction is collected as colocated grab samples. The nonvolatile fraction is collected into a stainless steel bowl and homogenized prior to collecting the fraction for extractable organic analysis and then the fraction for inorganic analysis (including cyanide if applicable). Separate bowls should be used to collect the environmental sample and the environmental duplicate.

- The collected samples are preserved, packaged and shipped to the lab as separate samples for analysis. The word "Duplicate" should be written in Column K of the OTR/COC and ITR/COC.

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 concentration/matrix.

- Additional volume must be collected from the same sample location for the aqueous samples. No extra volume is required for the soil samples. The additional volume is shipped to the lab using the same CLP numbers.

  Three times the total volume is necessary for collection of aqueous MS/MSD organic samples. Two times the total volume is necessary for collection of aqueous inorganic MS/MD samples. The sample containers are filled in the following order: VOA vials, BNA/Pest./PCB bottles, total metals and Cyanide (if applicable). No extra volume is needed for soil samples.

- The MS/MSD and/or MS/MD samples are noted on the OTR/COC and ITR/COC in Column K and also in a box labeled "Sample used for a spike and/or duplicate".

Custody Procedures

Prior to completion of a sampling episode the care and custody of the samples must be performed. Procedures for the packaging and shipping of samples and the documentation generated during that process is outlined in the following section.

Packaging and Shipping Samples (RAS and non-RAS)

1. Decontaminate and air or towel dry the outside of the sample containers (Alconox and tap water rinse). Make sure the caps are tightly sealed prior to decontamination.

2. Preserve the samples according to the SOP for Sample Preservation #MP-FPQA-021.

3. Apply one custody seal (Attachment A) around the circumference of the container or over the cap and onto the sides of the container. The custody seal must applied to sample containers in such a manner as to reveal if the container was opened during transit.

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

4. Place each container in its own ziplock bag. The two 40 ml vials may be placed in one bag with extra air space eliminated.

5. Place the associated sample tag into the ziplock bag and seal.

6. Segregate organic and inorganic fractions of samples. Do not split samples, other than separating organic and inorganic fractions, into separate coolers.

7. Put 1-2 inches of vermiculite in the bottom of the coolers, then place the samples into the cooler.

8. Surround the sample bottles with bags of ice or packets of "blue ice" to ensure that the proper temperature (4-6°C) is achieved and maintained during transport. It is not acceptable to place bags of ice only around the necks of the bottles, or to use only a few bags of ice or packets of "blue ice" since this technique does not ensure the attainment of the proper temperature.

9. Each cooler requires one address label on the outside. Tape label to top of cooler lid using clear tape. Leave room on one cooler for the Federal Express Airbill/Window for the shipment of coolers to each lab.

10. 1-10 samples may be written on each Traffic Report/Chain of Custody (TR/COC). Many times these forms can be partially completed in the office. If more than one TR/COC form is necessary than number them 1 of 2, 2 of 2 etc. Complete all the TR/COC's.

11. Place the last two copies of the TR/COC's in the cooler in a ziplock bag (these copies do not have the site name on them) and tape it to the inside lid of the cooler that has the airbill attached to it. Retain the remaining paperwork to send to the MPI-RSCC Coordinator.

12. When all paper work is filled out and the samples packed in their respective coolers, recheck documentation with the site manager.

13. Fill the cooler with vermiculite and secure the containers from movement within the coolers. Use strapping tape on each side of the cooler to seal the container for shipping.

14. Apply custody seals to the cooler. Place two custody seals diagonally across from each other where the cooler lid meets the cooler on both the hinged and unhinged sides. The custody seal has an adhesive side which enables it to stick where it is applied. The custody seal must be signed and dated and applied to coolers in such a manner as to reveal if the container was opened during transit.

15. If more than one cooler is being sent to one destination, label each cooler 1 of 2, 2 of 2, etc.

16. Fill out RAS Sample Shipping Call-In Form (Attachment A). Call or FAX the shipping information to the MPI-RSCC Coordinator (609-860-0100, FAX# 609-860-0250), by 4:30 pm or by 9:00 am the following morning.

    Note: If the MPI-RSCC Coordinator cannot be reached by 9 am the following morning, the samples can be called in directly to Dynacorp - CLASS at (703) 519-1471.

17. Send all remaining paperwork to MPI-RSCC Coordinator for proper distribution.

    Note: All samples will be shipped by overnight carrier within 24 hours of sample collection.

Documentation

During field activities and prior to completion of the following documentation, field logbooks must be generated. During the sampling episode all duties and activities of concern must be entered into a logbook.

All logbook entries must be dated, legible, and initialed and contain accurate and inclusive documentation of an individual's project activities. Because the logbook forms the basis for the later written reports, it must contain only facts and observations. Language should be objective, factual, and free of personal feelings or other terminology which might prove inappropriate. Entries made by individuals other than the person to whom the logbook was assigned are dated and signed by the individual making the entry. Individuals must sign each logbook assigned to them.

Any information obtained during the sampling episode will then be expressed in the following documents.

Traffic Reports/Chain-of-Custody (TR/COC)

Traffic Reports (TR's)

The Sample Management Office provides preprinted traffic reports (TR's) to track the shipment of samples through the CLP. For RAS, multisample traffic reports are used. Multisample TR's reference CLP analytical fractions, not sample containers and volumes, and may be used to document the shipment of 1 to 10 samples under one Case Number.

A CLP sample is collected from one matrix and consists of all the sample volume required for analysis under one RAS analytical program from the sample location. For example, one surface water sample to be analyzed for full TCL/TAL parameters would represent two CLP samples - one aqueous sample to be analyzed under the inorganic program (total metals, cyanide, or both), and one aqueous sample to be analyzed under the organic program (volatile organics, BNAs, and pesticides/PCBs).

Unique CLP sample numbers are assigned for each sample by the MPI-RSCC Coordinator, at the time of the RAS Request. The sample numbers are provided on adhesive labels. The type of analysis is printed on most of these labels. The appropriate label must be applied to the correct container.

- Sample numbers for inorganic analysis for Region 2 begin with the letters "MB", then are assigned two more letters and two numbers.
- Sample number for organic analysis for Region 2 begin with the letter "B", then are assigned two more letters and two number.

Note: These sample numbers must never apply to more than one sample being sent for organic and inorganic analysis. Unused portions of labels must be destroyed and not reused.

Chain-of-Custody (COC)

Custody of a sample is defined by the following:

- It is in your possession, or
- It is in your view, after being in your possession, or
- It was in your possession, and you locked it up, or
- It is in a designated secure area.

Each person involved with the sample must know COC procedures. The procedures should be included in the Project Plan or be published and available to all personnel. Due to the evidentiary nature of sample collecting investigations, the possession of samples must be traceable from the time that samples are collected until they are introduced as evidence in legal proceedings. To maintain and document sample possession, COC procedures are followed.

The COC records must be prepared as the sample containers are being packaged for shipping. The record must be signed and dated just prior to sealing the coolers for shipment. Enter the actual time at which the COC is prepared. The COC record used by Region 2 is part of the Traffic Report (TR) and is serialized.

Note: Explicit instructions for filling out the TR/COC's are located on the reverse side of each form.

Special Instructions

EPA-ESD Laboratory

If the EPA-ESD Laboratory is performing the analysis, the TR/COC will act only as a COC. A Field Data Sheet must accompany each sample along with the COC paperwork (see Attachment A).

The "Lab Number" on the Field Data Sheet must appear on the TR/COC, next to the assigned CLP Number.

The Gold (or bottom copy) of the field data sheet is kept by the field Sample Management Officer (SMO) and the rest of the copies are to be sent to the EPA-ESD Laboratory along with the samples.

Distribution of Documentation

After all sampling and documentation is completed the following outline will be used for the distribution of the documentation generated.

Laboratory

- Bottom 2 copies of TR/COC's

Site Manager for Project File

- 1 xerox copy of all the TR/COC's
- The original airbill receipts
- Bottle Lot Number Form and Bottle Certifications
- The original copy of the Sampling Trip Report (refer to the SOP for Preparation of the Sampling Trip Report #MP-FPQA-012).

MPI-RSCC Coordinator

- Top 2 copies of the TR/COC
- Two copies of the Sampling Trip Report
- Any extra unused CLP labels and paperwork
- A copy of the Bottle Lot Number Form

MPI-RSCC to Distribute To:

RSCC/ESAT Lockheed Environmental Systems

- 2nd page of all the Organic and Inorganic TR/COC's

Dynacorp. - CLASS

- Top copy of the Inorganic and Organic TR/COC
- A copy of the Sampling Trip Report

MPI-RSCC Files

- Sample Trip Report
- Copy of all TR/COC's
- Extra Labels and Paperwork
- Bottle Lot Number Form

V. References

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

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

USEPA Contract Laboratory Program (CLP) National Functional Guidelines For Organic Data Review, Multi-Media, Multi-Concentration, Doc. No. OLM01.0, Revised June, 1991.

USEPA CLP SOW for Organic Analysis Multi-Media, Multi-Concentration, Doc. No. OLM01.2, Revision OLM01.9 December 1993.

USEPA Contract Laboratory Program (CLP) National Functional Guidelines For Evaluating Inorganic Analysis, Revised October, 1989.

USEPA CLP SOW for Inorganic Analysis, Multi-Media, Multi-Concentration, Doc. No. ILM03.0, December 1993.

ATTACHMENT A

300476

MALCOLM PIRNIE

ARCS Contract# 68-W9-0051

CONTRACT LABORATORY PROGRAM DATA MANAGEMENT REQUEST SHEET

(Shaded Areas for MPI-RSCC Use Only)

Site Name: ______________________
Site Location: ______________________
Job Number: ______________________

Date Requested: ______________________
Proposed Sampling Date(s): ______________
Proposed Shipping Date: ______________

Actual Start Date: ______________
Actual Completion Date: ______________

SM/FTL: ______________________

Turnaround Time:
Routine ____ Fast ____ # of days ____

Case Number: ______________
SAS Number: ______________

Laboratories:
Organic: ______________________
Inorganic: ______________________
SAS/Other: ______________________
____
____

ROUTINE ANALYTICAL SERVICES (RAS)

SAMPLE TYPE	ORGANICS						INORGANICS					
	Full TCL Organics		VOA Only		Other		TAL Only		TAL + Cyanide		Other	
	R	C	R	C	R	C	R	C	R	C	R	C
Trip Blanks:												
Rinsates:												
Soil Sampling Equipment												
Aqueous Sampling Equipment												
Aqueous Environmental Samples:												
Low Concentration												
Medium Concentration												
Solid Environmental Samples:												
Low Concentration												
Medium Concentration												

R= # of Requested Samples C= Actual # Collected

Signature: ______________ Date: ________

U.S. EPA REGION II RSCC
LABORATORY BOOKING AND JOB TRACKING

DATE: ____________ RSCC Task Monitor: ______________ CASE: ____________
SAS CLIENT REQ.#: ______________ Philip Guarraia
SENT TO SMO: ______________ SAS: ____________
SENT TO CONTRACTOR: ________
CANCELLED: ______________ LAB: ______________

SITE: ______________________ PROPOSED SAMPLING PERIOD: ______________

CONTRACTOR: ______________________ CONTRACTOR CODE: ______________

SITE SPILL #: ________ PHASE: __________ LOCATION: ______________

SITE MGR./PHONE #: ______________________________

CERCLIS ID #: ______________________ RCRA CASE? Y/N ________

UNIQUE ID	#	MATRIX	ANALYSIS	LABORATORY	

ACTUAL SAMPLING & LAST SHIP DATES: ______________________________

DATA ENTRY 1: ______________

PAPERWORK RECEIVED: ______________

DATA PACKAGE REC'D: (1) __________ (2) __________ (3) __________ FROM LABORATOR

NUMBER CT1 CT2 MATRIX
______________________________ ROC PREP'D: ______________
______________________________ SENT TO DCR: ______________
______________________________ DATA ENTRY 2: ______________

DATA PACKAGE REC'D: ______________________________ FOLLOWING REVIEV

PHOTOCOPY/HIGHLIGHT: ______________________ ______________

2-WAY TRANSMITTAL: ______________________ ______________

TEAM MANAGER (or designee): ______________
FINAL APPROVAL

BOX NO.: ______________ DATA ENTRY 3: ______________
____

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BOTTLE LOT NUMBER FORM

SITE NAME ______________________ DATE ______________________

PROJECTED SAMPLING DATE ______________

PROJECT JOB # ______________________ SIGNATURE ______________________

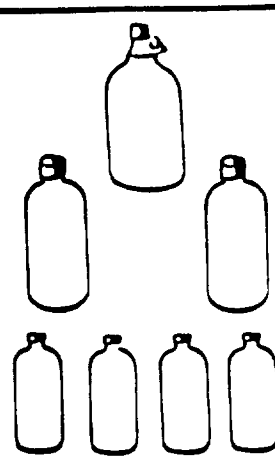
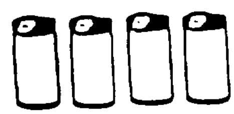
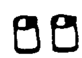
ARCS Contract# 68-W9-0051

Sample Number	# of 8 oz. jars	Supplier/ Lot #	# of 40 mL vials	Supplier/ Lot #	# of 80 oz. bottles	Supplier/ Lot #	# of 1L Poly bottles	Supplier/ Lot #	Specify other/ Lot #

RINSATE WATER LOT No(s).: ______________________

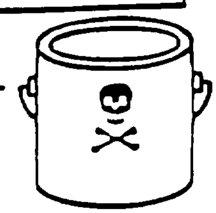
DECON LOT No(s).: ______________________

ORGANIC SAMPLE COLLECTION REQUIREMENTS

WATER SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
EXTRACTABLE ANALYSIS (LOW LEVEL)	1 GALLON		1 x 4-LITER AMBER GLASS BOTTLES OR 2 x 80-OZ. AMBER GLASS BOTTLES OR 4 x 1-LITER AMBER GLASS BOTTLES
EXTRACTABLE ANALYSIS (MEDIUM LEVEL*)	1 GALLON		4 x 32-OZ. WIDE-MOUTH GLASS JARS
VOLATILE ANALYSIS (LOW OR MEDIUM LEVEL*)	80 ML		2 x 40-ML GLASS VIALS

SOIL/SEDIMENT SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
EXTRACTABLE ANALYSIS (LOW OR MEDIUM LEVEL*)	6 OZ.		1 x 8-OZ. WIDE-MOUTH GLASS JAR OR 2 x 4-OZ. WIDE-MOUTH GLASS JARS
VOLATILE ANALYSIS (LOW OR MEDIUM LEVEL*)	240 ML		2 x 120-ML WIDE-MOUTH GLASS VIALS

*ALL MEDIUM LEVEL SAMPLES TO BE SEALED IN METAL PAINT CAN FOR SHIPMENT



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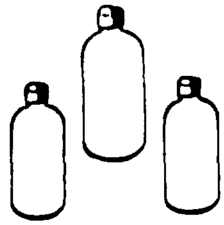
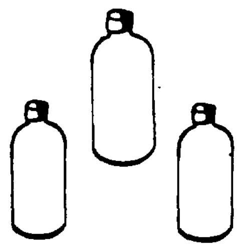
INORGANIC SAMPLE COLLECTION REQUIREMENTS

WATER SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
METALS ANALYSIS (LOW LEVEL)	1 LITER		1 x 1-LITER POLYETHYLENE BOTTLE OR 2 x 500 ML POLYETHYLENE BOTTLE
METALS ANALYSIS (MEDIUM LEVEL*)	16 OZ.		1 x 16-OZ. WIDE-MOUTH GLASS JAR
CYANIDE (CN$^-$) ANALYSIS (LOW LEVEL)	1 LITER		1 x 1-LITER POLYETHYLENE BOTTLE OR 2 x 500 ML POLYETHYLENE BOTTLE
CYANIDE (CN$^-$) ANALYSIS (MEDIUM LEVEL*)	16 OZ.		1 x 16-OZ. WIDE-MOUTH GLASS JAR

SOIL/SEDIMENT SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
METALS AND CYANIDE (CN$^-$) ANALYSIS (LOW OR MEDIUM LEVEL*)	6 OZ.		1 x 8-OZ. WIDE-MOUTH GLASS JAR
			OR
			2 x 4-OZ. WIDE-MOUTH GLASS JARS

*ALL MEDIUM LEVEL SAMPLES TO BE SEALED IN METAL PAINT CAN FOR SHIPMENT

300480

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY OFFICIAL SAMPLE SEAL	SAMPLE NO.	DATE	SEAL BROKEN BY	DATE
	SIGNATURE			
	PRINT NAME AND TITLE (Inspector, Analyst or Technician)			

EPA FORM 7500-2 (R7-75)

Designate		Type	Preservation	
Grab	Comp.	☐ Water ☐ Soil ☐ Sed		
Time		Samplers (Signatures)	ANALYSES	
			BOD	
			Solids (TSS) (TDS) (SS)	
			COD, TOC, Nutrients	
			Full TAL	
Month/Day/Year			Metals	
			Mercury	
			Cyanide	
			Cyanide Amenable	
			Full TCL	
Station No.		Station Location	Volatile Organics	
			BNA	
			Pesticides/PCBs	
Project Code			Remarks:	
			Case No:	
			SAS No:	
			CLP Sample No:	
		Tag No. 05378	Lab Sample No.	

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EPA United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703-557-2490 FTS 557-2490

(anic Traffic Report & Cnain of Custody Record

(For Organic CLP Analysis)

SAS No. (if applicable)

Case N

1. Project Code | Account Code | 2. Region No. | Sampling Co. | 4. Date Shipped | Carrier

Regional Information | Sampler (Name) | Airbill Number

Non-Superfund Program | Sampler Signature | 5. Ship To

Site Name

3. Type of Activity: Lead SF, PRP, ST, FED; Pre-Remedial PA, SSI, LSI; Remedial RIFS, RD, RA, O&M, NPLD; Removal CLEM, REMA, REM, OIL, UST

City, State | Site Spill ID

ATTN:

6. Preservative (Enter in Column D)
1. HCl
2. HNO3
3. $NaHSO_4$
4. H_2SO_4
5. Other (Specify)
6. Ice only
N. Not preserved

7. Sample Description (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (High only)
7. Waste (High only)
8. Other (Specify)

CLP Sample Numbers (from labels)	A Enter # from Box 7	B Conc. Low Med High	C Sample Type: Comp./Grab	D Preservative from Box 6	E RAS Analysis VOA	BNA	Pest/PCB	High only ARO/TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Inorg. Samp. No.	K Enter Appropriate Qualifier for Designated Field QC (B - Blank, S - Spike, D - Duplicate, PE - Perform. Eval, — - Not a QC Sample)

Shipment for Case complete? (Y/N) | Page 1 of ___ | Sample used for a spike and/or duplicate | Additional Sampler Signatures | Chain of Custody Seal Number

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks Is custody seal intact? Y/N/none	

Split Samples ☐ Accepted (Signature)
Declir

EPA Form 9-2 (Rev. 5-91) Replaces EPA Form (2075-7), previous edition which may be used

Organic Sample Collection Requirements

This form replaces both the individual Traffic Report and EPA Chain of Custody Record. If the sampling team elects to use an alternative chain-of-custody form, cross out the bottom portion of this record and indicate that chain-of-custody information is recorded on an alternative form.*

Water Samples	Required Volume	Container Type
Extractable Analysis (Low Level)	1 Gallon	1 X 4-Liter Amber Glass Bottle OR 2 X 80-oz. Amber Glass Bottle OR 4 X 1-Liter Amber Glass Bottles
Extractable Analysis (Medium Level*)	1 Gallon	32-oz. Wide-Mouth Glass Jars
Volatile Analysis (Low or Medium Level*)	80 ml.	2 X 40-ml. Glass Vials

*All Medium and High Level Samples to be Sealed in Metal Can for Shipment

Soil/Sediment Samples	Required Volume	Container Type
Extractable Analysis (Low or Medium Level*)	6 oz	1 X 8-oz. Wide-Mouth Glass Jar
		OR
	240 ml	2 X 4-oz. Wide-Mouth Glass Jars
Volatile Analysis (Low or Medium Level*)		2 X 120 ml Wide-Mouth Glass Vials†

†Soil VOA Vials under study, subject to change, check to ensure proper sealing

HIGH CONCENTRATION SAMPLE COLLECTION REQUIREMENTS

Liquid or Solid Samples	Required Volume	Container Type
Extractable and Volatile Analysis	6 oz.	1 X 8-oz. Wide-Mouth Glass Jar

1. **Organic Sample Collection Requirements**
   - Please indicate sample to spike and/or duplicate.
   - Ship medium and high concentration samples in paint cans.
   - Aqueous samples require one triple-volume sample per twenty for Matrix Spike/Matrix Spike Duplicate.
   - Oily samples must be analyzed under the Special Analytical Services (SAS) program.
   - Confirmatory analysis and Special Analytical Services (SAS) parameters may require extra volume: for SAS consult specified SAS methods for requirements.
   - Additional sample volume not required for method OLC01.

2. **Cooler and Sample Documentation**
   - Complete all sections of the Traffic Report/Chain of Custody Form - Press firmly with a ball point pen to ensure that carbon copies are legible. Check the information and correct any errors.
   - Please remember to complete the Chain of Custody information on the form.
   - Seal the two sets of laboratory Traffic Report/Chain of Custody form copies in a plastic bag. Include a return address for the cooler. Tape bag under cooler lid.
   - Overlap the lid and bottle of each sample container with custody seals.
   - Seal each container in a plastic bag.
   - Pack medium and high concentration samples in metal cans.
   - Cool low waters to 4° C. Cooling of low soils is optional. Do not cool medium or high concentration waters and soils.
   - Separate and surround cooler contents with vermiculite or equivalent packaging.
   - Seal the cooler, overlapping the lid and body with custody seals.
   - FAX SMO a copy of the Traffic Report/Chain of Custody Form as soon as possible. Send SMO the pink copy of the Traffic Report within 5 days.
   - In column E RAS analysis indicate number of sample bottles sent for analysis.

3. **Sample Shipment Reporting**
   - PHONE IN ALL SHIPMENTS IMMEDIATELY TO SMO (or to RSCC, if instructed)

     Required information:

     Case (and/or SAS) Number
     Date shipped
     Number of samples by concentration and matrix
     Carrier and airbill number
     Next planned shipment
   - Leave your name and a number where you can be reached.
   - Information for SATURDAY DELIVERIES must be phoned in by 3:00 PM (Eastern) the preceding FRIDAY.
   - Report any delays or changes of scope (i.e., changes in number of samples to be collected, matrix changes, etc.)
   - CALL IF YOU HAVE ANY QUESTIONS

USEPA Contract Laboratory Program
Sample Management Office
P.O. Box 818
Alexandria, VA 22313
Phone: (703) 557-2490
(703) 684-5678
FAX: (703) 683-0378

United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703-557-2490 FTS 557-2490

Inorg .c Traffic Report & Chain of Custody Record

(For Inorganic CLP Analysis)

SAS No. (if applicable)

Case No.

1. Project Code	Account Code	2. Region No.	Sampling Co.	4. Date Shipped	Carrier
Regional Information		Sampler *(Name)*		Airbill Number	
Non-Superfund Program		Sampler Signature		5. Ship To	
Site Name		3. Type of Activity			
City, State,	Site Spill ID			ATTN:	

3. Type of Activity

Lead	Pre-Remedial	Remedial	Removal
SF ☐	PA ☐	RIFS ☐	CLEM ☐
PRP ☐	SSI ☐	RD ☐	REMA ☐
ST ☐	LSI ☐	RA ☐	REM ☐
FED ☐		O&M ☐	OIL ☐
		NPLD ☐	UST ☐

6. Preservative *(Enter in Column D)*

1. HCl
2. HNO3
3. NaOH
4. H_2SO_4
5. $K_2CR_2O_7$
6. Ice only
7. Other *(Specify)*

N. Not preserved

7. Sample Description *(Enter in Column A)*

1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (High only)
7. Waste (High only)
8. Other *(Specify)*

CLP Sample Numbers (from labels)	A Enter # from Box 7	B Conc. Low Med High	C Sample Type: Comp./Grab	D Preservative from Box 6	E - RAS Analysis: Metals Total	Metals Dissolved	Cyanide	Low Conc. only Nitrate/Nitrite	Low Conc. only Fluoride	High only pH	High only Conductivity	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Org. Samp. No.	K Enter Appropriate Qualifier for Designated Field QC (B = Blank S = Spike D = Duplicate PE = Perform. Eval — = Not a QC Sample)

Shipment for Case complete? (Y/N)	Page 1 of ____	Sample used for a spike and/or duplicate	Additional Sampler Signatures	Chain of Custody Seal Number

CHAIN OF CUSTODY RECORD

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks Is custody seal intact? Y/N/none	

...n which may be used (...l Samples ☐ Accepted *(Signature)*

Inorganic Sample Collection Requirements

"This form replaces both the individual Traffic Report and EPA Chain of Custody Record. If the sampling team elects to use an alternative chain-of-custody form, cross out the bottom portion of this record and indicate that chain-of-custody information is recorded on an alternative form."

Water Samples	Required Volume	Container Type
Metals Analysis (Low Level)	1 Liter	1 X 1-Liter Polyethylene Bottle OR 2 X 500-mL Polyethylene Bottle
Metals Analysis (Medium Level*)	16 oz.	1 X 16-oz Wide-Mouth Glass Jar
Extractable Analysis (Medium Level*)	1 Liter	1 X 1-Liter Polyethylene Bottle OR 2 X 500-mL Polyethylene Bottle
Volatile Analysis (Low or Medium Level*)	16 oz.	1 X 16-oz. Wide-Mouth Glass Jar

*All Medium and High Level Samples to be Sealed in Metal Can for Shipment

Soil/Sediment Samples	Required Volume	Container Type
Metals and Cyanide (CN^-) Analysis (Low or Medium Level*)	6 oz.	1 X 8-oz. Wide-Mouth Glass Jar OR 2 X 4-oz. Wide-Mouth Glass Jars

HIGH CONCENTRATION SAMPLE COLLECTION REQUIREMENTS

Liquid or Solid Samples	Required Volume	Container Type
Metals and Cyanide* Analysis	6 oz.	1 X 8-oz. Wide-Mouth Glass Jar

1. Inorganic Sample Collection Requirements

- Aqueous samples require one double-volume sample per twenty for Matrix Spike/Matrix Spike Duplicate.
- Preserve low level water samples:

Total metals	Preserve with HNO_3 to pH $\leq$ 2.
Dissolved metals	Preserve with HNO_3 to pH $\leq$ 2. No further digestion required.
Cyanide	Preserve with 10 NaOH to pH $\geq$12.

- Oily samples must be analyzed under the Special Analytical Services (SAS) program.
- Ship medium and high concentration samples in paint cans.

2. Cooler and Sample Documentation

- Complete all sections of the Traffic Report/Chain of Custody Form - Press firmly with a ball point pen to ensure that carbon copies are legible. Check the information and correct any errors.
- Please remember to complete the Chain of Custody information on the form.
- Seal the two sets of laboratory Traffic-Report/Chain of Custody form copies in a plastic bag. Include a return address for the cooler. Tape bag under cooler lid.
- Overlap the lid and bottle of each sample container with custody seals.
- Seal each container in a plastic bag.
- Pack medium and high concentration samples in metal cans.
- Separate and surround cooler contents with vermiculite or equivalent packaging.
- Seal the cooler, overlapping the lid and body with custody seals.
- Send SMO the pink copy of the Traffic Report within 5 days.
- In column E RAS analysis indicate number of sample bottles sent for analysis.

3. Sample Shipment Reporting

- PHONE IN ALL SHIPMENTS IMMEDIATELY TO SMO (or to RSCC, if instructed)
  Required information:
  - Case (and/or SAS) Number
  - Date shipped
  - Number of samples by concentration and matrix
  - Carrier and airbill number
  - Next planned shipment

  Leave your name and a number where you can be reached.
- Information for SATURDAY DELIVERIES must be phoned in by 3:00 PM. (Eastern) the preceding FRIDAY.
- Report any delays or changes of scope (i.e., changes in number of samples to be collected, matrix changes, etc.)
- CALL IF YOU HAVE ANY QUESTIONS

USEPA Contract Laboratory Program
Sample Management Office
P.O. Box 818
Alexandria, VA 22313
Phone: (703) 557-2490
(703) 684-5678

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EPA United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703 557 2490 FTS 557 2490

Special Analytical Service
Packing List/Chain of Custody

SAS No.

1. Project Code	Account Code	2. Region No.	Sampling Co.	4. Date Shipped	Carrier
Regional Information		Sampler *(Name)*		Airbill Number	
Non-Superfund Program		Sampler Signature		5. Ship To	
Site Name		3. Type of Activity			
City, State	Site Spill ID				

3. Type of Activity — Lead: SF, PRP, ST, FED; Pre-Remedial: PA, SSI, LSI; Remedial: RIFS, RD, RA, O&M, NPLD; Removal: CLEM, REMA, REM, OIL, UST

6. **Sample Description** *(Enter in Column A)*
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil
7. Waste
8. Other *(Specify)*

7. **Preservative** *(Enter in Column C)*
1. HCl
2. HNO3
3. $NAHSO_4$
4. H_2SO_4
5. NAOH
6. Other *(Specify)*
7. Ice only
N. Not preserved

Sample Numbers	A Matrix Enter from Box 6	B Conc Low Med High	C Preserv-ative Used from Box 7	D Analysis	E Regional Specific Tracking Number or Tag Number	F Station Location Identifier	G Mo/Day/Year/Time Sample Collection	H Sampler Initials	I Designated Field QC
1.									
2									
3									
4									
5									
6.									
7.									
8									
9									
10.									

Shipment for SAS complete? (Y/N)	Page 1 of __	Sample Used for Spike and/or Duplicate	Additional Sampler Signatures	Chain of Custody Seal Number

CHAIN OF CUSTODY RECORD

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks Is custody seal intact? Y/N/none	

Split Samples ☐ Accepted *(Signature)*

1. Sample Collection Requirements
   Note: Comfirmatory analysis and Special Analytical Services (SAS) parameters may require extra volume.

2. Cooler and Sample Documentation
   - Complete all sections of the SAS Packing List/Chain of Custody Form - Press firmly with a ball point pen to ensure that carbon copies are legible. Check the information and correct any errors.
   - Please remember to complete the Chain of Custody information on the form.
   - Seal the two sets of laboratory SAS Packing List/Chain of Custody form copies in a plastic bag. Include a return address for the cooler. Tape bag under cooler lid.
   - Overlap the lid and bottle and bottle of each sample container with custody seals.
   - Seal each container in a plastic bag.
   - Pack medium and high concentration samples in metal cans.
   - Cool low waters to 4° C. Cooling of low soils is optional. Do not cool medium or high concentration waters and soils.
   - Separate and surround cooler contents with vermiculite or equivalent packaging.
   - Seal the cooler, overlapping the lid and body with custody seals.
   - Send SMO the yellow copy of the SAS Packing List/Chain of Custody Form within 3 days.

3. Sample Shipment Reporting
   - PHONE IN ALL SHIPMENTS IMMEDIATELY TO SMO (or to RSCC, if instructed)
     Required information:
       SAS (and/or Case) number
       Date shipped
       Number of samples by concentration, matrix, and analysis
       Carrier and airbill number
       Next planned shipment
     Leave your name and a number where you can be reached.
   - Information for SATURDAY DELIVERIES must be phoned in by 3:00 p.m. (Eastern) the preceding FRIDAY.
   - Report any delays or changes of scope (i.e., changes in number of samples to be collected, matrix changes, etc.)
   - CALL IF YOU HAVE ANY QUESTIONS
     USEPA Contract Laboratory Program
     Sample Management Office
     P.O. Box 818
     Alexandria, VA 22313
     Phone: (703) 557-2490
     (703) 684-5678
     FAX: (703) 683-0378

NOTIFICATION OF SAMPLE SHIPMENT

Site Name: ____________________

Case No. __________ Caller's Name V. Smith __________ Phone # (609) 860-0100

SAS No. __________ Date of Call __/__/__ Region USEPA Region II

Lab Name	Type of Analysis	No./Matrix Concentration of Samples (e.g. 10 LW)	Ship Date	Airbill No.	Shipping Complete?
					Y / N
					Y / N
					Y / N
					Y / N

Comments: ____________________

Message Taker: ____________________

NOTIFICATION OF SAMPLE SHIPMENT

Case No. __________ Caller's Name V. Smith __________ Phone # (609) 860-0100

SAS No. __________ Date of Call __/__/__ Region USEPA Region I

Lab Name	Type of Analysis	No./Matrix Concentration of Samples (e.g. 10 LW)	Ship Date	Airbill No.	Shipping Complete?
					Y / N
					Y / N
					Y / N
					Y / N

Comments: ____________________

Message Taker: ____________________

FACSIMILE TRANSMITTAL	Number of pages: 1
To:	From:
Co.:	Co.:
Phone #	Phone #
Fax #	Fax #

300488

FIELD DATA SHEET

ENVIRONMENTAL PROTECTION AGENCY · Region II, Edison, New Jersey

ENVIRONMENTAL SERVICES DIVISION

Project Name ______

Collector(s) ______ Affiliation ______

SAMPLING METHOD (Circle)

Kemmerer Dredge Ponar Manual
Niskin Net Seine Trawl Bucket
Trowel Cream Dipper
Automatic
Other ______

LDMS CODE ______

DATA BASE CODE ______

STA. TYPE CODE ______

SUBSTRATE TYPE (Circle) Aqueous Sediment Sludge Oil Biological
Solvent Extract Other ( )

BOD — Seed Supplied ☐ Yes ☐ No Source:

Sample Preparation (Circle)		Sample Source Type (Circle)	
Container	Cleaning Procedure	Landfill	Industrial
Glass Jar	Detergent Wash	Leachate	Effluent
Plastic Jar	Water Rinse	Drum	Process Stream
Metal	Acid Rinse	Test Well	Holding Pond
POA Vial	Solvent Rinse:	Depth:	Drum
Cubitainer	Acetone	Other: ______	Waste Pile
Acetate Core	Hexane	______	Municipal Treatment
Paper Cap	Methylene Chloride	Storage Tank	Influent
Teflon Cap	Other (Specify):	Top	Effluent-Cl
Foil Cap		Middle	Effluent-Non Cl
Other ______		Bottom	Sludge
______		Truck	Ambient
Preservation		Drum	Lake
Acid ______		Tank	Stream
Solvent ______		Other ______	Pond
Chemical ______		______	Ocean
Wet Ice		Wells	Estuary
Dry Ice		Monitoring	
Ambient		Production	
Other ______		Drinking	
______		Private	

Sample Location Description:

Remarks:

Samples to:

Bact	Bio	Chem	Other

Station No.

Sample Depth (Ft.)/Fac. Loc. Code

Lab Number

096863

Type of Sample

Grab	Composite Time	Composite Space

Collection (Ending) Date

Yr	Mo	Day

Ending Time (24 Hr)

Beginning Date

Yr	Mo	Day

Beginning Time (24 Hr)

pH

Sample Temp. (°C)

DO (mg/l)

Cond. (uMHOS/CM)

Salinity(‰)

Sample Split

☐ Yes ☐ No

If Yes With Whom?

Receipt ☐ Yes ☐ No

300489

APPENDIX B

SAMPLE MANAGEMENT

Malcolm Pirnie, Inc.
ARCS II QA/QC Field Procedures
Standard Operating Procedure

Procedure #MP-FPQA-016-01/95
Date: July 1996
Revision No. 0
Prepared by: Valerie Smith
Approved by: Alan Greenlaw

Title: Procedure to Conduct Sample Management for RAS and non-RAS Sampling

I. Introduction

This guideline is to provide general reference information on sample management procedures.

II. Limitations

These limitations apply to all sample management procedures excepting requirements of project-specific sample management plans.

III. Definitions

Contract Laboratory Program (CLP). All samples collected will be analyzed at an approved laboratory within the EPA CLP. The EPA CLP was developed to retain laboratory services that will ensure that all environmental samples collected under the Superfund Program will be analyzed in accordance with recognized EPA laboratory methods and QA/QC procedures.

Target Compound List (TCL). It is a list of chemical substances consisting of 125 organic compounds. The list is broken into three subdivisions: volatiles, semi-volatiles and pesticide/PCBs.

Target Analyte List (TAL). It is a list of chemical substances consisting of 23 inorganic compounds and cyanide.

Routine Analytical Services (RAS). Laboratory analysis for substances or parameters shown on the TCL and TAL in solid and aqueous samples.

Delivery of non-RAS. Laboratory analysis for substances or parameters not shown on the TCL and TAL. Analysis of non-soil/sediment, nonaqueous matrices, and analysis of RAS compounds using non-RAS protocols.

Trip Blanks. Trip blanks are used to check for sample contamination originating from sample transport, shipping, and from site conditions. Trip blanks are necessary when aqueous environmental samples are collected for volatile organic analysis.

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 and collected into containers 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. Triple volume of aqueous samples for MS/MSD analysis is collected in the field, at a frequency of at least 5 percent per matrix/concentration. No extra volume is required for the soil samples.

Matrix Spike/Matrix Duplicates (MS/MD). The spike analysis is the process by which standard mixes of various inorganic TAL compounds 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 in the process where the assigned sample is split in two and analyzed at the laboratory. The analysis is an indicator of a laboratories analytical precision based on each sample matrix. Double volume of aqueous samples for MS/MD analysis is collected in the field, at a frequency of at least 5 percent per matrix/concentration. No extra volume is required for soil samples.

Low-Concentration Sample. Samples in which a compound may be present at concentration levels less than 10.0 ppm.

Medium-Concentration Sample. Samples in which a compound may be present at concentration levels equal to or greater than 10.0 ppm to as much as 15 percent 150,000 ppm) of the total sample.

High-Concentration Sample. Samples in which a compound may be present at concentration levels greater than 15 percent (150,000 ppm) of the total sample.

IV. Guidelines

The purpose of sample management is to assume that all samples collected during a hazardous waste site investigation sampling episode will be accounted for when the project is completed. The purpose is achieved by adhering to the following procedures that outline a generic method of sample management.

Request for Delivery of non-RAS)

Non-RAS sampling requests include substances or parameters not shown on the TCL and TAL. All non-RAS requests should be approved and solicited through the ARCS II Operations Manager in White Plains.

Request for Routine Analytical Services (RAS)

RAS sampling requests include low- and medium-concentration aqueous and soil/sediment samples for TCL and TAL analysis.

RAS CLP analytical programs are defined below:

- Inorganic analysis - Total Metals, Cyanide, or both (35 day turnaround)

- Organic analysis - Volatile Organics (VOA), Base/Neutral/Acid Extractables (BNAs), Pesticide/PCBs, or any combination of these (35 day turnaround)

- Inorganic analysis - Total Metals, Cyanide, or both - fast turnaround (14 days)

- Organic analysis - Volatile Organics (VOA), Base/Neutral/Acid Extractables (BNAs), Pesticide/PCBs, or any combination of these - fast turnaround (14 days)

The laboratories within the CLP are under contract to deliver data based on the latest date of sample receipt in each sample group. Approved RAS requests are issued a unique Case Number for each sampling project occurring at one site over a specific scheduled time period.

RAS Sampling Requests

In anticipation of a sampling episode, RAS sampling requests are to be made using a CLP Data Management Request Sheet (see Attachment A), or by contacting the Malcolm Pirnie, Inc., Regional Sample Control Center (MPI-RSCC) Coordinator, located in the Central New Jersey (CNJ) Office, by 4 pm the Monday prior to the week of the scheduled sampling event.

The MPI-RSCC Coordinator will fill in a Laboratory Booking Job Tracking (LBJT) form (see Attachment A) and forward, via FAX, to the EPA Management Monitoring Branch (MMB) contact, who will send this request out for laboratory solicitation. When laboratories are solicited, a Case Number is assigned. The Case Number and Laboratory names assigned are sent to the MPI-RSCC Coordinator, who will then forward them to the person who initiated the RAS request.

Note: At times, the EPA-ESD Laboratory will choose to perform all or part of the analysis requested. If the EPA-ESD laboratory is procured, in addition to following this SOP, the special instructions under the Documentation section of this SOP must be followed.

At the time of the RAS request the MPI RSCC Coordinator will also assign CLP Sample Numbers (one to each sample being analyzed for TCL and/or one for TAL) and provide you with all the necessary paperwork. Bottle labels and sample tags may also be generated on the computer, by the MPI-RSCC Coordinator, if requested.

Sample Containers

- All sample containers 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, certified sample containers from an approved supplier. Copies of these certifications will be brought to the site while sampling and then kept in site files for future reference.

- Each bottle used to collect a sample must be identified by a supplier and lot number, to ensure that it is permanently associated with the sample collected in that particular container. The Bottle Lot Number form must be filled out and accompany the bottle certification sheets (see Attachment A). This procedure also applies to containers used to carry demonstrated analyte-free water to be used for blank preparation. This is to ensure that for all samples collected, the specific sample bottles used can be traced to the sample container contractor, QC certification paperwork and custody records applicable to their identifying lot numbers.

  (Attachment A lists the sample container requirements for all levels of organic and inorganic sample collections.)

Sample Container Preparation

Prior to commencement of a sampling episode the proper containers, labels, and samples (environmental and QA/QC) must be prepared. The types of samples to be collected will be the basis for determining the method of sample preparation.

Sample Labels

A sample label must be affixed to each sample container. Information provided on the sample label must include the following:

1. Sample number: This is the MPI-designated sample number. It is associated with the sample source location on a site map.
2. The assigned CLP Number.
3. Date: Indicate the month, day, and year the sample was collected.
4. The type of analysis requested.
5. The type of preservation performed in the field.

All information recorded should be printed on labels using indelible (waterproof) ink. Clear, acetate tape must be applied over all labeling to maintain label integrity during decontamination procedures.

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APPENDIX

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APPENDIX C

FIELD AUDITS

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Malcolm Pirnie, Inc.
ARCS II QA/QC Field Procedure
Standard Operating Procedure

Procedure #MP-FPQA-014-01/95
Date: January 1995
Revision No. 0
Prepared by: Valerie Smith
Approved by: Alan Greenlaw

Title: Procedure for Conducting Field Audits

I. Introduction

This guideline is to provide general reference information on the aspects of performing a field audit. (Note: Inmost cases the auditor will be the site Quality Assurance Officer(SQAO), however this SOP has been prepared for any Auditor to use.)

II. Limitations

These limitations apply to all field audits during any sampling event excepting requirements of project-specific plans for field audits.

III. Discussion

This field audit procedure is to be used for the auditing of field sampling events to verify adherence to the field sampling plan (FSP) and to document any deviations from prescribed procedures. A field audit is the verification of a sampling team's performance during a sampling episode.

A copy of the approved work plan should be reviewed by the auditor prior to going in the field. The auditor should be familiar with the number of samples, parameters, sampling methodology, decontamination procedures, etc. to be utilized at the site prior to performing the field audit. The auditor should review the H&S Plan and be prepared for the level of personnel protection specified in the work plan. This means that the auditor should have the necessary PPE equipment available for use in their vehicle prior to going in the field.

It is recommended that prior to performing a field audit, the auditor contact the project manager and discuss the audit. This type of pre-sampling conference with the project manager has proven to be an effective tool to ensure proper preparation, for the sampling event, has in fact occurred. This will avoid project delays and time wasted by staff auditors.

If the sampling episode is going to occur over an extended period of time, the auditor should specify the dates they wish to be on-site to witness sample collection. In addition, directions to the sampling location should be obtained.

The auditor should verify the sample matrix and equipment that the sampling team plans to use. If necessary, discuss the sampling technique to be utilized with the project manager in the event that last minute substitutions might occur. If this situation arises, the auditor must evaluate if the changes proposed will compromise the objectives of the FSP and if necessary, advise the project management team of potential delays.

Document References in the Field

The auditor should have the following documents available for reference in the field when performing quality control field audits:

1. Copy of the approved work plan and any relevant memos, correspondence or addenda.

2. Copy of the Field Sampling Procedures Manual and/or the USEPA Groundwater Monitoring Technical Enforcement Guidance Document.

3. Appropriate bound field log book (in an 8 x 11 format).

4. Appropriate field audit checklist

5. List of telephone numbers for project personnel and emergency numbers.

6. Camera (optional)

Note: The field audit checklist should be 100% complete prior to leaving the site where the sampling event has occurred.

Corrective Action in the Field

Besides observing and reporting, the auditor is responsible for initiating steps for the start-up of corrective action procedures.

If the auditor witnesses discrepancies in the field between the approved work plan and the performance of the sampling team, then the auditor has several options available for corrective action. These options are dependent upon the type of infraction observed.

Infractions observed and the corrective action taken must be documented in the auditor's log book.

Types of Infractions

(Definition: Any deviation from the procedures described in the approved work plans or SOPs being audited.)

- Minor Infractions

  Minor infractions are problems that are observed by the auditor and immediately brought to the attention of the party conducting the investigation. The auditor and the party conducting the investigation should discuss the problem and agree upon what corrective action is necessary. This will allow for the infractions to be corrected immediately in the field.

  Impact, if any, to the data generated can be easily eliminated and procedures can be corrected and/or repeated to achieve the desired result.

  Examples of minor infractions would include: not wearing disposable gloves, insufficient well evacuation, and not filling volatile organic sample containers completely.

- Major Infraction

  Major infractions are events or procedures that substantially deviate from approved work plans, administrative documents, the USEPA Groundwater Monitoring Technical Enforcement Guidance Document, or will otherwise result in increased project costs not previously approved.

  Upon witnessing a major infraction which would cause work to cease, the auditor shall inform the party conducting the investigation of the problem. They should then discuss what steps are necessary for corrective action. During this time all work on site should stop until a resolution is agreed upon.

  If the party conducting the investigations refuses to cease work or take the necessary steps for corrective action, then the auditor shall inform the party that samples obtained will potentially cause data critical to the environmental evaluation of a project to be qualified or become suspect. This type of infraction has the potential to cause total or partial rejection of samples submitted to the laboratory.

  Examples of major infractions would include: no trip or field blanks, improper decontamination procedures, and change in sampling location and procedures.

  When infractions are observed, the results of the audit should be immediately communicated in writing to the PMO QA Manager, Corporate QA Officer, and Project Manager.

Preparation of a Field Audit Report

The quality control field audit report provides a means of relaying the events of a sampling episode to key personnel. These events could possibly affect the sample integrity (QA/QC) and therefore they are important to the decisions that are made in regards to analytical data.

A quality control field audit report will usually contain the following information.

1. Date and location of field audit
2. Sample matrices witnessed
3. Name of personnel conducting the sampling
4. Summary of sample methodology
5. Description of any infractions that occurred and the corrective actions taken.
6. Conclusions
7. Recommendations
8. Map of sample locations
9. Table of samples witnessed by the auditor
10. Quality control field audit checklist (refer to attachments)

IV. References

U.S. EPA Region II CERCLA Quality Assurance Manual. Part II, Quality Control Handbook for CERCLA Sampling and Analysis, Section XV. October 1989, Rev. 1.

N.J. Department of Environmental Protection - Field Sampling Procedures Manual. February 1988.

QUALITY CONTROL FIELD AUDIT REPORT

SUMMARY INFORMATION

1. PROJECT NAME: ______________________________

2. PROJECT ADDRESS: ______________________________
____

3. PRELIMINARY ASSESSMENT ____ RI/FS ____ RD ____ CONSTRUCTION ____

OTHER ______________________________

4. DATE(S) OF QC FIELD AUDIT ______________________________

5. AUDITOR'S NAME ______________________ PHONE __________

6. FACILITY CONTACT ______________________ PHONE __________

7. CONTRACTOR CONTACT ______________________ PHONE __________

8. PERSONNEL ON-SITE

NAME	REPRESENTING	PHONE

9. AUDITOR'S COMMENTS: ______________________________
____
____

10. WEATHER CONDITIONS:

SUNNY PARTLY SUNNY PARTLY CLOUDY CLOUDY RAIN DRIZZLE SNOW SLEET

TEMPERATURE __________ WIND SPEED __________ WIND DIRECTION __________

11. LEVEL OF PERSONNEL PROTECTION REQUIRED IN WORK PLAN

A B C D

LEVEL OF PERSONNEL PROTECTION ACTUALLY DONNED:

A B C D

12. FIELD SURVEY EQUIPMENT:

INSTRUMENT	MODEL	CALIBRATION CHECK	CALIBRATION STANDARD SETTING	SPAN
CONDUCTIVITY METER	______	______	______	______
DISSOLVED OXYGEN METER	______	______	______	______
pH METER	______	______	______	______
COMBUSTIBLE GAS INDICATOR (LEL/O_2)	______	______	______	______
FLAME IONIZATION DETECTOR (OVA)	______	______	______	______
PHOTOIONIZATION DETECTOR (HNU)	______	______	______	______
TOTAL GAS INDICATOR (CO, H_2S)	______	______	______	______
OTHER	______	______	______	______

OBSERVATIONS ______________________________

____

13. DID THE SAMPLING TEAM TAKE PERIODIC SURVEYS OF THE AMBIENT AIR CONDITIONS? YES NO N/A

14. DID THE SAMPLING TEAM PROVIDE A DECON ZONE DESIGNATING CLEAN AND CONTAMINATED AREAS? YES NO N/A

15. WERE PHOTOGRAPHS TAKEN? YES NO

16. AUDITOR'S COMMENTS: ______________________________

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MONITORING WELL SAMPLING SETUP AND EVACUATION

EVACUATION PROCEDURES

1. WELL CASING CONSTRUCTION   STAINLESS STEEL   TEFLON   PVC   OTHER ____________
2. DIAMETER OF WELL CASING   2"   4"   6"   OTHER ____________
3. LOCKING CAPS ON THE WELLS   YES   NO   N/A   PROTECTIVE CASING   YES   NO   N/A
4. METHOD UTILIZED TO DETERMINE THE STATIC WATER LEVEL   WATER LEVEL INDICATOR   OTHER ____________________
5. REFERENCE POINT THAT THE STATIC WATER LEVEL WAS MEASURED FROM:

   SURVEY POINT   TOP OF INNER CASING   TOP OF PROTECTIVE CASING   HEIGHT OF CASING ABOVE GROUND SURFACE

6. WAS THE WATER LEVEL INDICATOR DECONTAMINATED ACCORDING TO STANDARD PROCEDURES BETWEEN EACH WELL?:

   YES   NO   N/A

IF NO, METHOD UTILIZED: ____

____

7. EVACUATION METHOD:

   BAILER   CENTRIFUGAL PUMP   PERISTALTIC PUMP   BLADDER PUMP   SUBMERSIBLE PUMP

   GAS DISPLACEMENT PUMP   GAS LIFT PUMP   OTHER ____________________

8. TYPE OF HOSE UTILIZED:

   POLYETHYLENE (ASTM DRINKING WATER GRADE 2239)   TEFLON   SILASTIC   N/A

   OTHER ____________________ ____________________

9. WAS THE HOSE DEDICATED TO EACH WELL LOCATION?: YES   NO   N/A

   IF NO, METHOD OF DECONTAMINATION ____________________

10. WAS THE PUMP DEDICATED TO EACH WELL LOCATION?:   YES   NO   N/A
11. WAS THE PUMP: LABORATORY DECONTAMINATED   FIELD DECONTAMINATED   N/A
12. WAS THE PUMP DECONTAMINATED ACCORDING TO STANDARD CERCLA PROCEDURES?:   YES   NO

    IF NO, METHOD OF DECONTAMINATION ____________________

13. WAS THE PUMP HEAD OR END OF HOSE WITHIN 6 FEET OF THE DYNAMIC WATER LEVEL DURING EVACUATION?:

    YES   NO   N/A

14. WAS THE DECONTAMINATION AREA LOCATED AWAY FROM THE SOURCE OF CONTAMINATION?:   YES   NO   N/A
15. AUDITOR'S COMMENTS: ____

____

AQUEOUS SAMPLING PROCEDURES

1. AQUEOUS MATRIX SAMPLED:

POTABLE WELL GROUNDWATER SURFACE WATER LEACHATE RUNOFF STORM SEWER

SANITARY SEWER OTHER: ____________________

2. TYPE OF SAMPLE: GRAB COMPOSITE IF COMPOSITE, # SAMPLES/COMPOSITE ____________

3. WAS THE VOA SAMPLE COLLECTED FIRST: YES NO N/A

4. TYPE OF SAMPLING EQUIPMENT:

	MATERIAL OF CONSTRUCTION			
	STAINLESS STEEL	TEFLON	GLASS	OTHER
BAILER	______	______	______	______
BLADDER PUMP	______	______	______	______
SAMPLER	______	______	______	______
COLIWASA	______	______	______	______
KEMMERER DEPTH SAMPLER	______	______	______	______
WHEATON DIP SAMPLER	______	______	______	______
TUB SAMPLER	______	______	______	______
BACON BOMB	______	______	______	______

5. TYPE OF LEADER LINE THAT COMES IN CONTACT WITH THE WELL WATER:

TEFLON TEFLON-COATED STAINLESS STEEL N/A OTHER ____________

6. LENGTH OF THE LEADER LINE: ____________________

7. WAS THE SAMPLING EQUIPMENT DEDICATED?: YES ____________ NO ____________

8. WAS THE SAMPLING EQUIPMENT: LAB DECONTAMINATED FIELD DECONTAMINATED

9. WAS THE SAMPLING EQUIPMENT DECONTAMINATED ACCORDING TO STANDARD PROCEDURES?: YES NO

IF NO, METHOD OF DECONTAMINATION: ____________________

10. WAS THE DECONTAMINATION AREA LOCATED AWAY FROM THE SOURCE OF CONTAMINATION?: YES NO N/A

11. ARE DISPOSABLE GLOVES WORN AND CHANGED BETWEEN EACH SAMPLE LOCATION?: YES NO

12. AUDITOR'S COMMENTS: ____________________

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NON-AQUEOUS SAMPLE INFORMATION

1. NON-AQUEOUS MATRIX SAMPLED:

SOIL SEDIMENT SLUDGE CHEMICAL SOLIDS WASTE PILE

OTHER ____________________

2. TYPE OF SAMPLE: GRAB COMPOSITE IF COMPOSITE, # SAMPLES/COMPOSITE ____________

3. WAS THE VOA SAMPLE COLLECTED FIRST FROM A DISCRETE LOCATION PRIOR TO HOMOGENIZATION?: YES NO N/A

4. WAS THE SAMPLE HOMOGENIZED PRIOR TO ACQUISITION INTO THE SAMPLE CONTAINERS?: YES NO

5. TYPE OF SAMPLING EQUIPMENT:

	MATERIAL OF CONSTRUCTION			
	STAINLESS STEEL	TEFLON	GLASS	OTHER
SPOON/SPATULA	______	______	______	______
TROWEL/SCOOP	______	______	______	______
BUCKET AUGER	______	______	______	______
SPLIT SPOON	______	______	______	______
SHELBY TUBE	______	______	______	______
TRIER	______	______	______	______
PONAR DREDGE	______	______	______	______

6. WAS THE DRILL RIG, AUGER FLIGHTS, RODS, ETC. DECONTAMINATED ACCORDING TO STANDARD PROCEDURE BETWEEN EACH SAMPLE LOCATION?:
YES NO N/A

IF NO, METHOD OF DECONTAMINATION ____________________

7. IF MUD ROTARY DRILLING WAS UTILIZED WHAT WAS THE SOURCE OF THE WATER?: ____________

8. WAS THE SAMPLING EQUIPMENT DEDICATED?: YES ________ NO ________

9. WAS THE SAMPLING EQUIPMENT: LAB DECONTAMINATED FIELD DECONTAMINATED

10. WAS THE SAMPLING EQUIPMENT DECONTAMINATED ACCORDING TO STANDARD PROCEDURES?: YES NO

IF NO, METHOD OF DECONTAMINATION: ____________________

11. WAS THE DECONTAMINATION AREA LOCATED AWAY FROM THE SOURCE OF CONTAMINATION?: YES NO N/A

12. ARE DISPOSABLE GLOVES WORN AND CHANGED BETWEEN EACH SAMPLE LOCATION?: YES NO

13. AUDITOR'S COMMENTS: ____________________

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QA/QC INFORMATION

1. LABORATORIES:

NAME ______________________ PHONE __________

NAME ______________________ PHONE __________

CONTACT PERSON ______________________

CLP   CLP CAPABLE   CERTIFIED   OTHER ______________

2. SAMPLE INFORMATION:

MATRIX	PARAMETER	PRESERVATIVE	CONTAINER DESCRIPTION

3. WHAT ORDER, BY ANALYTICAL PARAMETER, ARE SAMPLES COLLECTED: ______________

4. FIELD BLANKS: YES   NO   N/A   FREQUENCY ______________

METHOD: ______________________

WAS IDENTICAL BOTTLE TO BOTTLE TRANSFER OF WATER UTILIZED?:   YES   NO

5. TRIP BLANKS: YES   NO   N/A   FREQUENCY ______________

6. WHAT WAS THE SOURCE OF THE BLANK WATER?:   LABORATORY DEMONSTRATED ANALYTE-FREE OTHER ______________

7. SAMPLE PACKAGING AND HANDLING:

SAMPLE CONTAINERS LABELED	YES	NO	N/A
COC FORMS COMPLETED	YES	NO	N/A
CUSTODY SEALS	YES	NO	N/A
SAMPLES PRESERVED TO 4°C:	YES	NO	N/A

8. AUDITOR'S COMMENTS:

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MALCOLM PIRNIE

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APPENDIX

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RECYCLED PAPER

APPENDIX D

VARIANCE REQUEST SOP AND FORMS

Malcolm Pirnie, Inc.
ARCS II QA Program
Standard Operating Procedure

Procedure MP-PMOQA-009 1/92
Date: January 8, 1992
Revision No. 1
Prepared by: Lisa Szegedi
Fred Loneker
Revised By: Fred Loneker
Approved by: Alan Greenlaw

Title: Procedures for Requesting Modification in the Working Documents of a Remedial Investigation/Feasibility Study (RI/FS).

I. Introduction

Variances may become necessary during the course of field investigations as site conditions dictate. Therefore, modifications of the work plans are required to conduct work efficiently without jeopardizing data quality. The purpose of this SOP is to outline the procedures and documentation required for requesting work plan variances.

II. Methods and Procedures

The general steps in the variance process are as follows:

A. When the need for a modification of a project work plan arises, a Variance Request Form must be completed. This form should contain the date of the request, the document to be revised (with page reference), and a detailed description of necessary changes as well as the rationale supporting the modifications. Variance Request Forms are to be completed and signed by the Site Manager.

B. Completed Variance Request Forms must be forwarded to the USEPA Work Assignment Manager (WAM) for approval. A letter summarizing the proposed changes should accompany the request forms.

C. The WAM will review the request forms either approving or amending the proposal. Revisions made by the WAM to the variance request should be incorporated into the original request form, with updated copies being forwarded to the WAM for documentation purposes.

D. The finalized request form should be appended to the affected document and modifications implemented.

VARIANCE REQUEST FORM
(Example)

Date: January 8, 1991

Document: Field Sampling Plan, July 1991, (p. 5-23)

Activity: Well Development

Requested Modification: Delete well development for monitoring well MW-2S.

Rationale: A Non-Aqueous Phase Liquid (NAPL) has been detected in monitoring well MW-2S. The NAPL contains up to 6 percent PCB. In order to avoid generating waste from well development which may require off-site disposal, it is recommended that MW-2S not be developed or purged prior to sampling.

MPI Field Team Leader: ______________________________

MPI Site Manager: ______________________________

Remedial Project Manager: ______________________________

c: D. Stainken
K. Krishnaswami

VARIANCE REQUEST FORM

Date:

Document:

Activity:

Requested Modification:

Rationale:

MPI Field Team Leader: ______________________________

MPI Site Manager: ______________________________

Remedial Project Manager: ______________________________

c: D. Stainken
K. Krishnaswami