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International Specialists in the Environment
720 Third Avenue, Suite 1700
Seattle, Washington 98104
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March 30, 2010

Mr. Larry Beck
Bureau of Land Management, Anchorage Field Office
4700 BLM Road
Anchorage, AK 99507
via e-mail: Larry_Beck@ak.blm.gov

RE: Final Project Management Plan, Red Devil Mine RI/FS

Dear Mr. Beck:

Please find enclosed the final Project Management Plan (PMP) for the Red Devil Mine RI/FS project. This final PMP incorporates review comments on the draft document made by BLM and the Alaska Department of Environmental Conservation (ADEC). ADEC's review comments were discussed with Anne Marie Palmieri on March 18, 2010. Resolution of ADEC comments is provided in the attached Review Comment table.

This submittal completes the deliverable requirements for Task 1 of the contract. Please call me at (206) 624-9537 if you have any questions.

Sincerely,

William Richards
Project Manager

REVIEW COMMENTS			
PROJECT: BLM Red Devil Mine			**DOCUMENT:** Draft Project Management Plan
DATE: 03/15/10	**REVIEWER:** Anne Marie Palmieri		**PHONE:** (907) 766-3184
Item No.	**Location (page, par., sen.)**	**COMMENTS**	**Contractor Response**
1.	Acronyms	GRO/GTEX – should this be BTEX?	Comment accepted. GTEX will be changed to BTEX.
2.	Section 2, para 1, line 3	Remove "as appropriate" at the end of the sentence.	Comment accepted.
3.	Section 3.3, para 3, line 2	Change: "…ADEC water quality standards in surface water and ground water…" to "…ADEC water quality standards in surface water and groundwater cleanup levels in ground water…"	Comment accepted.
4.	Figure 2, Site Map	Include the 3rd settling pond. Extend the boundaries of the Main Mine Processing Area to include the gravel storage pad or denote it separately as there is contamination present there as well. It should be recognized that sampling will need to occur in areas outside those designated as the 'Settling Ponds' and 'Main Mine Processing Area'.	Comment accepted. 3rd settling pond will be added. Orange boundary surrounding "Main Mine Processing Area" already includes the "gravel storage pad"; it is the area under the label words "Main Mine". Orange boundary will be extended south to include the power plant area. It should be noted that the RI/FS investigative activities will not be limited to the features shown on this map.
5.	Section 5, para 1, line 3	Remove "as appropriate" at the end of the sentence.	Comment accepted.
6.	Section 5.0, para 3, line 4	Suggest replacing "waste" with "substances".	Comment accepted.
7.	Section 5.0, para 3	Include a statement that the Site Cleanup Rules of 18 AAC 75.325-.990 are ARARs and will be followed.	Comment accepted.
8.	Section 6	It would be good to have a short narrative description of the role that each of these people will play – what is the difference in role for the BLM staff – project manager, project inspector, field office manager? Similar to the descriptions of E&E staff in Section 8.	Comment accepted. BLM will provide to E & E for inclusion in the PMP. See attached BLM Key Staff Narrative.
9.	Section 6, Tables 1 and 2	Please correct the spelling of my name and email address.	Comment accepted.
10.	Section 8	It would be beneficial to add a statement clarifying that none of the E&E staff who will be working on the RI/FS were involved in the EPA HRS development.	Comment accepted.

REVIEW COMMENTS			
PROJECT: BLM Red Devil Mine			**DOCUMENT:** Draft Project Management Plan
DATE: 03/15/10	**REVIEWER:** Anne Marie Palmieri		**PHONE:** (907) 766-3184
Item No.	**Location (page, par., sen.)**	**COMMENTS**	**Contractor Response**
11.	Section 8, Figure 3	1) Vivian Melde is listed as key staff in the organizational chart but not in the narrative. 2) Include a statement about the subcontractors in the narrative; i.e. roles they fill and lines of communication. It would also be beneficial to add an analytical laboratory in here as well.	Comment accepted. V. Melde's role will be added to the narrative. Lines of communication with all subcontractors will be added to the narrative.
12.	Section 9	Schedule needs to be updated.	Comment accepted. The updated schedule will be included in the final PMP.
13.	Section 10.2, Technical Reports	1) This section should specify how the external reviewers will receive the draft reports; i.e. will those come through BLM or E&E directly. 2) The review process should also include a formal comment resolution meeting (teleconference) unless determined to be unnecessary by the reviewing agencies. 3) This section should state that the RI/FS work plan will not be implemented until it has been approved by ADEC, per 18 AAC 75.335(b). 4) Hasn't the RI/FS Report option been funded? If so, please modify this paragraph.	1) Comment accepted. BLM will make distribution of all draft plans and reports for external review and comment. External review comments will be provided back to BLM directly. 2) Comment accepted. 3) Comment Accepted 4) RI/FS Report will be funded when the Work Plan is complete and actual costs are better known.
14.	Appendix A	ADEC provided significant verbal comments regarding the E&E Technical Approach during the October 9th meeting. It appears that the E&E Technical Approach document that is included in the PMP is the same one originally submitted to BLM which does not address any of the ADEC comments/issues. How do you plan to capture those comments and responses? I have not seen any responses to the comments but assume that now that work is proceeding again that responses will be forthcoming in a timely manner – correct? Please advise if you need me to resubmit those in a written format.	Appendix A includes the scope of work for which the current contract is based. The technical approach for the RI/FS will be modified as the study design is developed for the Work Plan. A statement will be made to this effect in the PMP. BLM requests that ADEC submit written comments provided verbally during the October 2009 meeting.
15.		--end--	

FINAL
Project Management Plan
Red Devil Mine
Remedial Investigation/Feasibility Study

March 2010

Prepared for:

BUREAU OF LAND MANAGEMENT
Anchorage Field Office
4700 BLM Road
Anchorage, Alaska 99507

Prepared by:

ECOLOGY AND ENVIRONMENT, INC.
368 Pleasant View Drive
Lancaster, New York 14086

Table of Contents

Table of Contents (cont.)

Appendix **Page**

List of Tables

List of Figures

List of Abbreviations and Acronyms

Item	Definition
ADEC	Alaska Department of Environmental Conservation
AFO	Anchorage Field Office
ANCSA	Alaska Native Claims Settlement Act
AQL	Acceptable Quality Level
ARARs	Applicable and Relevant or Appropriate Requirements
ATV	all-terrain vehicle
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIP	Community Involvement Plan
COCs	Contaminants of Concern
COR	Contracting Officer's Representative
DOI	Department of the Interior
DRO/RRO	diesel range organics/residual range organics
E & E	Ecology and Environment, Inc.
EPA	(U.S.) Environmental Protection Agency
ESRI	Environmental Systems Research Institute
GIS	Geographic Information System
GPS	Global Positioning System
GRO/BTEX	gasoline range organics/benzene, toluene, ethylbenzene, xylenes
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations
IDW	Investigation Derived Waste
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
OSHA	Occupational Health and Safety Administration
pdf	Portable Document Format
PI	Project Inspector
PMP	Project Management Plan
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
RDM	Red Devil Mine
redox	reduction-oxidation reaction
RI/FS	Remedial Investigation/Feasibility Study
SPLP	Synthetic Precipitation Leaching Procedure
TAL	Target Analyte List
XRF	X-ray fluorescence

1 Introduction

This Project Management Plan (PMP) addresses the procedures and process for implementation of a Remedial Investigation/Feasibility Study (RI/FS) at the Red Devil Mine (RDM) in Alaska. This PMP is intended to be a "living" document and will be modified as necessary during execution of the RI/FS. The PMP is based on the Bureau of Land Management (BLM) Project Management Handbook (H-1703-4), on information contained in the BLM scope of work for the RDM RI/FS, and on the proposal prepared by Ecology and Environment, Inc., (E & E) for the Red Devil Mine RI/FS contract. The scope of the RI/FS which forms the technical basis of the contract between BLM and E & E is provided in Appendix A of this document. The technical approach and scope of the RI/FS will be modified as the study design is developed in consultation with the Alaska Department of Environmental Conservation (ADEC), the Environmental Protection Agency (EPA), Region 10, and other relevant stakeholders.

2 Project Goals and Objectives

The purpose of the project is to complete an RI/FS at RDM consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and State of Alaska laws, procedures, and guidance. The objectives of the RI/FS are to:

- Determine the nature, extent, and transport of site-related hazardous substances at RDM;
- Determine the risks to human health and ecological receptors from site-related hazardous substances at RDM; and
- Develop remedial alternatives for the site that will reduce any unacceptable site-related risks to acceptable levels.

The long-term goal for RDM is to implement appropriate site remedies and perform sufficient monitoring to document that the site has been cleaned up to the extent practicable and to the satisfaction of ADEC and EPA, Region 10. The RI/FS is a major step toward achieving this long-term goal.

Following site cleanup, the site lands will be conveyed by BLM to The Kuskokwim Corporation (surface estate) and the Calista Corporation (subsurface estate) under the terms of the Alaska Native Claims Settlement Act (ANCSA).

3 Site Description, Background, and History

3.1 Site Setting

The RDM is an abandoned cinnabar mining and mercury retort site. The mine was once the leading mercury producer (mine and retort) in Alaska. The site is approximately 250 air miles west of Anchorage, 75 air miles northeast of Aniak, and 1,500 marine/river barge miles from Anchorage (Figure 1). The legal description for the site is:

Township 19 North, Range 44 West, Southeast Quarter of Section 6, Sleetmute D-4 Quadrangle, Seward Meridian.

Its approximate coordinates are 61° 45' 38.1" north latitude and 157° 18' 42.7" west longitude (NAD 27).

The RDM is in a remote location with no road or rail connection to any community. Access to the site is from boat/barge on the Kuskokwim River or by means of an airstrip at the nearby village of Red Devil.

The RDM is located in the upper Kuskokwim River Basin and lies in a climatic transition between the continental zone of Alaska's interior and the maritime zone of the coastal regions. Average temperatures can vary from -7 to 65 degrees Fahrenheit. Annual snowfall averages 56 inches, with a total mean annual precipitation of 18.8 inches of water.

The topography nearest the site consists of rolling hills that are heavily vegetated. The Red Devil Creek is a tributary of the Kuskokwim River. The creek flows through the RDM and some of its tailings before reaching the Kuskokwim River, which is approximately 0.3 miles to the north.

The RDM lies on the southwest flank of the Sleetmute anticline along the Red Devil Fault Zone. The majority of the displacements are right lateral strike slip. The mineralization occurs as cinnabar and stibnite, as well as associated sulfides bearing epithermal vein deposits hosted in the Cretaceous Kuskokwim Formation (an interbedded greywacke-mudstone-shale sequence). Unconsolidated alluvial/colluvial deposits and/or tailings material underlie portions of the mine site and overlie the Kuskokwim Formation (bedrock).

3.2 Operational History Summary

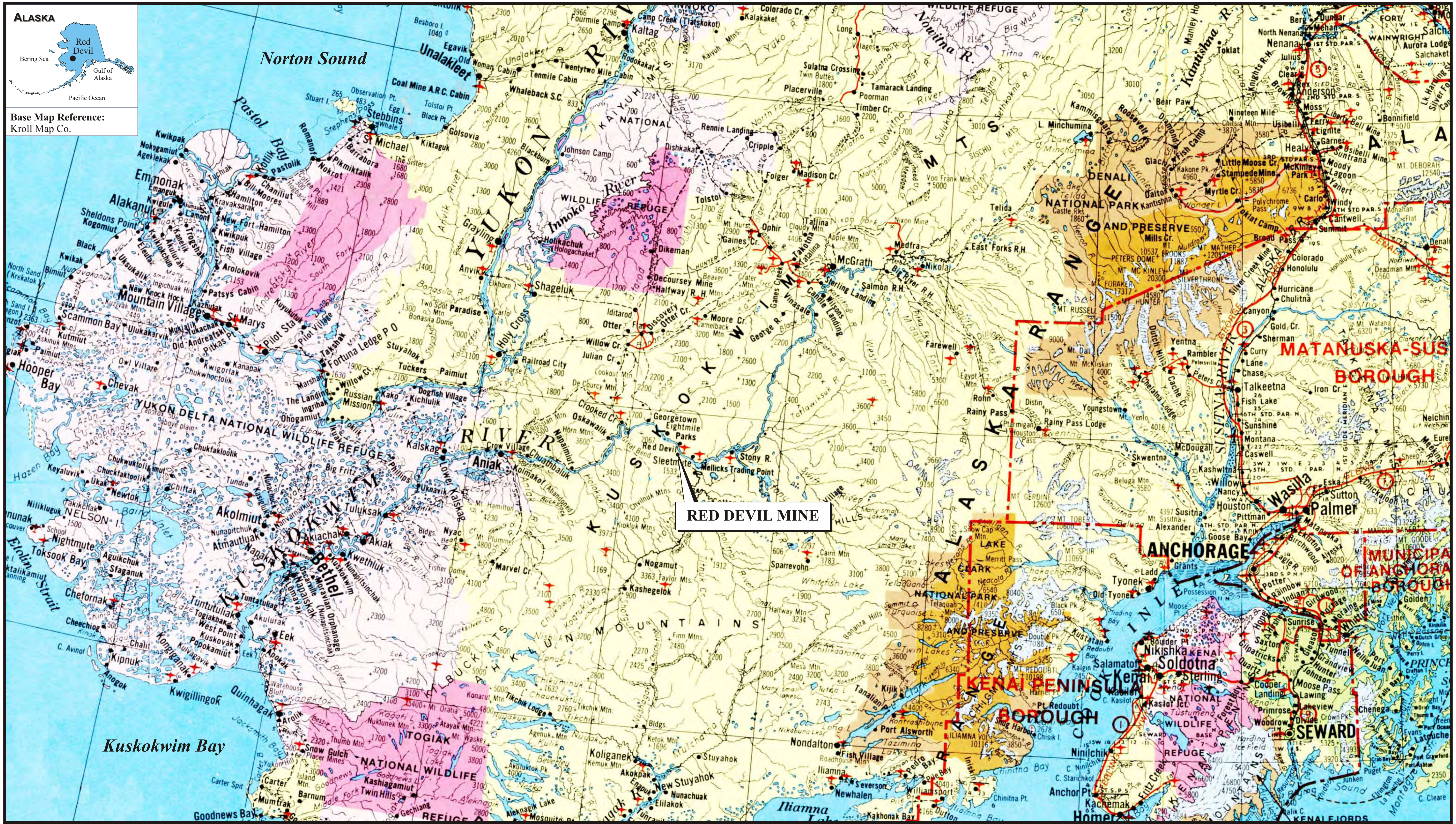
The mine was first opened in the 1930s and closed in 1971. During the mid-1950s, RDM was a leading producer of mercury. Underground mine workings consist of approximately 9,500 feet of shafts, adits, drifts, crosscuts, and stopes. Except for three concrete slabs poured during the early 1940s, all of the associated above-ground mining structures have been removed. Figure 2 illustrates the general site features. More detailed maps of current and historical site features will be presented in the RI/FS Work Plan.

3.3 Previous Environmental Investigations

RDM has been a subject of numerous environmental investigations since 1989. Based on the results of these previous investigations, the ADEC and EPA are requesting that BLM further characterize the RDM using the RI/FS process, with the expectation that additional remedial action(s) will be necessary.

The focus of the BLM since 2001 has been characterization and demolition of the post-1956 "modern" retort, characterization of pre-1956 historical retorting operations, and investigation of petroleum releases from above-ground storage tanks and associated soil removal. BLM has continued groundwater monitoring of five shallow monitoring wells installed as part of the "modern" retort facility cleanup project, and has monitored these wells annually since 2003.

These previous investigations have shown that arsenic, antimony, lead, and mercury exist above ADEC water quality standards in surface water and ground water cleanup levels in groundwater at the site. The results of soil and tailing analyses suggest that multiple sources of these metals may be present, and their spatial delineation and associated risk will be investigated by this RI/FS. The strategy of this RI/FS will be based on the findings of previous investigations and the recognition of existing data gaps.



ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

0 40 80
Approximate Scale in Miles

RED DEVIL MINE
Red Devil, Alaska

Figure 1
SITE LOCATION MAP

Date:	Drawn by:	
10/1/09	AES	10:001096OX70.01\fig 1

Mine Entrance Road
Red Devil Creek
Settling Pond
Petroleum AST Area
Main Mine Processing Area

RED DEVIL MINE

Red Devil, Alaska

Figure 2
Site Map

0 50 100 200 300 400
Feet
0 15 30 60 90 120
Meters
Scale 1:2,400

N

4 Programmatic Framework

The primary source of funding for this project is the Central Hazmat Fund of the Department of the Interior (DOI). Other sources are BLM's Special Cleanup Fund and BLM Alaska's annual Hazard Management and Resource Restoration base funding.

5 Regulatory Framework

The RDM RI/FS is being conducted pursuant to CERCLA, or Superfund. In addition, the RI/FS will comply with State of Alaska laws, procedures, and guidance.

Executive Orders 12580 and 13016 delegate authority and responsibility of CERCLA (Superfund) to the Secretary of the DOI for the response to actual or potential releases of hazardous substances on or affecting public lands administered by the DOI. Secretarial Order 3201 further delegates certain provisions of CERCLA to the BLM director and state directors. The implementation of this CERCLA authority is also pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Under this authority the BLM is continuing a CERCLA response to releases of hazardous substances at the RDM.

Applicable and Relevant or Appropriate Requirements (ARARs) for the RDM RI/FS will be established in the RI/FS Work Plan. ARARs generally include federal and state regulations addressing water quality and management of hazardous substances. Alaska Site Cleanup Rules of 18 AAC 75.325 through 75.990 will be identified as ARARs in the Work Plan.

6 Organizational Structure

Table 1 summarizes the government organizational roles for completion of the RDM RI/FS. Contact information for key project staff and agency personnel is presented in Table 2.

The Red Devil Mine project receives management, technical, administrative, and financial support from many levels and activities within US Department of Interior and the subordinate Bureau of Land Management. The duties and responsibilities of key staff for this project at the working level are discussed below.

Project Manager (PM): BLM employee who serves as the Red Devil Mine RI/FS Remedial Project Manager as described by 40 CFR 300. The PM is the Red Devil Mine RI/FS project team leader and is responsible for planning, organizing, budgeting, scheduling, coordinating, directing, and controlling the combined efforts of staff, and contract services to accomplish project objectives. The PM is involved in all phases of the project from problem definition through project design, implementation, and close out. The PM serves as BLM's direct link with regulatory agencies providing oversight of the project, such as the Alaska Department of Environmental Conservation and the Environmental Protection Agency.

Contracting Officer (CO): The CO is the BLM employee who has the authority to enter into, administer, or terminate contracts and make related determinations or findings. The CO may bind the Government only to the extent or the authority delegated to them. The CO may not be a subject matter expert for the goods or service covered by a given contract, therefore the CO may appoint BLM employees who have subject matter specific technical knowledge, skills, and abilities as a Contracting Officer's Representative (COR) and/or Project Inspector (PI) to assist in administering a contract. For this project the BLM has contracted with Ecology & Environment, Inc. to perform an RI/FS at the Red Devil Mine and the CO has appointed a COR.

Contracting Officer's Representative (COR): BLM employee appointed in writing by the Contracting Officer (CO) to represent him/her for project specific technical matters that affect the contract(s), and for contract administration duties and authorities assigned by the CO. Duties and authorities may include but are not limited to: Shall advise the CO of any unusual problems affecting the

progress or cost of the contract(s). Respond to the contractor's inquiries on purely technical aspects of the contract(s). Review contractor's progress reporting to determine if there has been technical and/or physical progress commensurate with the level of expenditures. And inspect deliverables for conformance with the contract work statement and specification requirements and make acceptance or, reject for cause, such deliverables.

Project Inspector (PI): BLM employee appointed by the CO to inspect deliverables, recommend acceptance or rejection, and assist the CO in evaluating contractor's reply to rejection notifications. PI is the term applied by BLM for the BLM employee who monitors and inspects the contractor's work in the field. The PI will assist the COR in performing his/her duties, but may not be delegated authority or responsibility by the COR. A PI may or may not be the same person as the COR. As of the publishing of this PMP, the CO has not appointed a PI separate from the COR for this project.

BLM Alaska State Office Program Lead (Hazmat): Provides interface between the PM and BLM Alaska State Office, BLM Washington Office, and Department of Interior. Monitors progress of the project for the BLM Alaska State Director. Provides subject matter technical information and advice to the BLM State Director and Managers. Responsible to advocate for and coordinate critical program activities such as funding requests and project nominations for annual appropriations, BLM's Special Cleanup Fund, and Department of Interior's Central Hazmat Fund.

BLM Anchorage Field Manager: The Field Manager is responsible for all aspects of the management of the public lands within his jurisdiction; the public lands within the Anchorage Field Office boundaries. The Field Manager is responsible to conduct consultation with the Natives who live within the boundaries of Anchorage Field Office administered or managed lands regarding all BLM actions which affect those lands. The Red Devil Mine is within the lands managed by the Anchorage Field Office and is selected for conveyance to The Kuskokwim Corp (surface estate) and Calista Corp. (subsurface estate). The Field Manager is responsible to make all final determinations for federal actions which affect these lands, to include authorizing expenditure of public monies for the contracts to conduct this project.

EPA and ADEC Point of Contact: These persons are the regulatory oversight primary points of contact for the Alaska Department of Environmental Conservation and US Environmental Protection Agency.

Table 1 Organizational Structure

Agency	Department/Division	Name	Role
BLM	Alaska State Office	Paul Krabacher	State Office Program Lead (SOPL)
BLM	National Operations Center	Kris Doebbler	Project Manager (acting)
BLM	Anchorage Field Office	Larry Beck	Contracting Officer's Representative (COR)
BLM	Anchorage Field Office	Jim Fincher	Field Manager
BLM	National Operations Center	Cheryl Flanagan	Contracting Officer
ADEC	Spill Prevention and Response Program	Anne Marie Palmieri	ADEC Point of Contact
EPA	Office of Environmental Cleanup	Ken Marcy	EPA Point of Contact

Table 2 Contact Information

Name	Role	Telephone	E-mail
Paul Krabacher	BLM SOPL	(907) 271-3266	paul_krabacher@blm.gov
Kris Doebbler	BLM Project Manager (acting)	(303) 236-3350	kris_doebbler@blm.gov
Larry Beck	BLM COR	(907) 267-1226	larry_beck@blm.gov
Jim Fincher	BLM Field Manager	(907) 267-1248	james_fincher@ak.blm.gov
Cheryl Flanagan	BLM Contracting Officer	(303) 236-3534	cheryl_flannagan@blm.gov
Bill Richards	E & E Project Manager	(206) 624-9537	wrichards@ene.com
Rick Rudy	E & E Principal in Charge	(303) 443-3282	rrudy@ene.com
Bryan Lund	Marsh Creek Project Manager	(907) 258-0500	bryan.lund@marshcreek.com
Anne Marie Palmieri	ADEC Point of Contact	(907) 766-3184	annemarie.palmieri@alaska.gov
Ken Marcy	EPA Point of Contact	(206) 463-1349	marcy.ken@epa.gov

7 Statement of Work

The statement of work issued by BLM to E & E is presented below. E & E's response to the statement of work as presented in our proposal dated September 1, 2009, is included as Attachment A to this PMP for completeness.

The Contractor shall furnish all personnel, equipment, supervision, transportation, supplies, and incidentals to perform all work necessary for completion of the tasks issued in this SOW. It should be noted that a review and comment period shall occur for each deliverable. This review and comment process shall consist of both contract consistency review (BLM review) and agency (ADEC, EPA and BLM) draft deliverables. Each draft will require a response to comments. For clarity, the response to comments shall consist of a format that contains page, line or sentence number, and discussion with proposed resolution of the issue/comment. An electronic copy of the draft and final document deliverables shall be provided in a Portable Document Format (pdf) and Word 2007 format. Each deliverable shall be Rehabilitation Act Section 508 compliant. In addition, 10 bound hardcopies of each draft and final deliverable shall be provided to the BLM on the delivery date specified for each task. All final tables and graphs of analytical data shall also be provided in Excel 2007 format. All Geographic Information System (GIS) data and its supporting shape files shall be provided in Environmental Systems Research Institute (ESRI) compatible electronic format or as agreed upon by the BLM if the Contractor doesn't currently use ESRI software.

BLM will have available, as Government Furnished Equipment, a Niton XL 3t 600 Environmental Analyzer (XRF) for metals screening for this project. The equipment is located at the Anchorage Field Office. The XRF will be signed-out to the contractor prior to mobilization. The contractor shall provide its own trained operator, and shall maintain and repair the XRF before return to BLM.

Execution of this project shall comply with National Environmental Policy Act (NEPA) policy by preventing and controlling invasive non-native plant and noxious weed introduction or spreading per Executive Order 13112. Contractor shall practice the standard practice of decontaminating all equipment and personnel before departing from a hazmat site. The contractor shall thoroughly clean all vehicles, transport equipment used in access and construction and Personal Protective Equipment (PPE) used by the onsite crew prior to moving equipment across or onto BLM managed lands to ensure it is weed and weed seed free. Contractor's cleaning shall include high pressure washing where practical to

treat the insides of bumpers, wheel wells, undercarriages, inside belly plates, excavating blades, buckets, tracks, rollers, drills, buckets, shovels, any digging tools, and any other equipment to remove potential weeds and weed seed carrying soil, greasy dirt, and vegetative material.

Field work at the project site shall be done in presence of the BLM Alaska Field Office (AFO) Project Inspector (PI). The contractor shall transport the BLM Project Inspector's 4-wheeler all-terrain vehicle (ATV, 650# shipping weight) into and out of the Site along with the contractor's equipment. Because commercial supply of fuel is not available at Red Devil Village, the contractor shall include, along with fuel for the contractor's equipment, 1.5 gallons of unleaded gasoline per day of mobilization for the PI's vehicle.

No Investigation Derived Waste (IDW) or other debris generated during this project shall be placed in the local Red Devil landfill.

Prior to making contracts on lands subject to selection pursuant to section 19(b) of the Alaska Native Claims Settlement Act, the BLM is required to obtain the consent of the representatives of the Natives living on those lands (43 CFR 2650.1). The RDM is located within land that is a priority selection for the Sleetmute Village Townsite (The Kuskokwim Corporation). The BLM considers making reasonable use of locally available assets such as labor and equipment to be critical to accomplishing conveyance of the land. Many individuals and community organizations within or near Red Devil Village have a limited inventory of equipment, trained operators, lodging, and local river transportation assets which may be helpful in accomplishing this project.

Task 1 – Project Management Plan

The Project Management Plan (PMP; this document) is a written document designed to cover all project activities; from start to completion. It documents all of the procedures and process that are in effect throughout the life–span of the project in order to ensure its coordinated and successful completion. The contractor shall develop this PMP consistent with but not limited to the BLM's Project Management Handbook H-1703-4. In general, the PMP provides, but is not limited to, detailing all of the administrative objectives and regulations, procedures, sequences and schedule for the accomplishment of all work associated with the completion of the various tasks; including the projected/estimated time necessary to complete the steps of the RI/FS. The plan shall also include details as to lines of communication and contact information; qualitative statements of the methods and procedures, and reference to the work plans that will be used; and sequence of operations for all activities associated with tasks or work specified. The PMP shall also provide proof of employee training, proof of up-to-date contractor liability insurance; proof that up-to-date liability insurance will remain in effect for the duration of the contract; organizational charts for the company and its subcontractor(s); and lists of subcontractors used and their Quality Assurance/Quality Control Procedures. The PMP shall provide a statement of qualifications of the contractor employees who

will be responsible for conducting this project, with emphasis on experience working on CERCLA RI/FS projects.

The plan shall also address the need to maximize the use of local labor and equipment for the duration of the project. In addition, it shall also address site control methods to prevent the spread of any contamination beyond site boundaries. It shall address contractor's control of the flow of personnel, vehicles, and materials into and out of the work area. Project coordination meetings shall be held as necessary. The purpose of these meetings is to discuss findings of the field investigations/studies, discuss comments on deliverables, and cover technical aspects of the project. The contractor shall generate a meeting summary report for each meeting. It is expected that the project manager and no more than two key staff shall be present at these meetings.

In addition to coordination meetings, contractor shall hold weekly teleconferences between the BLM and contractor's project manager. The purpose of these calls shall be to discuss recent developments and planned activities, problems encountered, problem resolution, and project schedule and budget status. For the purpose of this cost estimate, it is assumed this project will cover two (2) or more fiscal years of Federal funding.

Performance Standard, Acceptable Quality Level (AQL) and Method of Monitoring for Task 1 are as follows:

Performance Standard	Acceptable Quality Level (AQL)	Method of Monitoring
Contractor shall meet the defined deadlines in developing the Final Project Management Plan (PMP)	COR has documents in-hand on agreed dates for deadlines	Direct COR contact and BLM customer feedback

Task 2 – RI/FS Work Plan

The contractor shall prepare a RI/FS Work Plan that is (1) capable of delineating and documenting the nature and extent of contamination at the RDM site; (2) that is capable of determining the concentrations of naturally-occurring background metals; and (3) that includes a risk assessment plan to determine and document the associated human health and ecological risk caused by this contamination including subsistence and bio-availability issues. The RI/FS shall follow and reference all pertinent guidance documents and manuals of the ADEC, EPA and the BLM in order to implement a successful RI/FS. In general, the RI/FS work plan shall define all of the objectives and information expectations, and shall include detailed descriptions of the strategies, tasks, and procedures necessary for its implementation. The RI and the FS are interactive and, to some degree, may be conducted concurrently. Thus, the data objectives in the RI are influenced by the development of remedial alternatives in the FS, which in turn affects the RI data needs and the scope of any potential treatability study. The RI/FS work plan

and report shall utilize the historical RDM data as needed to achieve the RI/FS objectives.

Site-specific facts exist that shall be recognized and integrated into the scope of the RI/FS. These details are: the Contaminants of Concern (COCs) have been determined to be As, Hg, methylmercury (MeHg), Sb and Pb in all media except air. The air pathway isn't to be considered in the scope of this RI/FS. Nickel (Ni) and Copper (Cu) are to be added to a few of the smaller source areas. Analysis of full Target Analyte List (TAL) may need to be performed on a selected number of samples (10%) in order to fully document their presence, particularly for determining the impacts to aquatic life. In addition, the constituents of cinnabar concentration by floatation process compounds shall be considered for a few of the source areas.

Due to the nature of the COCs, the RI/FS shall include an effort to determine the bio-availability and subsistence issues of As, Sb, Hg, MeHg, and possibly Pb. In addition, a detailed background characterization plan shall also be included under this task. The background characterization plan shall follow EPA guidance to determine what is naturally shed into the environment by the local mineral deposit.

Field screening using a portable X-ray fluorescence (XRF) shall be incorporated into the characterization strategy and methods. The BLM will make available to the contractor a field portable XRF. BLM will have available, as Government Furnished Equipment, a Niton XL 3t 600 Environmental Analyzer for metals screening for this project. The equipment is located at the Anchorage Field Office. The XRF will be signed-out to the contractor prior to mobilization. The contractor shall provide own trained operator. The contractor shall maintain and repair the XRF before returning it to the BLM in as good a condition as when it was furnished to the contractor.

Ancillary deliverables to be generated within this Task include the development of a topographic map that has an accurate 2ft contour interval and is based upon NAD 83 latitude-longitude and decimal degree. All products prepared under this Task Order shall be based upon this metadata. Aero-Metric's office in Anchorage, AK has suitable data for the preparation of this product. The 2ft contour interval shall cover the area of the RDM source areas and potential remediation areas, and can be no greater than a 5 ft to 10 ft contour interval (preferably 5ft) in surrounding area such as the background study area (Fig 2). This map shall be improved upon by the contractor after the implementation of the RI/FS field work (Task 3) by the inclusion of the coordinate information collected at each sample location. A professional grade (less than 1 ft in all dimensions) Global Positioning System (GPS) shall be used to record the location of all samples collected for the RI/FS. Under separate cover, a cost estimate for the implementation of this Work Plan shall accompany the deliverable of the draft and final RI/FS Work Plan deliverables.

The contractor shall follow the appropriate ADEC, BLM and EPA guidance documents and manuals to complete this RI/FS.

Performance Standard, Acceptable Quality Level (AQL) and Method of Monitoring for Task 2 are as follows:

Performance Standard	Acceptable Quality Level (AQL)	Method of Monitoring
Contractor shall meet the defined deadlines in developing the Final FI/FS Work Plan	COR has documents in-hand on agreed dates for deadlines	Direct COR contact and BLM customer feedback

Task 3 – Implementation of RI/FS Work Plan

The contractor shall implement the work plan developed in Task 2. The exact scope of this effort (Task 3) cannot be defined at this time by this SOW because it is contingent upon the strategies and objectives to be detailed and approved in the RI/FS work plan (Task 2). The following example quantities are intended to be designated in the RI/FS Work Plan (Task 2):

- Fifteen (15) groundwater monitoring wells installed, developed and sampled according to ADEC and EPA methods. The samples will be analyzed for the COCs of As, Pb, Hg, MeHg, and Sb. The contractor shall propose the analytical methods for each COC. Two wells will be sampled for As and Hg specification, and TAL for both total and dissolved constituents.

- Sixty (60) soil borings shall be drilled to the top of bedrock (assumed average depth of 30 ft) and sampled for the COCs. The contractor shall assume that the average of three (3) samples will be collected from each boring and analyzed in the following item below. XRF screening shall be used to prioritize the samples selected for laboratory analysis.

- The contractor shall analyze 180 soil samples collected from the borings for the COCs of As, Pb, Hg, MeHg, and Sb. The contractor shall propose the analytical methods for each COC. In addition 10% shall be analyzed for the full Target Analyte List (TAL).

- Synthetic Precipitation Leaching Procedure (SPLP) by EPA method 1312 shall be used to analyze an estimated 10% of the total number collected in order to establish information regarding the leachability of the COCs from the mine waste.

- Speciation of As and Hg for bio-availability objectives shall be analyzed for 10% of the samples.

- Forty (40) surface soils shall be collected for background and contaminant delineation that may not be collocated with a borehole location. These samples shall be analyzed for the COCs. Ten per cent (10%) of these samples shall be analyzed for the As and Hg speciation and TAL objectives.

- Twenty (20) surface water and twenty (20) sediment samples shall be collected and analyzed using EPA methods. The samples shall be collected in Red Devil Creek, a background creek, and the Kuskokwim River. Discharge measurements shall be collected were necessary. These samples shall be analyzed for the COCs and 10% of these samples shall be analyzed for the TAL metals.

Performance Standard, Acceptable Quality Level (AQL) and Method of Monitoring for Task 3 are as follows:

Performance Standard	Acceptable Quality Level (AQL)	Method of Monitoring
Contractor shall provide firm-fixed-pricing to implement the RI/FS Work Plan as defined herein – along with firm fixed pricing for additional units	COR has documents in-hand to allow firm fixed pricing of this task based on estimated quantity	Direct COR contact and BLM customer feedback
RI/FS Work Plan Delivered and Implemented	Fully developed and performed based accurately on Task 2 results	Direct COR contact and BLM customer feedback

Task 4 – 2009 Groundwater Sampling from Existing Monitoring Wells and Surface Water Sampling.

The contractor shall sample the five existing groundwater monitoring wells and collect five surface water samples once before onset of winter 2009-2010 for the COCs following EPA and ADEC methods. Well #3, Well #6, and the surface water station nearest the delta shall also be sampled for diesel range organics/residual range organics (DRO/RRO) and gasoline range Organics/GTEX (GRO/GTEX). Two of the wells and the surface water station nearest the delta shall be sampled and analyzed for the speciation of As, Hg, and the full Target Analyte List (TAL) for both dissolved and total constituents in order to assist in the development of the objectives of the RI/FS. This data shall be delivered as a data report containing field notes, water levels, and analytical results. The report will include a table displaying all the historic groundwater data as shown in Table 4 of the 2008 RDM Groundwater Monitoring report (#86 in the RDM AR). The report shall also provide a time-series graph of each COC for each of the wells. The historical data is available in electronic format so only the new results need to be added.

The five surface water samples shall be collected from the Red Devil Creek at locations: 1) upgradient of RDM, 2) upgradient from where the spring enters the

creek, 3) from the Spring, 4) downgradient of mixing zone of the Spring , and 5) near the delta prior to its mixing with the Kuskokwim River. Discharge measurements of the creek shall be accurately recorded. Field parameters shall consist of pH, specific conductance, temperature and reduction-oxidation reaction (Redox) potential for all ground water and surface water samples. Each surface water station shall be located on a standard Global Position System (GPS) device, staked, and marked for future reference. Additional samples may be identified based on the final work plan, and the Contractor shall provide a unit rate for additional samples and parameters.

The five existing wells may need to be redeveloped by the Contractor prior this sampling effort. This determination will be made upon assessing the difference between the current total depth field measurements and the as-built well construction diagrams. Sediment accumulation of 1.0 ft or more shall require the redevelopment. The contractor shall follow EPA guidance for well development. Additional samples may be identified based on the final work plan, and the Contractor shall provide a unit rate for additional samples and parameters.

Performance Standard, Acceptable Quality Level (AQL) and Method of Monitoring for Task 4 are as follows:

Performance Standard	Acceptable Quality Level (AQL)	Method of Monitoring
Contractor shall meet the defined deadlines for the groundwater report	COR has documents in-hand on agreed dates for deadlines	Direct COR contact and BLM customer feedback

Task 5 – Community Involvement Plan

The contractor shall update the existing BLM Community Involvement Plan (CIP) that is presented in the Administrative Record. All updates must follow EPA and BLM Community Involvement manuals and handbooks.

Performance Standard, Acceptable Quality Level (AQL) and Method of Monitoring for Task 5 are as follows:

Performance Standard	Acceptable Quality Level (AQL)	Method of Monitoring
Contractor shall meet the defined deadlines for the Community Involvement Plan (CIP)	COR has documents in-hand on agreed dates for deadlines	Direct COR contact and BLM customer feedback

Task 6 – Health and Safety Plan (HASP)

The Contractor shall provide a site specific HASP for the work specified. This task shall be completed and reviewed by the BLM prior to the initiation of field work by the contractor.

Performance Standard, Acceptable Quality Level (AQL) and Method of Monitoring for Task 6 are as follows:

Performance Standard	Acceptable Quality Level (AQL)	Method of Monitoring
Contractor shall meet the defined deadlines for the Health and Safety Plan (HASP)	COR has documents in-hand on agreed dates for deadlines	Direct COR contact and BLM customer feedback

Task 7 – Quality Assurance Project Plan (QAPP)

The Contractor shall provide a site specific QAPP for the work necessary. This plan shall address, but is not limited to, sampling field procedures; sampling chain of custody; sampling transport and preservation procedures; equipment calibration and maintenance procedures and frequency; analytical procedures; performance and system audits; preventative maintenance procedures; data assessment for precision, accuracy and completeness; corrective action procedures; and quality assurance reporting procedures. The sampling plan shall follow guidance provided in EPA and ADEC manuals. The QAPP shall be submitted to BLM for review and approval prior to any sampling.

Performance Standard, Acceptable Quality Level (AQL) and Method of Monitoring for Task 7 are as follows:

Performance Standard	Acceptable Quality Level (AQL)	Method of Monitoring
Contractor shall meet the defined deadlines for the Quality Assurance Project Plan (QAPP)	COR has documents in-hand on agreed dates for deadlines	Direct COR contact and BLM customer feedback

Task 8 – RI/FS Report

The contractor shall prepare a RI/FS Report that documents the contamination's nature and extent, determines and documents the associated human health and ecological risk caused by this contamination, and completes a feasibility study. The RI/FS shall follow and reference all pertinent guidance documents and manuals of the ADEC, EPA and the BLM in order to complete a successful RI/FS report. In general, the RI/FS report shall define all of the objectives and information expectations, how they were or were not accomplished; and detailed descriptions of the data and conclusions.

Performance Standard, Acceptable Quality Level (AQL) and Method of Monitoring for Task 7 are as follows:

Performance Standard	Acceptable Quality Level (AQL)	Method of Monitoring
Contractor shall meet the defined deadlines for the Final Remedial Investigation/Feasibility Study (RI/FS)	COR has documents in-hand on agreed dates for deadlines	Direct COR contact and BLM customer feedback

8 Project Team Identification and Responsibilities

Figure 3 illustrates the project organization, lines of authority, and responsibilities of the E & E team. Brief descriptions of the E & E management and key staff members' roles are included below. Also shown in Figure 3 are the key BLM staff involved with execution of the RI/FS.

E & E will use a Project Team to complete the scope of services. The Project Team structure mirrors the key task areas identified in the Statement of Work. The Project Team will consist of the Project Manager, a Remedial Investigation Lead, a Community Involvement Lead, the Risk Assessment Leads, and a Feasibility Study Lead. The Project Team will work closely with the BLM Project Manager and related specialists to ensure that the data collection efforts are streamlined and focused and the project documents meet the needs, goals, and quality expectations of BLM. None of the members of the E & E Red Devil Mine RI/FS project team have supported the EPA in its development of a Hazard Ranking System score for the site.

A summary of the project roles for the key E & E staff comprising the Project Team is provided below.

E & E's **Project Manager** is William Richards. Mr. Richards will direct the day-to-day activities of E & E's team and serve as the primary point of contact to BLM for technical communications. He will track the project schedule and budget and prepare monthly progress reports to BLM. Mr. Richards will assist the project leaders with developing study design strategies and report formats, and he will provide QC review of all technical deliverables. Mr. Richards will also be a key participant in meetings with Alaska DEC staff and other stakeholders.

E & E's **Principal in Charge** is Rick Rudy, C.P.G. Mr. Rudy is an E & E senior manager as well as a technical resource on numerous BLM projects throughout the west. As E & E's primary point of contact with BLM's National Operations Center in Denver, Mr. Rudy has a key role in project planning and direction. Mr. Rudy will serve as the primary point of contact for the BLM Contracting Officer on contractual and invoicing issues and will assist the project manager with QA/QC of project related deliverables.

E & E's **Remedial Investigation Lead** is Mark Longtine, R.G. Mr. Longtine will lead the development of the RI/FS Work Plan and will serve as E & E's field team leader. He will play a key role in the development of the RI/FS Report, developing and refining site hydrogeologic conceptual models, and providing input to both the risk assessment and development of remedial alternatives for the FS.

E & E's **Human Health Risk Assessment Lead** is Stephanie Pingree. Ms. Pingree will lead the development of the human health risk assessment and provide input to the RI/FS Work Plan to ensure that risk-assessment-related data needs are obtained. With E & E's project manager, she will be a key participant in meetings and negotiations with Alaska DEC staff and other stakeholders.

E & E's **Ecological Risk Assessment Lead** is Dr. Carl Mach. Dr. Mach will lead development of the ecological risk assessment, and will provide input to the RI/FS Work Plan to ensure that risk-assessment-related data needs are obtained. He will also be available to assist BLM in communications with Alaska DEC staff about actual impacts to the important ecological receptors at the site.

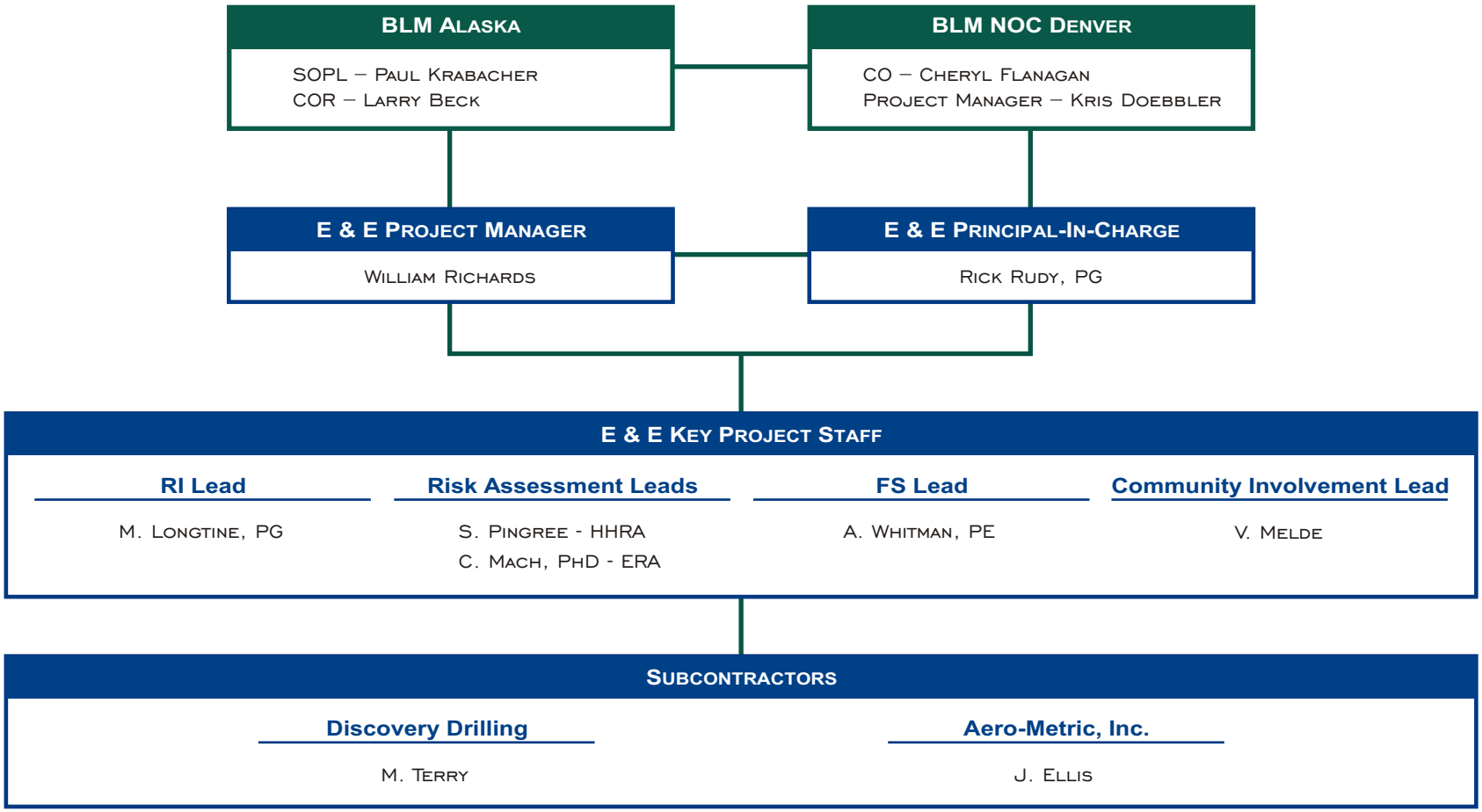
E & E's **Feasibility Study Lead** is Alexander Whitman, P.E. Mr. Whitman will lead development of the feasibility study, and will provide input to the RI/FS Work Plan to ensure that feasibility-study-related data needs are obtained during the field investigation.

E & E's **Community Involvement Lead** is Vivian Melde. Ms. Melde will lead the development of the RI/FS Community Involvement Plan and will support BLM with public outreach efforts as needed.

The E & E project team will be supported by several subcontractors, including:

- Drilling/subsurface exploration;
- Site topographic mapping; and
- Analytical laboratories.

These subcontractors will report to the E & E Project Manager. In addition, several vendors will be utilized to provide support services during the RI/FS fieldwork, including locally obtained lodging services and heavy equipment; and Anchorage-based aircraft charter services.



CO – Contracting Officer
COR – Contracting Officers Representative
SOPL – State Office Program Lead

Line of Communication

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

RED DEVIL MINE
Red Devil, Alaska

Figure 3
PROJECT ORGANIZATION

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9 Schedule

Figure 4 illustrates the baseline project schedule in the form of a Gantt Chart.

The major project milestones are based on timing specifications in the Statement of Work and on subsequent discussions between the BLM Project Manager and E & E. In Task 1, four coordination meetings are identified. The primary topics for these meetings will be:

- Coordination Meeting 1 (April 5, 2010): First RI/FS study design meeting. Resolve ADEC comments on the RI/FS scope of work, and set the stage of Field Sampling Plan development.
- Coordination Meeting 2 (April 19-20, 2010): Finalize the RI/FS study design and discuss the draft Community Involvement Plan.
- Coordination Meeting 3 (August 20, 2010): Review final RI/FS Work Plan and coordinate field work initiation.
- Coordination Meeting 4 (November 19, 2010): Present RI/FS fieldwork findings and preliminary analytical data tables. Scope and negotiate Task 8 (RI/FS Report).

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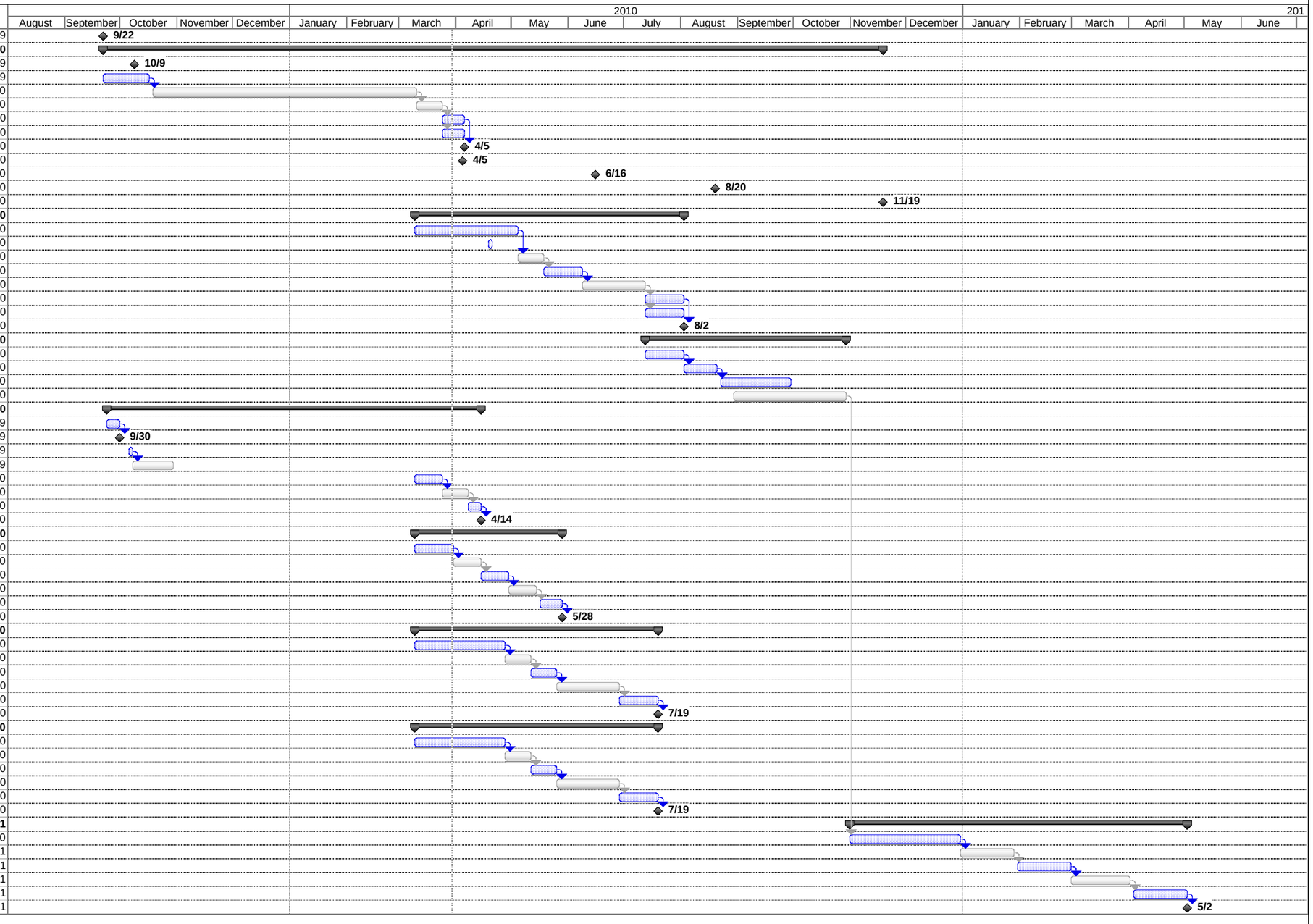
Figure 4
Red Devil Mine RI/FS
Baseline Schedule

ID	Task Name	Duration	Start	Finish
1	**Contract Award**	0 days	Tue 9/22/09	Tue 9/22/09
2	**Task 1: Project Management/PMP**	**303 days**	**Tue 9/22/09**	**Fri 11/19/10**
3	Kickoff Meeting	0 days	Fri 10/9/09	Fri 10/9/09
4	Develop CCR Draft PMP	19 days	Tue 9/22/09	Fri 10/16/09
5	BLM Review CCR Draft PMP/COI Resolution	103 days	Mon 10/19/09	Wed 3/10/10
6	Agency Review of Draft PMP	10 days	Thu 3/11/10	Wed 3/24/10
7	Develop Final PMP	8 days	Thu 3/25/10	Mon 4/5/10
8	Develop/Submit Response to Comments	8 days	Thu 3/25/10	Mon 4/5/10
9	Submit Final PMP	0 days	Mon 4/5/10	Mon 4/5/10
10	Study Design Teleconference	0 days	Mon 4/5/10	Mon 4/5/10
11	Coordinatoin Meeting 2	0 days	Wed 6/16/10	Wed 6/16/10
12	Coordination Meeting 3	0 days	Fri 8/20/10	Fri 8/20/10
13	Coordination Meeting 4	0 days	Fri 11/19/10	Fri 11/19/10
14	**Task 2: RI/FS Work Plan**	**104 days**	**Wed 3/10/10**	**Mon 8/2/10**
15	Develop CCR Draft Work Plan	40 days	Wed 3/10/10	Tue 5/4/10
16	Technical Meeting with ADEC	2 days	Mon 4/19/10	Tue 4/20/10
17	BLM Review CCR Draft Work Plan	10 days	Wed 5/5/10	Tue 5/18/10
18	Develop Agency Draft Work Plan	15 days	Wed 5/19/10	Tue 6/8/10
19	Agency Review of Work Plan	24 days	Wed 6/9/10	Mon 7/12/10
20	Develop Final Work Plan	15 days	Tue 7/13/10	Mon 8/2/10
21	Develop/Submit Response to Comments	15 days	Tue 7/13/10	Mon 8/2/10
22	Submit Final Work Plan	0 days	Mon 8/2/10	Mon 8/2/10
23	**Task 3: Implementation of RI/FS Work Plan**	**79 days**	**Tue 7/13/10**	**Fri 10/29/10**
24	Determine Task 3 Pricing Adjustments	15 days	Tue 7/13/10	Mon 8/2/10
25	Equipment/Supplies Procurement	14 days	Tue 8/3/10	Fri 8/20/10
26	Implement Fieldwork	28 days	Mon 8/23/10	Wed 9/29/10
27	Laboratory Analysis	45 days	Mon 8/30/10	Fri 10/29/10
28	**Task 4: 2009 Monitoring**	**145 days**	**Thu 9/24/09**	**Wed 4/14/10**
29	Prepare Work Plan	5 days	Thu 9/24/09	Wed 9/30/09
30	Submit Work Plan to BLM/ADEC	0 days	Wed 9/30/09	Wed 9/30/09
31	Implement Fieldwork	2 days	Tue 10/6/09	Wed 10/7/09
32	Laboratory Analysis	16 days	Thu 10/8/09	Thu 10/29/09
33	Develop Draft Monitoring Report	11 days	Wed 3/10/10	Wed 3/24/10
34	BLM Review Draft Monitoring Report	10 days	Thu 3/25/10	Wed 4/7/10
35	Develop Final Monitoring Report	5 days	Thu 4/8/10	Wed 4/14/10
36	Submit Final Monitoring Report	0 days	Wed 4/14/10	Wed 4/14/10
37	**Task 5: Community Involvement Plan**	**58 days**	**Wed 3/10/10**	**Fri 5/28/10**
38	Develop CCR Draft CIP	15 days	Wed 3/10/10	Tue 3/30/10
39	BLM Review CCR Draft CIP	11 days	Wed 3/31/10	Wed 4/14/10
40	Develop Agency Draft CIP	11 days	Thu 4/15/10	Thu 4/29/10
41	Agency Review of Draft CIP	11 days	Fri 4/30/10	Fri 5/14/10
42	Develop Final CIP	10 days	Mon 5/17/10	Fri 5/28/10
43	Submit Final CIP	0 days	Fri 5/28/10	Fri 5/28/10
44	**Task 6: Health and Safety Plan**	**94 days**	**Wed 3/10/10**	**Mon 7/19/10**
45	Develop CCR Draft HASP	35 days	Wed 3/10/10	Tue 4/27/10
46	BLM Review CCR Draft HASP	10 days	Wed 4/28/10	Tue 5/11/10
47	Develop Agency Draft HASP	10 days	Wed 5/12/10	Tue 5/25/10
48	Agency Review of Draft HASP	24 days	Wed 5/26/10	Mon 6/28/10
49	Develop Final HASP	15 days	Tue 6/29/10	Mon 7/19/10
50	Submit Final HASP	0 days	Mon 7/19/10	Mon 7/19/10
51	**Task 7: Quality Assurance Project Plan**	**94 days**	**Wed 3/10/10**	**Mon 7/19/10**
52	Develop CCR Draft QAPP	35 days	Wed 3/10/10	Tue 4/27/10
53	BLM Review CCR Draft QAPP	10 days	Wed 4/28/10	Tue 5/11/10
54	Develop Agency Draft QAPP	10 days	Wed 5/12/10	Tue 5/25/10
55	Agency Review of Draft QAPP	24 days	Wed 5/26/10	Mon 6/28/10
56	Develop Final QAPP	15 days	Tue 6/29/10	Mon 7/19/10
57	Submit Final QAPP	0 days	Mon 7/19/10	Mon 7/19/10
58	**Task 8: RI/FS Report (Award Not Yet Made)**	**131 days**	**Mon 11/1/10**	**Mon 5/2/11**
59	Develop CCR Draft RI/FS Report	44 days	Mon 11/1/10	Thu 12/30/10
60	BLM Review CCR Draft RI/FS Report	21 days	Fri 12/31/10	Fri 1/28/11
61	Develop Agency Review Draft RI/FS Report	21 days	Mon 1/31/11	Mon 2/28/11
62	Agency Review of Draft RI/FS	24 days	Tue 3/1/11	Fri 4/1/11
63	Develop Final RI/FS Report	21 days	Mon 4/4/11	Mon 5/2/11
64	Submit Final RI/FS Report	0 days	Mon 5/2/11	Mon 5/2/11



Project: RDM
March 2010 Update

Task Milestone Summary External Tasks

10 Reporting Requirements

The two primary types of reports that will be generated during implementation of the RI/FS, monthly progress reports and technical reports, are discussed below.

10.1 Progress Reports

Progress reports will be prepared monthly and will be submitted with E & E's monthly invoices. The progress reports will include the following information:

- Date range of the invoice
- Activities conducted and milestones achieved
- Activities planned for the next reporting period
- Issues requiring BLM attention or response
- Invoice period costs with supporting backup for labor and other direct costs
- Total costs to date and an analysis of actual work completed

10.2 Technical Reports

As identified in the Statement of Work and the project schedule (Section 9.0), five technical reports will be prepared under this contract in addition to this PMP. They are:

- RI/FS Work Plan
- Community Involvement Plan
- Health and Safety Plan
- Quality Assurance Project Plan
- 2009 Monitoring Report

Each of these documents will undergo a series of review and comment resolution/incorporation cycles; these are an initial BLM contract consistency review, and a review by ADEC, EPA, and other interested agencies and stakeholders. All draft reports will be submitted to BLM for distribution to agency staff. Agency review comments on draft documents will be discussed during a comment resolution meeting (teleconference) unless determined to be unnecessary by the reviewing agencies. Final reports will be provided to BLM in both hard copy and electronic copy.

The RI/FS Work Plan will not be implemented until it has been approved by ADEC per 18 AAC 75.335(b).

The RI/FS Report is not part of the current contract; it will be funded at a later date in 2010. However, the RI/FS report will undergo a similar set of review and comment resolution/incorporation cycles.

11 Risks

There are several issues that could impede accomplishment of this project. Typical issues encountered at similar sites managed by the BLM that may impact this project include changes in project management, funding, or weather.

A certain amount of delay can be expected when key project management personnel change. Sometimes key personnel vacate a position unexpectedly or on short notice. There will be unavoidable delays in project progress while replacement personnel are hired and assigned. The replacement personnel may then need time to become familiar with the current status of the project in order to make informed decisions.

Complexities of the federal budget process can cause lag between phases of the project. The Anti-Deficiency Act prohibits entering into contractual or other agreements to expend public funds that have not yet been appropriated by Congress.

Weather delays are partially manageable by limiting the schedule for onsite work to when winter conditions abate; however, it is preferable to conduct onsite work during the summer months when air and marine transportation are generally reliable. The Red Devil Mine is at a remote location with limited transportation links to outside communities. No links by road or rail exist; access is by air or marine transportation only. Heavy equipment and supplies may need to be barged to the site from distant points of origin; it is approximately 1,500 miles by marine route from Anchorage to Red Devil. Storms, pack ice, and fluctuating river depth limit when this is possible. An example of possible delay caused by weather would be if the Kuskokwim River floods and the airstrip is put out of service by high water.

12 Quality Control

A Quality Assurance Project Plan (QAPP) will be prepared for the RDM RI/FS. The QAPP will describe laboratory quality control requirements and protocols for quality assurance of analytical data and measurement data for the project.

Quality control of project documents will follow a multi-tiered process. Primary authors of reports or report sections will submit draft documents to peer reviewers. The peer reviewers are senior-level technical discipline experts that have the education, training, and experience to critique technical presentations and analyses. Following peer review, draft documents will be submitted to the Project Manager and the Principal-in-Charge for a final review, which consists primarily of ensuring the contractual requirements have been met, the document presentation is clear and concise, and the deliverable is internally consistent. The final stage of the document quality control process involves technical editing; proofreading text, tables, and figures; and formatting the document.

13 Additional Requirements

The Statement of Work identifies information to be included in the PMP in addition to the requirements of BLM Handbook 1703-4. These additional requirements are addressed below.

13.1 Employee Training

Occupational Health and Safety Administration (OSHA) Hazardous Waste Operations (HAZWOPER) training certificates for E & E field personnel are provided in Attachment B.

13.2 Liability Insurance

A liability insurance specimen for E & E is provided in Attachment C. The certificate demonstrates that E & E's liability insurance will remain in effect for the duration of the RI/FS contract.

13.3 Subcontractor Quality Assurance/Quality Control Procedures

As of the date of this draft PMP, E & E is in the process of negotiating contract agreements with our primary subcontractors, Discovery Drilling and Aero-Metric, Inc. Upon execution of subcontract agreements with these firms, E & E will request a copy of the quality assurance/quality control procedures of those firms and submit that documentation to the BLM Contracting Officer's Representative (COR).

13.4 Employee Qualifications

Resumes for the key E & E project staff are provided in Attachment D.

13.5 Use of Local Labor and Equipment

E & E will use local services and equipment to the extent practicable and allowable during implementation of the RI/FS. Specifically, the following local entities will be used:

- **Red Devil Lodge.** The lodge will be used to supply E & E and our subcontractors with all lodging services and meals during the RI fieldwork and the 2009 monitoring event. Red Devil Lodge will also provide all-terrain vehicles for onsite transportation.

- **Vanderpool Flying Service.** This local firm will rent heavy equipment to E & E and our drilling subcontractor for making necessary site improvements including minor road repairs and brush clearing.

13.6 Site Control

Site control methods to prevent the spread of contamination offsite and to protect worker safety will be addressed in the RI/FS Work Plan and in the HASP. In general, these methods will involve systematic personnel, equipment, and vehicle decontamination processes, signage at the mine entrance road, and use of hazard tape around work areas involving heavy equipment (e.g., drilling operations).

A

E & E Technical Approach to the Statement of Work

TECHNICAL APPROACH

E & E is aware that considerable sampling and analysis at the Red Devil Mine has been conducted, and that historical data needs to be evaluated for usability in site characterization and risk assessment efforts. E & E will work with BLM to develop data quality objectives for historical data that are agreeable to Alaska DEC. This will be integrated into the analysis of existing information and identification of data gaps portion of the RI/FS work plan (Task 2). By evaluating and utilizing appropriate historical data and identifying Data Quality Objectives (DQOs) to meet risk assessment needs, additional sampling can be focused on data gaps and potential risk drivers, saving money on analytical and reporting tasks. Taking a systematic approach to review of historical data will provide a defensible and focused approach to additional needs at the site.

Use of appropriate field analytical techniques will empower the BLM and E & E project managers with the ability to make real-time decisions. This will eliminate the need for multiple mobilizations and off-site laboratory analysis to provide field decision inputs, reducing labor and analytical costs.

Relevant BLM, EPA, and Alaska DEC guidance (e.g., BLM CERCLA Handbook, EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA) will be adhered to. E & E understands that the RI/FS process is dynamic and often presents unforeseen conditions or changes. The E & E team will be flexible to adapt to changes in management actions or technical approaches, while remaining focused to meet the project schedule and control costs. The most significant feature of this approach is the integration of key RI activities with elements of the risk assessment and FS. By integrating features of the RI, risk assessment, and FS early in the planning process, E & E's multi-disciplinary project teams are able to provide a continual and dynamic blending of site characterization and remedial planning activities that focus the investigative efforts on the data requirements of greatest concern. In our experience with BLM, EPA Regions 8, 9, and 10, and other clients, this overlapping approach to the RI/FS process results in higher overall efficiency.

Task 1: Project Management Plan

E & E will prepare a Project Management Plan (PMP) that is consistent with both BLM's Project Management Handbook (H-1703-4) and a shared understanding between BLM and E & E of the project technical and administrative objectives, scope, schedule, budget, and quality assurance mechanisms. The PMP will be prepared in concert with the overall technical approach to the project, including the project work plans, and will be coordinated with the work performed by others completing the petroleum contaminated soil cleanup. The plan will specify how E & E will utilize local labor and equipment (e.g., heavy equipment and boats) to the full extent possible.

Upon initiation of the contract, E & E will establish a shared understanding of the project with BLM. In addition to initial communications, this effort will be formally initiated with a kickoff meeting to be attended by E & E's key project team members and BLM. This meeting will be held at the Anchorage Field Office. The meeting will serve as a venue for reviewing the key issues and concerns to be addressed in the RI/FS; reviewing the contract, project schedule, and deliverables; clarifying project objectives and processes; and collecting available information. The kickoff meeting will offer an opportunity for the BLM team and the E & E team to further enhance working relationships, identify areas of complimentary expertise and common interest, and share ideas for achieving the project objectives.

In addition, E & E will establish a working relationship with BLM's selected petroleum cleanup contractor to provide for coordination of each contractor's respective field activities. This will assure that the objectives of each project will be met in the most cost-effective manner possible. Specific activities and issues requiring close coordination include site access and control, travel and logistics, and potential overlap of on-site activities. For example, E & E anticipates that it may be necessary to establish an appropriate means to cross Red Devil Creek with vehicles and heavy equipment. E & E assumes that BLM's selected petroleum cleanup contractor will provide for this. E & E recommends that BLM's selected petroleum cleanup contractor participate in the proposed kickoff meeting or a separate meeting to initiate a cooperative working relationship to ensure success of both projects.

After establishing a shared understanding for the project E & E will begin drafting the PMP. In addition to the guidance provided by the Project Management Handbook, E & E will include elements described further in this section.

Staff Organization & Qualifications. The PMP will include an organizational chart illustrating the lines of communication with BLM, within E & E, with E & E's subcontractors, and with BLM's petroleum cleanup contractor. The organizational chart will reflect each staff member's role in the project. Although presented in this proposal, qualifications of each staff member will also be included in the PMP. Copies of relevant certificates and other proofs of employee qualifications and training will be included. For E & E and each of its subcontractors up to date liability insurance certificates that comply with contractual requirements will be included.

Project Schedule. The PMP will include a project schedule, produced as a Gant chart in MS Project, that shows the scheduled sequences and key milestones of each task. The project schedule will also be summarized with the task sequences and procedures that must be understood and adhered to by all involved parties to successfully execute the project plans in a timely and cost effective manner. The project schedule will include time for BLM and agency (i.e. Alaska DEC and EPA) review. We will use Microsoft Project 2000 to present and evaluate the effects of schedule progress for individual tasks on the overall project schedule. When appropriate, Mr. Richards will adjust task schedules to accurately reflect the current status of the project.

Quality Control/Quality Assurance. The mechanisms for assuring project quality control will be outlined in the PMP. In addition to the QAPP produced in Task 7, the PMP will specify the procedures to be conducted at various points during the project that will ensure that quality objectives are met for the respective point in time. Key personnel responsible for QA/QC will be identified along with their relevant experience and credentials. Subcontractor QA/QC procedures will also be included to further demonstrate that subcontractors are in compliance with the flow down requirements of the PMP.

Site Control. The PMP will sufficiently outline the procedures necessary to maintain appropriate site control. This will take into account the planned activities of BLM's petroleum cleanup contractor. Although the remoteness of the site imposes a certain degree of site control, the PMP will identify any additional signage or other posted warnings necessary during project activities. The PMP will summarize the elements of the site Health and Safety Plan (Task 6) that specify site entrance and exiting procedures designed to prevent off-site transport of any contaminants. Requirements for entry to the site will be clearly delineated, including qualifications and training requirements for personnel. Vehicle inspection and decontamination

procedures will be included that prevent both off-site transport of contaminants as well as on-site transport of undesirable materials, such as invasive plant species or prohibited items (e.g., no smoking or food consumption will be allowed on site).

Project Coordination Meetings & Teleconferences. Four project coordination meetings will be conducted in the BLM Anchorage Field Office with key E & E personnel, including subcontractors as necessary. Such meetings will be utilized to confirm project plans (such as the kickoff meeting), discuss field investigation findings, address comments on deliverable documentation, and reach agreements on technical aspects of the project. E & E recommends participation by BLM's petroleum cleanup contractor in the kickoff meeting. Weekly teleconference calls will also be held with BLM Anchorage staff during key phases of the project, such as during finalization of the work plan, during lead-up to field investigation, during development of RI/FS report, and prior to any negotiations with DEC. These meetings will be attended by Anchorage-based Vivian Melde in person, with Project Manager Richards on the phone to control costs. Daily safety briefings will be held whenever field activities are being conducted.

Project Management Systems for Controlling Cost and Schedule. Flexible and adaptive management of the RI/FS process is only possible if project management systems are sufficiently robust to provide accurate, timely information with which managers can make good decisions. E & E's proprietary COMPASS system is a Web-based, project management system used to keep project managers informed of project progress and budget. This system has proven successful on projects that we have previously conducted for BLM. It allows instant access to all project management, scheduling, and budget data, and allows authorized users to share common information.

Using COMPASS, E & E will establish a schedule, budget, and labor breakdown for each task, including work and materials supplied by subcontractors. Prior to initiating work on a specific task E & E's Project Manager, Bill Richards, will inform project team members of the expectations, budget, and labor hours available to complete the task. He will track percent complete on a weekly basis, making it easy for corrective action to be taken early if an issue arises. In addition, COMPASS provides a forecasting tool that enables project managers to calculate and estimate projected costs at the completion of a task. This feature helps project managers maintain flexibility in completing a project as scope elements evolve or as phases are completed.

To implement QC, the PMs review E & E's Early Hours Report and Early Other Direct Costs (ODC) Report. These reports provide a preview of hours and ODCs being charged to a particular project. By viewing charges to a project on a real-time basis, the PM has the opportunity to verify that the charges are appropriate before they are officially entered into COMPASS. When an invoice is drafted it will be sent to the PM for review and approval before being sent to BLM. The project manager will prepare an invoice cover letter and report in a format prepared with BLM input. In the invoice report the project manager will discuss progress, accomplishments and any issues resolved since the last invoice. The report will also include anticipated accomplishments for the subsequent reporting period.

Task 2: RI/FS Work Plan

E & E will develop the RI/FS work plan in accordance with EPA RI/FS guidance and the BLM CERCLA Handbook. To ensure success we will frequently involve BLM in the process prior to formally scheduled review points and deliverables. This prepares BLM reviewers in advance of

receiving the draft, facilitating the review process and enhancing the quality of the agency review draft.

The RI/FS Workplan will detail E & E's investigative approach, which will be developed based on EPA's DQO review process. Data are needed to determine the nature and extent, fate and transport, potential risk to human and ecological receptors, and, following the RI/FS, performance monitoring of potential remedial actions. Numbers and locations of samples of various types of media, and the appropriate laboratory analytical methods will be determined based on DQO process. Based on existing information, E & E anticipates that surface and subsurface soil, groundwater, surface water, surface sediment, and fish tissue samples should be collected in order to address the satisfy the DQOs. E & E understands that some of the existing data are of questionable utility for the purposes of the RI/FS. These historic data will be evaluated for use in the RI/FS and used as appropriate.

Although the Work Plan will identify specific investigative approaches, it will also be designed to allow flexibility to make decisions based on field observations and real-time field-screening data, including total metals concentrations obtained using a BLM-provided, X-ray fluorescence (XRF) analyzer.

Because some typical elements of an RI/FS work plan are addressed in other tasks (e.g., Task 5- Community Involvement Plan, Task 6- Health and Safety Plan, and Task 7- Quality Assurance Project Plan), Task 2 is streamlined to include only the work plan elements not addressed in other tasks. Nevertheless, as stipulated in the PMP description, all of the project plans will be coordinated to form a cohesive systematic approach. A proposed outline and descriptions of key elements of the RI/FS Work Plan are provided below.

Proposed Outline for the RI/FS Work Plan

Executive Summary

1. Introduction
1.1 Objectives and Purpose
1.2 Definition of the Site
1.3 Document Organization
1.4 Limitations

2. Site Background and Setting
2.1 Location
2.2 Historical and Current Conditions
2.3 Environmental Setting

3. Evaluation of Existing Data and Identification of Data Gaps
3.1 Previous Investigations and Existing Data
3.2 Areas of Concern & Summary of Findings
    3.2.1 Known nature and extent of contamination
    3.2.2 Data on Naturally Occurring Background Levels
3.3 Data Gaps
3.4 Preliminary identification of response objectives and remedial action alternatives

4. Work Plan Rationale
4.1 DQO needs

4.2 Work plan approach

5. RI/FS Tasks

6. Submittal Requirements

7. Costs and Key Assumptions

8. Schedule

9. References

Appendices
Field Sampling Plan
Risk Assessment Work Plan

Section 1 of the Work Plan will primarily focus on the objectives and purpose of the plan. It will include a definition of the site and describe how the document is organized. Identified limitations will also be stated and addressed when applicable.

In Section 2 of the Work Plan, we will describe the physical site setting, including its operational history, any known previous site activities, and the site boundaries. Local land use, natural resources, economic conditions and sociological factors will also be summarized to support the risk assessment approach. A summary of the environmental setting will include known information about the site geology, hydrology, climate, surface features, vegetation and biological resources.

Section 3 will address the evaluation of existing data and identify what data needs to be obtained during the remedial investigation. E & E will carefully to review and assess the extensive existing information for the site, and will collaborate with BLM and Alaska DEC to establish agreement on the criteria used to discern usable historical data from data that is either no longer applicable or does not meet site DQOs. Historical information on naturally occurring background levels from BLM and U.S. Geologic Survey will be evaluated in the same manner as other historical data.

Through this assessment and communications with both BLM and Alaska DEC, E & E will establish a solid understanding of the status of contaminants, media and pathways at the site, as well as the varying concerns and visions for the future. From this firm basis of understanding, E & E will summarize the existing information and identify the data gaps in need of resolution in order to complete the RI/FS.

Based on the assessment of existing information a preliminary conceptual site model (CSM) will be presented in the work plan. (Also see the description of Appendix B, Risk Assessment Work Plan.) The CSM will summarize the known waste sources, contaminants of concern, impacted media, pathways and potential human and ecological receptors. The CSM provides a rational basis for the field sampling plan (FSP) and the risk assessment work plan (RAWP). Data gaps will be identified and explored to determine what effects they could have on characterizing the source, nature, and extent of contamination. Data gaps will then be prioritized based on their potential impact to the risk management/decision-making process. Data gaps with a high potential to affect the accuracy and completeness of risk estimates will be addressed in subsequent tasks.

Review of data gaps identified by BLM and Alaska DEC in the February 18, 2009, meeting notes will be included in this section.

Section 3 will conclude with a preliminary identification of remedial action alternatives. It is anticipated that there will not be sufficient information at this stage to develop meaningful response objectives. However, after implementation of the field sampling and risk assessment activities, response objectives can be proposed for later discussion and review. Preliminary remedial action alternatives will be proposed based on known contaminants and suspected media and pathways.

Section 4 will describe the work plan rationale, including the goals of the RI/FS, DQO needs and the work plan approach. The items for Section 4 will be developed based on E & E's understanding of the site (developed during Section 3 review) and through communications with BLM. E & E's preliminary investigative approach is briefly summarized below in the discussion of the Field Sampling Plan (RI/FS Work Plan Appendix A).

Section 5 will outline RI/FS tasks. The tasks will amount to a sub-scope of work necessary to implement the RI/FS work plan. Appendix A, Field Sampling Plan, scope was developed based on E & E's current knowledge of the site and understanding of Alaska DEC and EPA requirements. RI/FS tasks are presented in more detail below.

Section 6 will summarize the submittal requirements for implementing the RI/FS work plan along with an anticipated schedule.

Section 7 will discuss projected costs and any key assumptions made in the decisions necessary to develop the FSP, the RAWP, or to establish the preliminary cost estimate. Although a base cost estimate is provided in this proposal, the projected costs will be estimated based on the assessment of the existing data, the field sampling plan and other work element plans that have been developed to that point.

Section 8 will provide a detailed schedule of the tasks involved in implementing the project plans. The schedule will be consistent with the PMP, developed in conjunction with BLM. As a cost control measure and to eliminate any resource conflicts, RI activities will be coordinated with work performed by others at the site.

There will be two appendices provided with the RI/FS Work Plan. Appendix A will be the Field Sampling Plan and Appendix B will be the RAWP.

Appendix A: Field Sampling Plan

E & E will prepare a flexible and dynamic FSP that will identify clear field sampling objectives for both the RI and FS for the site. The FSP will address all media to be sampled, including surface and sub-surface soil, mine tailings, river and stream sediments, surface water, and groundwater. (We recommend fish tissue sampling to be conducted by F&W and/or DOHSS, with coordination/assistance provided by E&E.)

The FSP will include detailed procedures for drilling, sampling, documenting geologic descriptions, decontamination, sample handling, shipping, maintaining and documenting chain of custody, and handling investigation-derived wastes (IDW). E & E will work closely with the BLM to formulate the FSP, particularly with respect to selecting sampling locations and determining appropriate laboratory analyses.

The FSP will include the following components:

- A summary of previous investigations, including analytical results, preliminary conceptual site models, and contaminant trend information;
- A list of specific field sampling objectives;
- Tables indicating the number, location, type, and analytical parameters for field sampling;
- Detailed sample and field data collection procedures;
- Sample containers and preservation;
- Sample handling, packaging, and shipping procedures;
- Investigation-derived waste management procedures; and
- Procedures for preventing the spread of contamination during field activities.

The QA/QC procedures and guidelines for the FSP will be developed in accordance with current EPA guidance (EPA/600/R-98/18) and are presented in the discussion for Task 7 below.

Based on information provided in the CERCLA Administrative Record, a preliminary investigative approach has been developed for the Red Devil Mine RI/FS field work. Key elements of the approach are described below.

Contaminants of Concern
Based on existing information, BLM has determined that the COCs for the site are antimony (Sb), arsenic (As), mercury (Hg), methylmercury (MeHg), and lead (Pb) for all media to be considered. In addition, nickel (Ni) and copper (Cu) will be evaluated in the steam plant area and areas potentially impacted by tailings. Other constituents that will be evaluated include diesel range organics (DRO), residual range organics (RRO), and constituents of mineral flotation processes conducted at the site sometime following 1968 to separate stibnite from cinnabar prior to retorting.

Background Conditions
A primary objective of the RI/FS will be to characterize the background conditions of the Red Devil Mine site for each of the pathways (surface water, stream sediment, soils, and ground water). A key element of E & E's investigative approach will be identification of an appropriate location(s) from which to collect background samples for each of the media. Existing sample results and information regarding the geologic and mining history of the area will be carefully reviewed to identify candidate background location(s). The EPA guidance for background characterization will be used; however, deviations are common due to site-specific conditions. It is anticipated that BLM will openly discuss these issues with Alaska DEC if they arise. Based on the Red Devil Mine Site Meeting Notes, it is tentatively anticipated that the Larsen Dyke area will be used for a background location for soil, sediment, surface water, and groundwater, pending evaluation of historic wind data and other data to assess possible aerial deposition of furnace/retort stack emissions. Additional background areas may be recognized as the RI/FS work plan develops or during the course of RI/FS field work. For example, depth to groundwater in the immediate location of the Larsen Dyke may be deeper than that occurring on-site and additional well(s) maybe necessary at lower elevations in the background area to better understand naturally occurring changes in chemicals of concern (COC) concentrations within the background pathway. All on-site groundwater results will be compared to background values, Alaska table standards and risk-based values to answer the information expectations detailed through the DQO process of the RI/FS.

Kuskokwim River and Red Devil Creek
A primary objective of the RI/FS will be to assess the current water quality and sediment conditions of the Kuskokwim River to identify potential impacts from the Red Devil Mine and other mines as well as background mineralization. Sampling locations will be selected based on thorough review of available existing information to provide the most reliable indication of contribution of loading by potential COC sources to the river and creek.

Groundwater
Another primary objective of the RI/FS will be characterizing the groundwater at the site from a background location through the site and downgradient to the Red Devil Creek delta. New two-inch monitoring wells will be installed within selected soil borings drilled with a hollow-stem auger drill rig. The monitoring well network will complement the existing well network, and will be designed to determine groundwater flow direction(s) and contaminant concentrations, and thus assess the contribution of impacts to groundwater and surface water in the creek and river from each of the on-site sources as well as possible background inputs of COCs. The potential impacts to groundwater by Monofill #2 will be assessed by installing new wells at carefully selected locations around the perimeter of the monofill. The Larsen Dyke area has been tentatively identified as a background location for groundwater, although depth to groundwater at that location may be too deep for comparison to on-site groundwater. The Larsen Dyke area and other potential areas will be further assessed for potential as background locations for groundwater. All groundwater will be analyzed for Hg, MeHg, As, Sb, Cu, Pb, and Ni. Groundwater from wells downgradient from the settling ponds will also be analyzed for Dowfroth 250 constituents, DRO, and RRO. The new groundwater wells will be installed within the unconfined aquifer, which exists within alluvial/colluvial material and tailings locally. As feasible, several deeper wells will be installed to provide information on vertical hydraulic gradient and possible contributions of COCs from underground mine workings. Wells will be developed as soon as possible after installation to gather static water depth/elevations as soon as possible to assist with determination of groundwater flow direction and guide the placement of subsequent wells.

Tailings Characterization
Tailings represent the most widely distributed source material at the site. The RI/FS will determine the lateral extent of tailings by mapping tailings distribution at the surface and the vertical extent by installing soil borings. Soil borings will be installed with a track-mounted hollow-stem auger drill rig at locations selected to maximize information on the 3D distribution of the tailings at the site from the original tailings piles/impoundments downgradient to the distal portion of the Red Devil Creek delta. Borings will be drilled down to bedrock, which is expected to be an average of 30 feet below ground surface (bgs) across much of the site.

The mining and mineral processing history spanned approximately 40 years, and several types of mineral processing were employed over that period including retorting of coarse (up to two inches) crushed ore and dust, soot, sludges, and milled ore. In approximately 1968, a flotation mill was constructed to separate stibnite (primary antimony mineral) from cinnabar (primary mercury mineral) prior to retorting. Prior to that time, the mine experienced difficulties separating antimony from mercury in the kiln/retort condensers. Flotation commonly involves a complex system of reagents, including five basic types of compounds: pH conditioners (regulators, modifiers), collectors, frothers, activators, and depressants. Based on existing information, Dowfroth 250, a frothing agent, was used extensively in sulfide mineral processing since its introduction in 1951 at the Red Devil Mine site. Milled tailings generated post-1968 may thus contain residual constituents of Dowfroth 250 in addition to the metal COCs. E & E will attempt to differentiate between the different types and generations of tailings at the site to better understand

the chemical and physical characteristics of each type of waste. This focused investigative approach is expected to provide BLM information to select the most cost effective remedy.

Tailings will be analyzed for total metals content as well as leachability (via SPLP metals analysis, EPA Method 1312) and species of Hg, As, and Pb. In addition, selected samples will be analyzed for arsenic and mercury speciation to facilitate evaluation of fate and transport as well as toxicity and bioaccessibility of the metals.

Monofill #2
In addition to assessing potential impacts to groundwater, Monofill #2 will be investigated to assess the design and current state of the monofill will be assessed to determine whether it complies with ARARs and evaluate its long-term effectiveness. The cover of the monofill (consisting of tailings) and the area surrounding the monofill will be evaluated for COCs, and samples will be collected to assess whether conditions have changes since 2001.

Mine Openings
Abandoned openings to underground mine workings (adits, shafts) will be located and inspected to assess the effectiveness and integrity of the plugging and evaluate possible discharges from the openings and impacts of such discharges on surface water and groundwater.

Characterization of Other Sources
Other sources that will be investigated are briefly listed below:

- Underground Mine Workings Openings (adits and shafts): analyze for Hg, MeHg, As, Sb, Cu, Ni
- Retort Building: Hg, MeHg, As, Sb, Cu, Ni Monofill #2 (Hazardous Waste): analyze for Hg, MeHg, As, Sb, Cu, Ni, SPLP metals
- Monofill #1 (Non-Hazardous Waste): analyze for Hg, MeHg, As, Sb, Cu, Ni
- Drum Storage Area: analyze for Hg, MeHg, As, Sb, Cu, Ni, DRO and RRO
- Gravel Pad: analyze for Hg, MeHg, As, Sb, Cu, Ni
- Tailings (post 1955 Retort Area): analyze for Hg, MeHg, As, Sb, Cu, Ni, SPLP metals
- Settling Ponds: analyze for Hg, MeHg, As, Sb, Cu, Ni, DRO, RRO, Dowfroth 250 constituents
- Steam Plant: analyze for Hg, MeHg, As, Sb, Cu, Ni, DRO, RRO
- Rotary Furnace (pre-1955 Facility): analyze for Hg, MeHg, As, Sb, Cu, Ni, SPLP metals
- Calcine (Burned Ore) Dump: analyze for Hg, MeHg, As, Sb, Cu, Ni, SPLP metals
- Pre-1955 Retort Building: analyze for Hg, MeHg, As, Sb, Cu, Ni, SPLP metals
- Rotary Furnace Stack: BLM to perform in-house air modeling to assess aerial deposition

Drilling
E & E proposes to subcontract Discovery Drilling, Inc. to perform all drilling services, to include installation of soil borings and new monitoring wells. All drilling, abandonment, and well construction activities will be performed in accordance with State of Alaska regulations. The locations of the proposed monitoring wells and borings will be selected by the E & E site geologist at the time of drilling activities depending on site conditions encountered in the field. Heavily vegetated areas will be cleared in preparation for drilling at the site.

It is estimated that 60 boreholes will be installed. During drilling, soil samples will be collected, at a minimum, at five-foot intervals from the ground surface to total depth with a decontaminated two-foot long split spoon sampler. It is assumed that the average depth of the borings will be 30 feet bgs. Samples will be logged by an E & E geologist and sampled for XRF field screening and

chemical analysis. After boreholes have been successfully advanced, unless they are converted to monitoring wells they will be abandoned by sealing the borehole with hydrated bentonite.

An estimated 15 monitoring wells will be installed within selected soil borings. Actual depth of bedrock will vary at each location. It is estimated that the new monitoring wells will be installed to a total depth of approximately 30 feet bgs. The actual depth of each well will be determined by the E & E site geologist depending on the geologic and hydrogeologic conditions observed during drilling. Wells will be completed with above-ground steel risers with locking monuments.

Well development will be accomplished by a combination of mechanical surging, bailing, and pumping with a submersible pump. Development waters generated will be temporarily stored in 55-gallon drums and relocated on-site for subsequent disposal.

Equipment Decontamination

All drilling and sampling and associated equipment will be decontaminated to prevent the cross-contamination of samples, control spread of contaminants to uncontaminated areas, and to prevent chemical exposure to the site personnel. All vehicles, transport equipment, and personal protective equipment (PPE) will be decontaminated prior to moving equipment across or onto BLM managed lands to ensure it is weed and weed seed free. Decontamination will include high pressure washing where practical to treat the insides of bumpers, wheel wells, undercarriages, inside belly plates, excavating blades, buckets, tracks, rollers, drills, buckets, shovels, any digging tools, and any other equipment to remove potential weeds and weed seed carrying soil, greasy dirt, and vegetative material. E&E personnel will inspect all equipment to ensure sufficient cleaning. All decontamination water will be temporarily stored in 55-gallon drums and relocated on-site for subsequent disposal.

E & E assumes that the driller may obtain and use surface water from Red Devil Creek at a vehicle-accessible location located upstream of the mine workings for decontamination and drilling activities.

Investigation- Derived Waste

IDW is expected to consist of the following waste types:

- Drill cuttings from monitoring wells and soil borings;
- Groundwater from well development;
- Wastewater from drilling operations;
- Decontamination fluids; and
- Disposable PPE and supplies.

It is assumed that the RI/FS field activities will not generate waste of a hazardous nature. At the completion of each borehole, the subcontracted driller will spread the drilling cuttings in the vicinity of the borehole and smooth the soil to the land contour.

Decontamination water and well development water will be collected and contained in drums supplied by the subcontractor. The Subcontractor will move the drums to a location(s) on site as specified by the E & E site manager. The waste water will be disposed of by slowly releasing the water onto the ground so that the waste water does not leave the immediate area, cause erosion, or create a muddy work environment. Upon being emptied of its contents, the drums will be re-used to contain decontamination and well development water from subsequent drilling operations.

Disposable equipment and PPE clothing will be rendered useless, and contained in 55-gallon steel drums and disposed of in a sanitary landfill off site.

XRF Field Screening
E & E will provide a trained operator to operate a BLM-furnished XRF spectrometer to perform field screening for total metals in soil samples. Results will be used to facilitate real-time decision making to guide subsequent investigative activities and to select samples for laboratory confirmation total metals analysis and (synthetic precipitation leaching procedures) and speciation metals analyses.

Ultraclean Sampling Methods
E & E proposes to use ultraclean sampling methods (EPA Method 1669) for all surface water, sediment, groundwater, and background soil samples that are expected to have low concentrations of COCs.

Laboratory Analytical Services
E & E proposes to subcontract Analytical Resources, Incorporated and Brooks Rand Labs, located in Tukwila and Seattle, Washington, respectively, to perform all laboratory analytical services. E & E proposes to use the following analytical methods:

- SPLP Metals (Soil) – EPA 1312/6000/7000
- Methylmercury (Soil/Sediment) – EPA 1630 Modified
- Arsenic Speciation (Soil/Sediment) – EPA 1632 Modified
- Arsenic, Antimony, Lead, Mercury (Soil/Sediment) – EPA 200.8
- TAL Metals (Soil/Sediment) – EPA 200.8/6010/7471a
- Speciation of Mercury in Soils by Sequential Extraction (Soil) – www.epa.gov/esd/pdf-ecb/542asd95.pdf
- Arsenic, Antimony, and Lead (Water) – EPA 200.8
- Methylmercury (Water) – EPA 1630
- Total Mercury (Water) – EPA 1631 Revision E
- Arsenic Speciation (Water) – EPA 1632
- TAL Metals (Water) – EPA 200.8/6010/7470a
- Metals, dissolved (Water) – EPA 200.8/6010/7470a

Mercury Speciation in Soils
Mercury compounds differ greatly in their toxicity and mobility in the environment. For example, $HgCl_2$ is much more toxic and mobile than HgS (cinnabar), which is stable in ore bodies for geologic time periods. Therefore, analysis of total mercury in soil samples is a poor indicator of the toxicological and environmental hazard associated with mercury contaminated sites. The toxicity and environmental mobility of different inorganic mercury compounds is closely related to their relative solubilities in aqueous media. Therefore, E & E proposes to analyze selected samples via a sequential extraction procedure (Speciation of Mercury in Soils by Sequential Extraction, www.epa.gov/esd/pdf-ecb/542asd95.pdf) in order to identify classes of mercury compounds based on solubility. The sequential extraction procedure utilizes progressively stronger aqueous solvents to separate the various classes of mercury compounds (based on solubility) that may exist in any given sample. Results are expected to assist with the evaluation of fate and transport of mercury within the system and to better assess the potential for human and ecological exposure and risk.

Logistics
E & E anticipates that the BLM Alaska Field Office Project Inspector (PI) will be present during field work. E & E will arrange for the transport of the BLM PI's 4-wheeler all-terrain vehicle (ATV) into and out of the site and provision of 1.5 gallons of unleaded gasoline per day of field work for the PI's vehicle.

Use of Local Services and Equipment
E & E will make reasonable use of locally available assets, including labor and equipment, during implementation of the RI/FS.

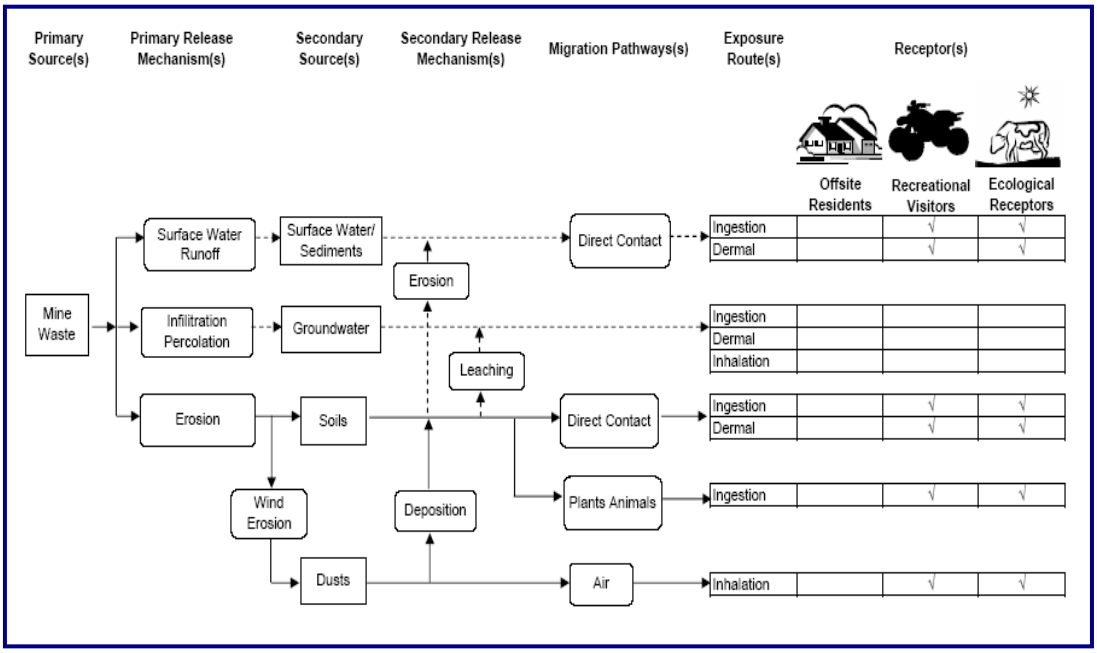
GIS and CAD
E & E's approach to RIs include use of computer-aided design (CAD) and geographic information system (GIS) to analyze data and prepare graphic presentations of contaminant trends and fate/transport mechanisms that can be adapted for use in risk assessment documents, the FS, and public outreach efforts. All sample locations will be recorded using a global position system (GPS) device. A topographic map will be prepared using the elevation data previously obtained by Aero-Metric, located in Anchorage, Alaska. The topographic map will be developed prior to RI/FS field work, and will be used in the field as a basemap. Historical location data (e.g., sample locations, surveyed site features) will be integrated into the CAD and GIS. New location data collected during the RI/FS (e.g., sample locations, abandoned mine openings, and other important site features) will be collected using a survey-grade GPS.

Appendix B: Risk Assessment Work Plan

E & E's approach to understanding and quantifying potential human health and ecological risk at the site includes four principal tasks: (1) review existing reports and data, prepare preliminary conceptual site model (CSM); (2) prepare screening levels risk assessments (RAs) as part of data gap analysis for the RI/FS work plan; (3) implement sampling to acquire data needed for the RAs through RI activities, and (4) conduct baseline risk assessments. These subtasks are discussed in turn below.

Review Existing Reports/Data, Prepare Preliminary Conceptual Model, and Identify Data Gaps.

Review of existing data and identification of data gaps will be conducted as part of Section 3 of the RI/FS work plan, as discussed above. As discussed, E & E will review historical BLM reports to determine which data is useable for the risk assessment based on EPA data usability criteria and BLM and Alaska



Example Conceptual Site Model. The CSM developed for Red Devil Mine will provide dynamic tool to identify data gaps. Potentially incomplete exposure pathways will be evaluated and, if appropriate, additional data will be collected to determine likelihood of pathway completion.

DEC agreed upon criteria. Based on a review of the existing data, E & E will develop a preliminary CSM for human and ecological receptors that addresses all media. The CSM will be based on an initial risk screening and will indicate sources, release mechanisms, exposure routes, human and ecological receptors, and current and potential future exposure pathways. The model will include complete pathways, as well as potentially complete pathways, and will graphically depict sources, pathways, and receptors in a clear and succinct manner.

Prepare Screening Level Risk Assessments for RI/FS Work Plan

Because the CERCLA process is to be followed for work at this site, a screening level ecological risk assessment (ERA) and screening level human health risk assessment (HHRA) will be incorporated into the RA work plan. USEPA, Alaska DEC, and BLM guidance documents and screening criteria will be used as appropriate for the screening level RAs. With this approach, E & E will be able to anticipate where additional risk evaluation is needed and identify any potential additional sampling needs early on, thereby reducing sampling and mobilization costs. Data and results of the streamlined risk assessment that BLM conducted in 2001 will be reviewed for use in our risk assessment development. Results of the screening level RAs and data gap analysis for the RA will be incorporated into Section 3 data gap analysis of the RI/FS Work Plan.

Implement Remedial Investigation/Feasibility Study Sampling

As discussed in the FSP, additional data is necessary to perform an accurate assessment of human health and ecological risk. Potential significant data gaps include: (1) background levels of contaminants in soil, surface water, groundwater, and sediment are not well defined; (2) chemical speciation of mercury, arsenic, and other contaminants at the site is poorly understood; and (3)

bioaccessibility of contaminants in soil and other media at the site is poorly understood. These areas are discussed below and will be addressed in the FSP and incorporated into the RA.

Background. It is expected that background levels of inorganic compounds, specifically arsenic and mercury, will be elevated. Although site concentrations of inorganic compounds may be considerably higher than regional background levels, the contribution of background to site-specific risk should not be overlooked. Based on our experience, the issue could be quantitatively evaluated in at least two ways. First, EPA usually evaluates all compounds of potential concern (COPC) above screening levels and background. Therefore, if the site concentration is above background the compound would be treated as being site related. This is a conservative (health protective) approach. Another methodology is to develop two risk estimates based on (1) background levels and (2) site levels, and perform necessary comparisons. In this manner the risk contributed by site contaminants can be dissected out. Appropriate background locations for all media (soil, sediment, groundwater, surface water, and biota) will be determined based on similar geologic criteria and lack of impact from site related activities including mercury and antimony vapors settling from the retort and furnace stacks. Larsen Dyke has tentatively been identified as a potential background area that will be investigated. To evaluate potential impacts to the Kuskokwim River from the site, it likely will be necessary to define background levels of site-related chemicals in surface water, sediment, and fish from the river.

Chemical Speciation. The toxicity and mobility in the environment of many metals is influenced greatly by their chemical speciation. This is especially true for mercury and arsenic. E & E will review existing reports and data for speciation data for these two metals. If no data are found, or if historic data are of questionable quality, mercury and arsenic chemical speciation will be determined on a subset of samples collected during the RI.

Bioaccessibility. Bioaccessibility is a measure of the total concentration of a chemical in soil or other media that is readily available for absorption into organisms once the medium is ingested. Bioaccessibility in simulated gastric fluids can be estimated using *in vitro* methods such as those developed by J.W. Drexler, University of Colorado (http://www.colorado.edu/geolsci/legs/invitro1.html). At the Saginaw Hill site, E & E incorporated arsenic bioaccessibility data into the HHRA. Under the guidance of Karl Ford, BLM, E & E developed acceptable site-specific arsenic cleanup levels that were considerably higher than the typical soil screening levels. While still protective of human health, this elevated cleanup level allowed for a practical and cost effective remedial action objectives (RAO) that could be met by various remedial alternatives. For the Red Devil Mine, E & E recommends that bioaccessability studies be conducted for arsenic, mercury, and perhaps other metals to help quantify dose estimates.

Potential impacts from exposure to lead will be assessed using the adult lead model and the Integrated Exposure Uptake Biokinetic Model for Lead in Children modified to account for lead in subsistence foods, as well as other environmental media.

Details on RA methods including methodology for exposure assessment, toxicity assessment and risk characterization will be provided in the work plan.

Task 3: Implementation of Remedial Investigation/Feasibility Study Work Plan

E & E will implement all tasks identified in the RI/FS Work Plan. These tasks will be fully discussed in the RI/FS Work Plan. E & E anticipates that implementation of the RI/FS Work Plan to include:

- Field Investigation including field screening techniques coupled with laboratory analysis;
- Data analysis and definition of nature and extent of contamination;

E & E recommend using field screening techniques to define and help choose waste rock/tailings samples for laboratory analysis. In this case, E & E will utilize BLM's XRF. By utilizing such field screening techniques, BLM can save costs by reducing the amount of laboratory analyses. In addition, the XRF can help identify hot spots and assist in decision making regarding samples that should be analyzed.

Any screening field technique should be supported by at least 10% laboratory confirmation sampling. In addition, specialized analytical techniques such as arsenic and mercury speciation and analysis of bioaccessibility are critical to determining the scope of any remedial action at the site. Understanding the arsenic and mercury species present on a site can help reduce the size and therefore cost of remediation of contaminated materials by increasing the acceptable cleanup level due to limited bioaccessibility based on speciation; and in turn, reduce the volume of materials requiring remediation. Sampling is expected to be focused on areas where data gaps are identified, E & E will utilize standard field investigation and sampling equipment, including disposable hand sampling equipment, subcontracted drilling services, and rental equipment.

E & E has developed a preliminary investigative approach for the RI/FS. Major components of the approach are briefly outlined in the description of the Field Sampling Plan (Task 2) above.

All field work will be conducted in the presence of a BLM Project Inspector. E & E will transport an all-terrain vehicle and associated fuel in and out of the site, coordinated with mobilization of field equipment.

Perform Data Analysis

E & E will analyze the data collected during the RI field effort and combine it with usable data from previous documented efforts. RI data will be managed using a GIS and Microsoft Access database format. Data will be presented in ArcView® format or other electronic format as directed by the BLM, and in accordance with the data management plan to facilitate preparation of the risk assessments and FS. Data collected for site characterization will meet the DQOs developed in the QA/QC plan stated in the FSP (or as revised during the RI).

Physical characteristics will be analyzed to describe the environmental setting at the site, including important surface features, soils, geology, hydrogeology, climate, and ecology. E & E's analysis of site physical characteristics will emphasize factors important in determining contaminant fate and transport for all pathways by which contaminants may migrate.

E & E will analyze data on contaminant source characteristics, including the source location; the type and integrity of any existing waste containment; and the types, quantities, chemical properties, physical properties, and concentrations of contaminants found on and near the RDM. E & E will evaluate the actual and potential magnitude of releases from each source, and the mobility and persistence of source contaminants. At the Captain Jack mine site, E & E utilized AutoCAD Land Development Desktop software to model the lower extents of contamination. This model enabled E & E to develop detailed volume estimations and graphically depict areas to be excavated or consolidated in the FS alternatives.

E & E will analyze data to define the nature and extent of contamination at and near the site in all environmental media. This analysis will include the horizontal and vertical extent of contamination in soil, ground water, sediment, air, biota, and man-made structures, as well as spatial and temporal trends in contamination. Additionally, E & E will analyze site contaminant fate and transport, using and combining the results of the site physical characteristics, source characteristics, and extent of contamination analyses described above. The analysis will include estimates of the rate of contaminant migration in the transport pathway.

Task 4: 2009 Groundwater and Surface Water Sampling

E & E will conduct groundwater and surface water sampling, as outlined in Task 4 for the scope of work. Groundwater will be sampled at five existing monitoring well locations (MW-1, MW-3, MW-4, MW-6, and MW-7) and analyzed for arsenic, lead, mercury, methyl mercury, and antimony using EPA methods. Two of the wells will be sampled and analyzed for speciation of arsenic, mercury and the full target analyte list for both total and dissolved constituents. MW-3 and MW-6 will also be analyzed for GRO/BTEX (Alaska Methods AK101/EPA Method 8260), DRO (AK102), and RRO (AK103). E & E will re-develop the wells as necessary prior to sampling. The wells will be redeveloped if sediment accumulated in the bottom of the well since construction is one feet or greater.

Five surface water samples will be collected from the Red Devil Creek in areas identified by BLM. The surface water samples will be analyzed for arsenic, lead, mercury, methyl mercury, and antimony using EPA methods. One surface water station (near the delta) will be sampled and analyzed for speciation of arsenic, mercury and the full target analyte list for both total and dissolved constituents and DRO, RRO, and GRO/BTEX.

Sampling will be conducted in October 2009. All sample locations will be located with a standard GPS device and will be consistent with prior monitoring locations. Results of the sampling will be provided to BLM is a draft and final report consistent with previous monitoring reports. The report will include field notes, water levels, analytical results and a table and graph of historical groundwater data.

Task 5: Community Involvement Plan

Involvement of the effected local communities will be a critical element to the success of this project. This approach is based on our experience at other BLM-related sites throughout the west and, specifically, our experience with communities throughout Alaska. E & E will prepare a community involvement plan (CIP) that will outline our community involvement strategy and be used to address community project concerns and expectations. The 1999 Community Relations Plan (CRP) for RDM will be updated consistent with EPA and BLM requirements. E & E will review and update, as needed, the community profile, community relations activities and community concerns. E & E will also include a project mailing list, developed in conjunction with the BLM and based initially off the list of contacts and interested parties provided in the CRP. The CIP will include a comprehensive public communication strategy for the project. This work will be coordinated with on-going public scoping and other outreach efforts associated with BLM's development of the Bering Sea - Western Interior (BSWI) Resource Management Plan.

E & E's approach to developing and maintaining public collaboration is to involve stakeholders early and often in the site investigation process. We suggest holding a public open house in Red Devil Village at an early, key phases of the project, such as during the development of the investigation process. The open house will provide a means for our team and BLM staff to listen to the public informally and answer questions in a non-confrontational way. We understand that

BLM has developed a good relationship with local community resulting in open communication. We believe our approach for community relations will complement the relationships that BLM has already built.

The strategy should target not only local users, but potential visitors, hunters and fishers from other regions. Our methods for public outreach include the following.

- Displaying notices or small posters in prominent public locations (such as the Red Devil Lodge and the Red Devil United States Post Office);
- Using the local radio in Aniak to disseminate information regarding how/when to provide public comment and provide project updates; and
- Contacting local groups (such as the Native corporations and Red Devil Village community) to collaborate on ways to reach their members.

Our goal is to ensure that we make use of every reasonable avenue to make the project publicly known and to allow the public to have input early in the process. Issues and concerns raised during initial scoping meetings or through public interview will then be incorporated into the CIP and used to help guide the overall investigation strategy. We followed this same approach at the Saginaw Hill Mine site in Tucson, Arizona for the BLM and resulted in a very trusting community of future BLM actions.

Task 6: Health and Safety Plan

E & E will prepare a site-specific health and safety plan (HASP) for the field investigation of the RDM. The HASP will be an appendix to the RI/FS Work Plan. The HASP will include the 11 elements described in the RI/FS Guidance, including a health and safety risk analysis, a description of monitoring and personnel protective equipment, medical monitoring, and site control. The HASP will also include provisions for working in remote areas and contingencies for working in inclement weather. The HASP will conform to requirements of the Occupational Health and Safety Administration in accordance with 40 CFT 300.150 of the NCP and 29 CFR 1910.120 1(1) and (1)(2).

Task 7: Quality Assurance Project Plan

The Quality Assurance Plan (QAPP) will follow EPA's Guidance for Quality Assurance Project Plans, EPA QA/G-5 (EPA/240/R- 02/009) and incorporate components identified in Alaska DEC's technical memorandum Environmental Laboratory Data and Quality Assurance Requirements (2009). The QAPP will be included as an appendix to the RI/FS Work Plan. This portion of the FSP will include the following components:

- DQOs;
- Laboratory identification and qualifications/certifications;
- Analytical methods and detection limits;
- Equipment calibration and maintenance procedures and frequency;
- Sample tracking and chain-of-custody requirements;
- Sampling transport and preservation procedures;
- Performance and system audits;
- Data assessment for precision, accuracy, and completeness;
- Corrective action procedures;
- QA reporting procedures;
- QA/QC sample frequency; and
- Internal laboratory QC requirements.

Task 8: Remedial Investigation/Feasibility Study Report

E & E will prepare the RI/FS report consistent with the RI/FS Work Plan (Task 2) and based on results of the field investigation and data analysis performed in Task 3. The RI/FS report will clearly present results of the nature and extent of contamination, determination of concentrations of naturally-occurring background metals, and results of bioavailability investigations. The RI/FS report will include the following components and will be further defined through development of the RI work plan. Details on the risk assessment and feasibility study portions of the RI/FS report are discussed in Sections 2.8.1 and 2.8.2:

- Introduction and study area identification
    - Discussion of historical field activities
    - Groundwater and surface water monitoring activities
    - RI field activities;
- Physical characteristics of the site
    - Results of RI field activities documenting physical characteristics
    - Topography and water table information
    - Site geology and hydrogeology
    - Ecology
    - Land use;
- Nature an extent of contamination
    - Presentation of historical data meeting DQOs for inclusion in RI, risk assessment and feasibility study
    - Results of RI field activities
    - Discussion of background sampling results;
- Contaminant fate and transport
    - Potential routes of migration
    - Contaminant persistence and migration
- Baseline human health and ecological risk assessments;
- RI Summary, conclusions and limitations; and
- Feasibility study.

The RI/FS report will be developed consistent with BLM, EPA and ADEC guidelines including but not limited to:

- BLM's Project Management Handbook;
- BLM's Response Actions Handbook;
- EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA;
- EPA's Risk Assessment Guidance for Superfund (Parts A through E);
- EPA's Ecological Risk Assessment Guidance for Superfund; and
- ADEC's Risk Assessment Procedures Manual.

Conduct Risk Assessment

E & E's risk assessors will work cooperatively with the project team to assemble and evaluate all available site data, including new data collected during the RI. The goal will be to develop a refined understanding of the nature and extent of contamination, transport mechanisms, fate of site-related contaminants and define the potential risk to receptors at the site.

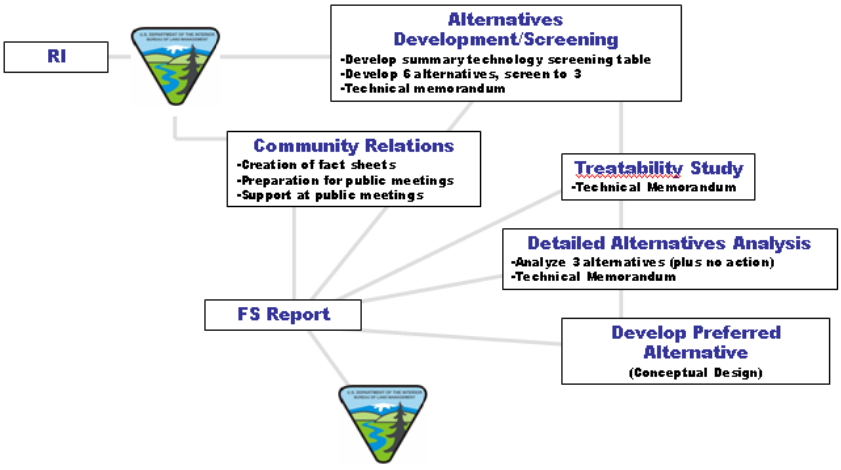
Baseline Human Health Risk Assessment

For the RDM, it will be important to address multiple land uses, including subsistence, recreational (e.g., ATV driver, hunter, etc.), and short-term worker scenarios (e.g., maintenance, surveying, etc.). In addition, chronic and intermediate (14-day) exposure will be investigated. Due to the type of contaminants present (heavy metals) E & E will evaluate exposure to fugitive dust and potential bioaccumulation in the food chain. E & E will use our experience at other sites to develop a methodology to evaluate these routes of exposure for both a screening-level assessment and a full baseline risk assessment. EPA Regional Screening Levels, Alaska DEC Method 2 cleanup levels, and BLM Risk Management Criteria will be used as screening criteria for identifying COPCs at the site. Because the human receptors at the site require site-specific exposure parameters, E & E will prepare an interim deliverable in a memorandum format outlining the revised CSM for the baseline HHRA and exposure parameters for BLM review and concurrence.

Site-specific quantitative risk analyses of COPCs will be conducted in the baseline risk assessment. As estimated risk from arsenic and mercury exposures is likely to be significantly elevated and possibly dependent upon metal speciation and bioaccessibility, the results of site-specific chemical speciation and bioaccessibility measurements will be applied to dosage estimates for arsenic and mercury intake. We will use EPA, BLM, and Alaska DEC risk guidance for the HHRA; the BLM guidance provides additional exposure scenarios to consider based on recreational exposure and gives some screening levels for those scenarios that are not available in EPA or Alaska DEC guidance.

Baseline Ecological Risk Assessment

The baseline ERA will be conducted consistent with Steps 3 through 8 of EPA's Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments and applicable Alaska DEC and BLM guidance. The baseline ERA will focus on the chemicals and receptors not eliminated from the risk-assessment process during the screening-level ERA provided in the RI work plan. The preliminary ecological CSM developed in Task 1 will be updated as appropriate. As will be done for the baseline HHRA, the updated ecological CSM and a list of exposure parameters for the chosen receptor species will be provided to BLM for review in a memorandum format. All new data collected during RI sampling activities will be utilized in the baseline ERA, especially those data



The development of the FS report will be a dynamic process that will rely on continued communication with BLM.

regarding levels of site-related chemicals in wildlife food items. The availability of such data will greatly reduce the uncertainty associated with estimating food-chain transfer of metals at the site and provide reliable risk estimates to support defensible risk-management decisions.

Perform Feasibility Study

During the report development of the RI/FS, E & E will initiate the FS for effective overlap. Using the RI results, potential remedial alternatives will be evaluated. Alternatives that involve minimal efforts to reduce potential exposures (e.g., deed restrictions) will be presented as "limited action" alternatives.

E & E proposes to present the alternatives evaluation in a technical memorandum (technical memorandum) for BLM input and review early in the process. The technical memorandum will address RAOs, general response actions, and appropriate remedial technologies. A screening level analysis will be presented that identifies up to seven alternatives and one no further action alternative on the basis of effectiveness, implementability, and cost. The use of this technical memorandum will enable E & E engineers and BLM personnel to work together to best identify the most pertinent alternatives for inclusion in the FS.

The FS will distill the information obtained during the RI into a document supporting the implementation of the final site remedy, utilizing the ARARs and projected end use of the site. The prospective remedies selected will be evaluated based on nine criteria: overall protection of human health and environment; compliance with ARARs; long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; cost; state acceptance; and community acceptance. E & E proposes to approach the FS according to the EPA guidance and will include the following steps: Develop RAOs based on the contaminants and media of interest, exposure pathways, and preliminary remediation goals that consider ARARs and risk factors; Develop general response actions for each medium to which containment, treatment or removal actions can be taken, based on technical implementability; Identify and screen technologies applicable to the response actions to eliminate those that are not technically implementable; Further screen technology process options to select a representative process for each type; and assemble the selected representative technologies into alternatives representing a range of treatment and containment combinations, as appropriate.

Establish Remedial Action Objectives

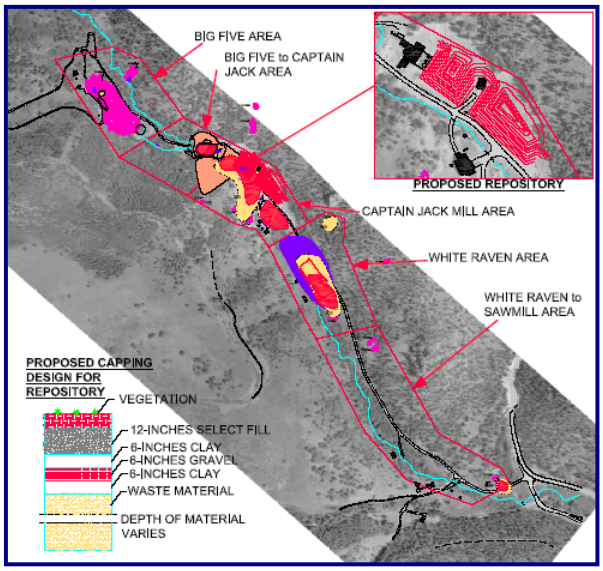
RAOs are specific goals for protecting human health and the environment. E & E will develop RAOs by evaluating ARARs that are protective of human health and the environment and by evaluating the results of the RI, including the human and ecological risk assessments. The development of RAOs involves ARARs and the results of the baseline human and ecological risk assessment in the RI. The RAOs for protecting human receptors will express both a contaminant level and an exposure route, rather than contaminant levels alone. As RAOs for protecting ecological receptors typically seek to preserve or restore a resource (i.e., surface soil, surface water), E & E will express environmental objectives in terms of the medium of interest and target cleanup levels, whenever possible. E & E will submit preliminary RAOs to the BLM for discussion prior to proceeding in the FS.

Develop General Response Actions

GRAs describe those actions that can potentially achieve the established RAOs of the FS. These actions are intended to: (1) mitigate potential exposure to, (2) control the migration of, and/or (3) remediate contaminants of concern identified in the risk assessment. GRAs for RDM may include: No Further Action, Risk and Hazard Management, Monitored Natural Attenuation, In-situ Treatment, Containment, and/or Removal and Disposal. E & E will develop GRAs based on CERCLA guidance and similar to the way we performed at the other BLM mine site. E & E proposes to develop these GRAs in close communication with BLM in order to provide an agreed upon framework from which to select process options.

Identify and Screen Appropriate Technologies

In this step, E & E will work to reduce the number of potentially applicable technology types and process options by evaluating the options with respect to technical implementability. E & E will draw on numerous sources for technology types and process options, including our extensive previous experience with mercury and arsenic-contaminated soils and sediments at mine sites. In addition, E & E will evaluate other media that may have been affected by the mine waste source, including surface water and groundwater. Historic and cultural considerations will be evaluated as well from a standpoint of public and administrative acceptance. E & E will eliminate certain process options and entire technology types from further consideration on the basis of technical implementability. As discussed above, E & E proposes to present this information to BLM in a technical memorandum for collaboration and concurrence before proceeding to the next step of the FS.



At the Captain Jack Site, alternatives were presented graphically for ease of community understanding and acceptance.

Evaluate Process Options

E & E will evaluate implementable technology processes in greater detail to select one process to represent each technology type. This will be done to simplify the subsequent development and evaluation of alternatives without limiting flexibility during RD. In some cases, E & E may need to select more than one process option for a technology type if two or more processes differ in their performance such that one would not represent the other adequately. These process options will be evaluated on the basis of effectiveness, implementability, and cost. Cost will be evaluated on a comparative basis in this step and categorized as low, moderate, or high cost when compared to other implementable options. E & E will utilize several available publications for cost comparisons, including EPA guidance documents and industry published papers on emerging technologies.

Re-Evaluate Data Needs

As the ability to scope this project will directly tie to the amount and quality of available information, the project plans may need to be developed iteratively. As new information is acquired or new decisions are made, data requirements may need to be re-evaluated and, if appropriate, project plans may require modification. If innovative technologies are identified, which require additional data from the site, E & E will propose additional site characterization and work closely with BLM to coordinate these efforts.

Assemble Technologies into Alternatives

E & E will combine general response actions and the process options chosen to represent the various technology types for each medium into alternatives that address the site as a whole. Alternative descriptions will include a discussion of the nature and extent of material to be remediated, conceptual design parameters (sizing, placement, etc.), administrative or institutional controls required, and O&M needed to ensure long-term effectiveness. Technologies that we anticipate including are: stabilization and consolidation, capping, run-on and run-off controls, soil fixation to prevent leaching, grading, and institutional controls.

Screen Alternatives

During this step, E & E will ensure that alternatives protect human health and the environment from each potential pathway of concern at the site. Next, the alternatives will be evaluated against the short- and long-term aspects of effectiveness, implementability, and cost. The objective of this step will be to reduce the number of alternatives; therefore, the analysis will be more thorough and extensive. E & E will continue to work closely with BLM to communicate progress in this step and discuss various alternatives that will not be moving forward to the detailed analysis.

Detailed Analysis of Alternatives

Once the evaluation has been conducted for each of the alternatives, E & E proposes to meet with BLM to discuss each of the alternatives being considered. . Construction and long term operation and maintenance cost estimates will be performed to enable a more detailed cost comparison. E & E typically presents each alternative in narrative form with several figures to graphically show the implementation of the alternative and draw attention to key site features that will be directly affected. This approach has worked well to aid in public understanding and acceptance of alternatives. The nine evaluation criteria previously discussed will be utilized to compare all alternatives and present a proposed site alternative.

Draft the Feasibility Study Report

E & E will provide BLM with an early outline of the FS draft report and if desired by BLM, provide completed chapters for early review to maintain or compress the project schedule. The results of the alternatives evaluation will be presented in the FS report. The report will include the following: Summarized FS objectives; Articulated GRAs; Summarized remedial objectives; ARARs analysis; Detailed analysis of remedial alternatives; Remedial alternatives description; Identification and screening of remedial technologies; and Summary and conclusions. A contract consistency review draft report will be available for BLM comment, after which an agency draft will be available for ADEC and other agency comment.

Draft the Remedial Investigation Report

The results of the RI will be presented in the RI report in the format following EPA guidance and the BLM CERCLA Handbook and in concurrence with BLM. An early outline will be submitted to BLM for input and approval. Recommended RAOs also will be described. If desired, E & E will submit draft chapters to BLM as they are complete to speed up the review process. In addition, documentation resulting from the field investigations and analytical data will be included as appendices. Review copies will be provided electronically, where possible, in order to minimize document production costs and to facilitate tracking of comments and responses among reviewers. E & E assumes that a contract consistency review draft will be prepared and revised prior to review by other agencies and the public.

B

E & E HAZWOPER Training Certificates

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Hazardous Materials
Worker Training Center

Providing Safety and Health Training for: Emergency Response Employees, Superfund Site Employees, and RCRA TSD Site Employees

This certifies that on September 8-12, 2008

Timothy P. Dobson

Attended and Successfully Completed the 40 Hour

OSHA Hazardous Waste Operations Certification Training Program

Per 29 CFR 1910.120 (e)

Certificate Number: HWOC40-08/09/12-875

Issue Date: September 12, 2008 Expiration Date: September 12, 2009

Instructor, Hazardous Materials Education

Director, Hazardous Materials Education

Director, Toxicology Research Center

STATE UNIVERSITY OF NEW YORK AT BUFFALO
TOXICOLOGY RESEARCH CENTER
3435 Main Street, Hayes B, Building 3, Buffalo, New York 14214-3015
(716) 829-2125

Hazardous Materials Worker Training Center

Providing Safety and Health Training for: Emergency Response Employees, Superfund Site Employees, and RCRA TSD Site Employees

This certifies that on June 19-23, 2006

Cameron J. Fisher

Attended and Successfully Completed the 40 Hour

OSHA Hazardous Waste Operations Certification Training Program

Per 29 CFR 1910.120 (e)

Certificate Number: HWOC40-06/06/23-696

Issue Date: June 23, 2006

Expiration Date: June 23, 2007

Instructor, Hazardous Materials Education

Director, Hazardous Materials Education

Director, Toxicology Research Center

ecology and environment, inc.

Acknowledges that

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has successfully completed the

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presented in Buffalo, New York

Paul W. Jonmaire

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DIRECTOR, HEALTH AND SAFETY

Douglas P. Schuessler

DOUGLAS P. SCHUESSLER
TRAINING MANAGER

May 20, 1994

DATE

This course meets the requirements of OSHA 29CFR1910.120(e) and has been approved by the United States Environmental Protection Agency

Certificate No. F010040

Certificate of Completion

Jennifer Schmitz

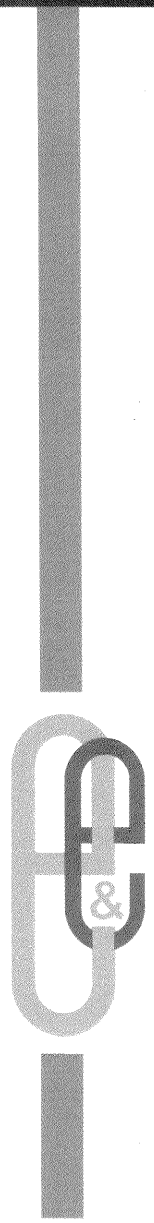
has successfully completed the

HAZWOPER SUPERVISOR TRAINING AND 8-HOUR ANNUAL REFRESHER

Presented by

ECOLOGY AND ENVIRONMENT, INC.

January 28, 2009 in
Seattle, Washington



THIS COURSE MEETS THE REQUIREMENTS OF
OSHA 29 CFR 1910.120(e)(4), WAC 296-843-20015,
OSHA 29 CFR 1910.120(e), AND WAC 296-843-200

D. Joseph Grojean

COURSE Manager

D. JOSEPH GROJEAN

C

E & E Liability Insurance Certificate

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368 Pleasant View Drive
Lancaster, NY 14086

INSURERS AFFORDING COVERAGE	NAIC #
INSURER A: Zurich American Insurance Co.	16535
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INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A		GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY CLAIMS MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT X LOC	GLO9324707	08/01/09	08/01/10	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$3,000,000 $500,000 $50,000 $3,000,000 $3,000,000 $3,000,000
A A		AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS X HIRED AUTOS X NON-OWNED AUTOS	BAP9324708 BINDER52471	08/01/09 08/01/09	08/01/10 08/01/10	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$2,000,000 $ $ $
		GARAGE LIABILITY ANY AUTO				AUTO ONLY - EA ACCIDENT OTHER THAN AUTO ONLY: EA ACC AGG	$ $ $
A		EXCESS/UMBRELLA LIABILITY X OCCUR CLAIMS MADE DEDUCTIBLE X RETENTION $ 10000	BINDER52458	08/01/09	08/01/10	EACH OCCURRENCE AGGREGATE	$15,000,000 $15,000,000
A		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below	WC9324709	08/01/09	08/01/10	X WC STATU-TORY LIMITS OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$1,000,000 $1,000,000 $1,000,000
A		OTHER Professional & Pollution Legal Liability	PEC654929800	08/01/09	08/01/10	$10,000,000 Each Claim $10,000,000 Aggregate	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

CERTIFICATE HOLDER

Specimen

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

IMPORTANT

If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

DISCLAIMER

The Certificate of Insurance on the reverse side of this form does not constitute a contract between the issuing insurer(s), authorized representative or producer, and the certificate holder, nor does it affirmatively or negatively amend, extend or alter the coverage afforded by the policies listed thereon.

D Resumes for Key E & E Staff

MARK W. LONGTINE, P.G. — RI Lead

EDUCATION

M.A., Geological Sciences, University of Texas at Austin

B.S., Geological Sciences, cum laude, University of Wisconsin-Madison

CERTIFICATIONS

Registered Professional Geologist, States of Idaho, Oregon, and Washington

With 19 years' experience, Mr. Longtine provides technical geologic support for site investigations and remedial actions. He evaluates sites with complex geologic and hydrogeologic systems on a local and regional scale; and he plans and leads multidisciplinary environmental investigations for sites containing hazardous waste, USTs, pipelines, and industrial manufacturing facilities. Mr. Longtine specializes in evaluation of mining and other sites with groundwater and subsurface soil contamination. For contaminated sites, he uses the investigation results to develop conceptual site models; delineate the nature and extent and fate and transport of surface and subsurface contamination; develop site-specific remedial measures; and generate project reports.

Upper Columbia River Site, Eastern Washington. Under the AES program for EPA Region 10, Mr. Longtine led E & E's support for an RI/FS addressing contamination by heavy metals, PCBs, and dioxins/furans from multiple sources within the 150-mile reach of the Upper Columbia River/Lake Roosevelt extending from the US/Canada border to Grand Coulee Dam. The large, complex site investigation involved coordination between the United States Department of State and the Canadian government and participation by numerous other federal, tribal, state, and local stakeholders Mr. Longtine had a key role in the RI/FS planning and scoping and led the historical data gathering/management effort; the initial evaluation of applicable or relevant and appropriate requirements; and the characterization of potential contaminant sources, including historic mining and metal processing facilities. He personally led E & E's sediment sampling team for the Phase I RI, which involved the collection of 400 sediment samples, as well as the Phase I fish investigation for the human health and ecological risk assessments (HHRA and ERA).

Opalite and Bretz Mines, McDermitt, Oregon. Mr. Longtine managed the investigations of these remote, abandoned mercury mines under E & E's multisite program for ODEQ, in coordination with BLM. He planned and implemented the characterization of waste rock, processed ore, and other source materials, as well as surface water, sediment, and fish tissue in coordination with the Oregon Department of Fish and Wildlife at background and downgradient locations. He used several nonroutine laboratory analytical techniques to help evaluate contaminant fate and transport and risk to human health and ecological receptors. In addition, he employed several types of field screening for mercury and other metals, resulting in significant savings in mobilization and analytical laboratory costs. He oversaw the development of the screening-level HHRA/ERA, the evaluation of physical hazards, an assessment of bat habitat, and development of time-critical removal actions.

Alder Mine, Twisp, Washington. For EPA Region 10, Mr. Longtine managed the combined START SI and removal assessment (RA) for this abandoned gold and copper mine/mill. He designed an investigative approach to evaluate on-site contaminant sources and the soil, surface water, and groundwater contaminant exposure/migration pathways that ensured that site investigation/RA objectives would be met with a single field mobilization. Mr. Longtine evaluated analytical data for on-site and background soil/rock, groundwater, surface water, and sediment; tailing tests; lateral and vertical groundwater gradients; regional geological information; and major anion-cation groundwater and surface water signatures and determined that previously documented arsenic groundwater contamination was not

attributable to on-site mill sources, enabling the limited resources of the PRP to be used to address other site removal actions.

During the PRP-led removal action, which included tailing removal and mill building decontamination/ demolition at the Alder Mine site, Mr. Longtine reviewed PRP planning and reporting documents, oversaw the PRP's removal activities by the PRP, and provided technical assistance to EPA during removal activities performed by EPA's Emergency and Rapid Response Service (ERRS) contractor. He led START sampling efforts, including use of field-screening techniques that facilitated real-time decision making and resulted in substantial analytical laboratory and mobilization cost savings. He also oversaw the development of site-specific screening criteria for the reuse of timbers and other salvaged building materials. The project required his close coordination with EPA, EPA's ERRS contractor, PRP representatives, BLM, the USDA Forest Service, the Washington State Departments of Ecology and Health, and Okanogan County Health District.

Hollis Mining Area, Prince of Wales Island, Alaska. For EPA Region 10, Mr. Longtine managed the START assessment of six abandoned gold and silver mines within the Lower Harris River Mining Claim and Maybeso Creek drainages. He used the results of field investigations and laboratory analyses to evaluate potential impacts of the historic mining activities on sediment and surface water quality within the two watersheds, coordinating closely with both EPA and the USDA Forest Service.

Additional Mine Sites, Oregon and Washington. For EPA Region 10, he managed E & E's investigations of 10 historic coal mines near Lake Whatcom (the sole source of drinking water for Bellingham, Washington). The project involved extensive research of the area's coal mining history and, in coordination with the Washington State Department of Ecology and USGS, an evaluation of potential acid mine drainage and heavy metal contamination of surface water discharging from the mines. Mr. Longtine also conducted SIs for the Midway and Analulu Mines in Oregon.

Mineral Resource Investigation, Ketchikan, Alaska. With the United States Bureau of Mines in Juneau, he conducted mapping and sampling to support a study of mineral potential in the Ketchikan area.

EDUCATION

Ph.D., Civil Engineering, University of Minnesota at Minneapolis

M.S., Biology, University of Minnesota at Duluth

B.S., Forest Ecology, summa cum laude, State University of New York College of Environmental Science and Forestry at Syracuse

A.S., Science/Mathematics, Erie Community College

Dr. Mach specializes in ecological risk assessment (ERA), limnology, water and sediment chemistry, and aquatic toxicology. With E & E, he has completed ERAs for aquatic and terrestrial resources at sites throughout the United States. He is experienced in evaluating the transport, fate, and ecological effects of a wide range of contaminants, including metals, lanthanide elements, PCBs, pesticides, radionuclides, PAHs, volatile organic chemicals (VOCs), and petroleum.

Rand Historical Mining Complex, Randsburg, California. For DOI's Bureau of Land Management, Dr. Mach helped prepare a risk assessment work plan and sampling and analysis plan for this large, historic mining area in the western Mojave Desert, which is listed on the Superfund National Priorities List due to its elevated arsenic concentrations. The work focused on delineating source areas; understanding transport pathways and sinks; quantifying bioaccumulation and bioavailability; and estimating human health and ecological risks. The risk assessment results were used to develop site-specific cleanup levels for the site.

Mojave National Preserve, California. For the National Park Service (NPS), Dr. Mach oversaw the ERA for a lanthanide mining site where decades of careless tailing disposal had contaminated part of the Preserve, threatening critical habitat for many desert wildlife species. He helped define the scope and overall design of the ERA and ensured that work products were scientifically sound, that defensible conclusions were drawn, and that interim remedial actions protected the Preserve's natural resources.

Carson River Mercury, West-Central Nevada. At this Superfund site, mercury contamination is widely distributed in water, sediment, and floodplain soil up to 70 miles downstream from a historic mining area. From 1993 through 1997, under E & E's ARCS program for EPA Region 9, Dr. Mach led the aquatic studies supporting the ERA and assessed the fate, transport, and ecological effects of mercury. He provided key support for the design and implementation of the Carson River field investigations to measure methylmercury and other forms of mercury in soil, sediment, surface water, and biota. He related seasonal variations in mercury speciation in the Carson River to flow conditions, water quality and sediment characteristics, and other environmental factors. He oversaw the use of ultra-clean methods for mercury sampling and analysis. In addition, he investigated abnormalities in fish and benthic community composition along a mercury contamination gradient to determine impacts on the aquatic ecosystem. Dr. Mach also helped develop strategies to minimize ecological and human health risks by limiting mercury remobilization and bioaccumulation.

Upper Columbia River Mines and Mills, Eastern Washington. Under E & E's Architect and Engineering Services (AES-10) program for EPA Region 10, Dr. Mach helped develop plans for sampling walleye, rainbow trout, whitefish, sucker, and burbot from the Upper Columbia River from the Canadian border to Grand Coolee Dam, a distance of approximately 150 miles. He developed plans for collecting, handling, and transporting fish from the field to the laboratory; as well as for laboratory preparation of whole-body and fillet samples for chemical analysis. He also provided input on statistical

methods used to estimate appropriate sample size needed to achieve acceptable levels of statistical power and confidence and provided guidance on approaches to select appropriate background areas for sediment sampling. In addition, Dr. Mach participated in scoping meetings with state and federal regulatory agencies and the Spokane and Colville Indian Tribes to ensure that the final sampling and analysis plans addressed the concerns of all interested parties.

Statewide Programs for Alaska DEC, Alaska. Between 1996 and 2001, under E & E's statewide contamination assessment and water quality contracts with the Alaska Department of Environmental Conservation (Alaska DEC), Dr. Mach has been a member of the E & E team that reviews ERAs prepared by other contractors for various sites statewide, including coastal sites in southeast Alaska and forested and tundra sites in the state's interior. He is assisting the agency at the Red Dog Mine, where ore concentrate has contaminated extensive areas of freshwater, marine, and terrestrial habitat. The reviews helped ensure that the assessments were scientifically sound and that the conclusions drawn were appropriate and adequately protective of state resources. Dr. Mach also develops ERA guidance documents that are used statewide for Alaska's Contaminated Sites Remediation Program.

Petroleum-Contaminated Sites, Nationwide. Since 1998, for Chevron, Dr. Mach has evaluated the ecological risks associated with petroleum contamination in terrestrial, aquatic, and estuarine systems at various sites in the United States. He has designed and implemented investigations to evaluate the biological uptake of petroleum constituents; prepared screening-level and baseline ERAs; designed ecological-monitoring plans; and developed risk-based remedial approaches for petroleum-contaminated sites.

Lake Trace Metal Studies, Wisconsin. At the University of Minnesota at Minneapolis, Dr. Mach designed, implemented, and interpreted field studies on the biogeochemical cycling of trace metals in an experimentally acidified Wisconsin lake. He was the coauthor of several professional publications and presented the research results at professional symposia. In addition to his research, he instructed and supervised laboratory technicians.

VIVIAN G. MELDE — Public Involvement Lead

EDUCATION

B.A., Communications,
University of Louisville

Specializing in public involvement and community relations, Ms. Melde has 25 years' experience as a liaison with clients, the public, and the media in Alaska. She has participated in all aspects of public meetings and hearings, meeting planning, and logistics. She writes and produces print advertisements, public notices, and radio and television announcements; prepares newsletters and fact sheets; documents proceedings; maintains mailing lists for interested parties and media contacts; prepares presentation graphics, slides, and videotapes; and prepares responsiveness summaries and other meeting reports.

Statewide Emergency Response Plan (SERP), Alaska. Under E & E's multiyear contract with the Alaska Department of Military and Veterans Affairs, Ms. Melde prepared a SERP addressing 70 Army National Guard facilities located throughout the state. As the task manager, she oversaw the team that researched and compiled community and logistical information concerning the support of emergency response capabilities for oil and hazardous releases at each facility. The SERP delineated resources for lodging; restaurants; and commercial, charter, and cargo transportation for spill response equipment and personnel; as well as facility information obtained from Spill Prevention Control and Countermeasure plans. Produced in both hard copy and electronic format, the SERP also included aerial maps, photographs, and site diagrams.

***Selendang Ayu* Oil Spill, Unalaska Island, Alaska.** Ms. Melde led the E & E team that supported the Alaska DEC's Unified Command in response to the December 2004 grounding of the M/V *Selendang Ayu*, an incident and oil spill that gained international attention when six crew members perished in the Bering Sea, following the crash of the United States Coast Guard helicopter attempting to evacuate them. As a Public Information Officer (PIO), she supported the Anchorage-based Joint Information Center (JIC) by attending media briefings and reviewing public information to be posted on the Alaska DEC Web site. From December 2004 through early 2005, her team staffed the JIC as the Alaska DEC's PIO in Dutch Harbor at the Incident Command Post. Team members coordinated public and media inquiries; attended routine staff briefings via statewide teleconferences; and participated in public meetings attended by representatives of tribal groups and the Alaska Native Corporation, a fisheries *ad hoc* group, and the Unalaska community.

Gaffney Road Area Groundwater Investigation, Fairbanks, Alaska. When PCE and benzene were found in groundwater within the shallow, unconfined aquifer beneath the central business district of the City of Fairbanks, Ms. Melde supported the Alaska DEC's public involvement efforts for this high-visibility site investigation. As E & E task manager, she produced two fact sheets, planned public meetings, and prepared a private well survey.

Defense Environmental Restoration Program, Alaska. For the USACE Alaska District, Ms. Melde worked on public involvement projects in Anchorage and Fairbanks. Her support of the community relations activities for the Fort Richardson and Fort Wainwright Restoration Advisory Boards (RABs) included planning and preparation of presentation materials for quarterly RAB meetings, development of quarterly fact sheets, and planning/attendance at public meetings relating to restoration efforts at both facilities. She also revised a community relations plan for the former Umiat Air Force Station (AFS) on Alaska's North Slope and the former Wildwood AFS on the Kenai Peninsula.

Region 10 START Program, Alaska, Washington, Oregon, and Idaho. For EPA Region 10, Ms. Melde helped prepare letters to owners and operators of Alaskan fish-processing facilities that may use reportable quantities of ammonia, offering compliance assistance for Tier Two reporting requirements. She also participated in field visits to several of the facilities in south-central and southeastern Alaska. In addition, she led a project to input Tier Two information into EPA's CAMEO (Computer-Aided Management of Emergency Operations) database for facilities in Alaska. Her team entered information for nearly 1,000 individual facilities throughout Alaska that store or process reportable quantities of extremely hazardous substances.

For seven villages along the Yukon River watershed, she presented an overview of the ICS at Fort Yukon, Alaska, in conjunction with training to assist the villages to develop community emergency response plans. She also helped update information for EPA's tribal database, which contains information on over 200 federally recognized Alaskan Native tribes. Ms. Melde contacted tribal offices by telephone and/or telefax to obtain current information on emergency contacts, tribal leaders, and environmental officials. On behalf of EPA, she attended meetings of the Alaska Regional Response Team (ARRT) and Alaska Regional Interagency Steering Committee and wrote meeting summaries for EPA. She also helped develop an internal, secure Web site for ARRT and took meeting notes for EPA Regional Response Team teleconference meetings. In addition, under the START program, she is a member of E & E's emergency response team for Alaska and has participated in monthly drills and periodic exercises.

Chugach Electric Association, Anchorage, Alaska. Ms. Melde worked with Chugach Electric Association, Inc., (Chugach) in Anchorage, Alaska, for over 11 years. Chugach is the largest electrical utility in the state. During her final two years as a key account specialist, Ms. Melde was responsible for maintaining and strengthening the intensive communication and service relations with top-ranked commercial customers. She assisted in planning research methods and marketing designs for key accounts, educated customers about their rates and opportunities for energy conservation, provided information on proposed utility deregulation, and worked with employees throughout the company to help ensure their knowledgeable response to customer inquiries and concerns.

During four years as a Chugach public relations specialist, Ms. Melde wrote articles for external and internal newsletters, press releases, and corporate reports; took photographs for stories and presentations; and provided media and public information as a spokesperson during power outages. She participated in safety presentations for area schools and coordinated the annual safety poster contest for school children. In addition, she produced quarterly financial reports, brochures, advertisements, charts, graphs, and special mailings; produced television and radio public service announcements; and planned and coordinated the company's annual membership meeting and election logistics.

Prior to her involvement in Chugach public relations, Ms. Melde worked for the executive manager of finance and planning. She was a key staff participant in Chugach's effort to refinance long-term debt through an initial Wall Street bond offering, which changed the utility's financial makeup from federal funding to publicly traded bond holding. She produced budget spreadsheets, graphs, and associated documents to support the board of directors and planned meetings, travel, and lodging arrangements for Chugach financial managers.

EDUCATION

M.S., Environmental Health, University of Washington School of Public Health and Community Medicine

B.S., Environmental Science, Washington State University

Ms. Pingree has 12 years' experience in toxicological evaluation, risk assessment, regulatory development, and the assessment and management of contaminated sites. She has prepared risk assessments addressing potential exposure to heavy metals, radionuclides, chlorinated solvents, dioxins, PCBs, pesticides, and petroleum products and their constituents. Her human health risk assessment and toxicology evaluation experience encompasses data gap analysis; development of conceptual site models; contaminants in subsistence foods, sediment, and contaminant fate and transport. Ms. Pingree also has significant research experience with mercury toxicology (see bibliography at end of this resume).

Kensington Mine, Juneau, Alaska. For the Alaska Department of Environmental Conservation (Alaska DEC), Ms. Pingree led a team of E & E toxicologists and chemists in development of a toxicity white paper addressing the acid rock drainage (ARD) potential and ecological toxicity affects of mine tailings at a proposed gold mine to be located outside of Juneau. Her team evaluated available peer-reviewed journal articles and site-specific toxicity and ARD analyses, completing the project under budget, within a very short schedule.

Red Dog Mine, Red Dog, Alaska. Both with E & E and during earlier employment with the Alaska DEC, Ms. Pingree represented the agency on an interagency technical review work group to address concerns raised by the community regarding the safe consumption of foods harvested at and near the Red Dog Mine site. Fugitive dust from the transportation of ore between the mine and the port had contaminated portions of the 52-mile Delong Mountain Regional Transport System (DMTS) road and port site with zinc, lead, and cadmium. Ms. Pingree helped develop a berry sampling work plan and a review of site-related heavy metal concerns, for inclusion in a public health evaluation conducted by the Alaska Department of Health and Social Services. Over multiple E & E and Alaska DEC project assignments, Ms. Pingree managed the team responsible for the review of the HHRA and ERA work plans and reports. She served as the technical lead on all HHRA evaluations and managed the review and response to public comments on the risk assessment for the Alaska DEC. The risk assessment focused on fugitive dust, lead modeling, potential contamination of subsistence foods, and sediment evaluation.

Opalite Mine, McDermitt, Oregon. For ODEQ, Ms. Pingree conducted a screening-level HHRA and a Level II screening-level ERA for this abandoned mercury mine following EPA and ODEQ risk assessment requirements. The project involved assessment of heavy metals in soil, sediment, surface water, and fish tissue.

Sixes River/Inman Mine Site, Curry County, Oregon. For the Bureau of Land Management (BLM), she completed a human health risk evaluation and a Level I ERA following EPA and ODEQ risk assessment guidelines. Former mining operations at the site, now a campground/recreation site, involved use of elemental mercury and testing of surface water, sediment, and soil indicated potential risk to ecological receptors exposed to mercury in soil. Ms. Pingree developed human health and ecological conceptual site models, compared mercury concentrations in environmental media to screening levels, and recommended further risk evaluation as part of E & E's remedial investigation (RI) for the site.

Pond Mine, Placer County, California. For BLM, Ms. Pingree used BLM risk management criteria to complete a HHRA and ERA as part of the RI for this site, where hydraulic mining operations had released mercury throughout the sluice tunnel complex, pit floor and ponds, and sedimentation ponds. She developed a conceptual site model indicating complete exposure pathways to human and ecological receptors, identified sensitive ecological receptors in watershed, and compared mercury concentrations in sediment and soil against appropriate screening levels.

Additional Risk Assessments While Employed by State of Alaska

For five years, Ms. Pingree was the Alaska DEC's lead risk assessor and managed the Technical Services Section of the State's Contaminated Sites Program, responsible for supporting the assessment and management of contaminated sites statewide. Under her leadership, the 12-person section staff provided expertise in risk assessment, toxicology, chemistry, and community involvement; database and Web site management; regulation and policy guidance development; implementation of the State's laboratory approval program; and coordination of the UST pollution prevention and inspection program. Ms. Pingree was responsible for managing about $2 million in federal grant funds annually, enabling the development and implementation of the State's Contaminated Sites, Brownfield, and Voluntary Cleanup programs; as well as the State programs for UST site assessment, cleanup, third-party inspection, and pollution prevention. In addition, she participated with other members of the Alaska DEC management team in long-range planning and cost estimation for a $19-million annual budget.

With Alaska DEC, Ms. Pingree reviewed site-specific risk assessments and work plans and participated in project scoping, comment resolution, and public meetings for contaminated site assessment and management. She provided specialized health, risk, and toxicological support for the agency's development of guidance documents, regulations, and policy documents. She reviewed and evaluated public health assessments/consultations conducted by the State, focusing on exposure to contaminants through consumption of subsistence foods and contaminant volatization to indoor air, to determine protective cleanup levels.

Academic Research and Papers Addressing Mercury Toxicity

Lewandowski, T.A., C.H. Pierce, S.D. Pingree*, S. Hong, and E.M. Faustman, 2002, Methylmercury Distribution in the Pregnant Rat and Embryo During Early Midbrain Organogenesis, *Teratology*, 66(5):235-241.

Pingree, S.D., P.L. Simmonds, K.T. Rummel, and J.S. Woods, 2001, Quantitative Evaluation of Urinary Porphyrins as a Measure of Kidney Mercury Content and Mercury Body Burden During Prolonged Methylmercury Exposure in Rats, *Toxicological Sciences*, 61:234-340.

Pingree, S.D., P.L. Simmonds, and J.S. Woods, 1999, Effects of 2,3-Demercapto-1-Propane-Sulfonate (DMPS) on Tissue and Urine Mercury Levels in Methyl Mercury-Exposed Rats, *The Toxicologist*, 48:330.

Pingree, S.D., P.L. Simmonds, and J.S. Woods, 2001, Effects of 2,3-Demercapto-1-Propanesulfonic Acid (DMPS) on Tissue and Urine Mercury Levels Following Prolonged Methylmercury Exposure in Rats, *Toxicological Sciences*, 61:224-233.

WILLIAM M. RICHARDS — Project Manager

EDUCATION

B.S., Environmental Science, Washington State University

Mr. Richards has 23 years' experience in the management and implementation of environmental impact studies and investigations of sites contaminated with hazardous substances in the Pacific Northwest and Alaska. His background includes work for a wide variety of government clients, including EPA; the National Park Service (NPS); DOI's Bureau of Land Management (BLM); the United States Army Corps of Engineers (USACE); the Washington State Department of Ecology; and the Alaska Department of Environmental Conservation (Alaska DEC).

Toxics Cleanup Program, Washington State. Mr. Richards is E & E's program manager for this multiyear professional services contract to assist the Washington State Department of Ecology in the investigation and remediation of state-lead sites. Mr. Richards is overseeing assignments involving source identification and control and risk assessment reviews in the Duwamish River corridor in Seattle, the assessment and cleanup of a shipyard in Lake Union, cleanup studies at the former Rayonier Pulp Mill in Port Angeles, completion of post-remedial action reports for 12 nearshore sites in Tacoma and Bellingham, sediment investigations and shoreline restoration studies in Port Angeles Harbor and Oakland Bay, a natural resource damage analysis of a hypothetical mine tailing dam failure in eastern Washington, and support for the Puget Sound toxics loading program including analysis of publicly owned treatment plant and stormwater discharge contributions of selected pollutants to the Puget Sound.

Region 10 AES Contract, Washington, Oregon, Idaho, and Alaska. From 2004 to 2008, Mr. Richards was E & E's program manager for a multisite, multiyear, multi-team Architect and Engineering Services (AES) contract to provide Superfund site assessment, engineering, and response support to EPA Region 10. He prepared work plans, developed project budgets, tracked costs and schedules, and represented E & E in meetings with EPA and other stakeholders. He oversaw major program assignments including support for the remedial investigation/feasibility study (RI/FS) for the Upper Columbia River; preparation of a five-year review of the effectiveness of interim and long-term remedial actions at the Bunker Hill mine complex in Idaho; design of a pilot-scale surface water treatment system for Canyon Creek, Idaho oversight of an RI/FS being performed Alaska Railroad contractors at Ship Creek in Anchorage, Alaska; analytical/data validation support for ongoing monitoring programs in the Coeur d'Alene River, Idaho; and design of an intertidal sediment cap at Eagle Harbor, Washington.

Multisite CERCLA Services, Alaska. Mr. Richards was program manager for E & E's multisite contract to provide Superfund-related services for Region 10 of the USDA Forest Service, which includes the Tongass and Chugach national forests. The scope of work included identification/characterization of potential Superfund sites on, or adversely affecting, lands administered by the Forest Service; as well as the completion of environmental evaluations and response actions under the National Oil and Hazardous Substances Pollution Contingency Plan. Sites included abandoned/inactive mines, dumps, landfills, and past spill sites.

Defense Environmental Restoration Program, Alaska. Mr. Richards managed numerous key assignments under E & E's multisite contract with the USACE Alaska District. As manager of the RI/FS and risk assessment for Operable Unit (OU) A at Fort Richardson, he developed a phased approach to avoid unnecessary investigation costs and initiated interim progress reports to the regulatory agencies to encourage early remedial decision making during the RI/FS. He reduced the requirements for RI

sampling and monitoring-well installation on the basis of early-phase RI sampling results, streamlined the FS to include only one of the original three OU-A study areas, and demonstrated that none of the three OU-A areas warranted remedial action under Superfund.

Under the USACE Alaska contract, Mr. Richards also managed the 11-person E & E team that conducted the $1.5-million RI/FS and risk assessment for OU-3 at Fort Wainwright. The two-month RI included installation/sampling of over 100 soil borings and monitoring wells, an ecological survey, hydrogeologic tests, and operation of an on-site field analytical screening laboratory. During the FS, Mr. Richards helped develop innovative remedial technologies and worked with regulatory personnel on behalf of the United States Army to negotiate mutually acceptable cleanup strategies.

In addition, Mr. Richards managed all of E & E's remote-site projects conducted for NPS through the USACE Alaska District's "support for others" program. He designed and implemented UST release investigations using portable drilling equipment and temporary well points at Brooks Camp in Katmai National Park. He led tank tightness testing in Katmai, Lake Clark, and Glacier Bay national parks and managed Superfund preliminary assessments (PAs) at remote landfills in Denali and Glacier Bay national parks. Mr. Richards conducted a study on behalf of NPS to predict potential human health and ecological impacts resulting from discharges of petroleum fuels into Naknek Lake in Katmai National Park.

Under the USACE Alaska "support for others" program, he also was project manager for the remote Coal Creek Camp mining site in Yukon-Charley Rivers National Preserve. The comprehensive investigation of multimedia environmental contamination by mercury, other toxic metals, and petroleum products included use of portable drilling and sample field screening equipment. Mr. Richards coordinated the streamlined risk assessment to develop site- specific, risk-based alternative mercury cleanup levels and prepared a focused remedial action plan to dredge the most highly contaminated sediment and treat the material on site with a mobile soil-washing unit.

Contaminated Site Assessment/Cleanup Programs, Alaska. Mr. Richards was program manager of E & E's multisite, multiyear PA/site inspection (SI) and contamination assessment contract for the Alaska DEC. He provided client liaison, personnel/resource allocation, budget development and tracking, and project scheduling for 21 PAs and nine SIs at locations including Anchorage, Fairbanks, Juneau, Cordova, Skagway, Kenai, Sitka, Homer, Kotzebue, and Ketchikan. He managed the risk assessment reviews for sites including Tin City and Sitka Naval Base. He completed an areawide groundwater study in Aniak and oversaw the cleanup of the Ketchikan Pulp Company (KPC) site, representing the Alaska DEC in meetings with KPC's contractor and the public. He managed project involving the development of a comprehensive GIS for the South Fairbanks Industrial Area to delineate water well locations and areas vulnerable to groundwater contamination.

Under this Alaska DEC contract, he also directed the completion of numerous CERCLA PA and SI documents addressing tidal zone mine tailings dumps in Southeast Alaska and unauthorized dump sites on the Kenai Peninsula. For example, at the Alaska-Juneau mine tailing dump, Mr. Richards managed the sampling of on-site tailings and off-site soil and the collection of high-volume air particulate samples. He coordinated field logistics and led field activities for sites including the McPeak Salvage, Miller Surplus, Soldotna Landfill, and A.J. Dump sites. He provided QA for E & E's application of the Alaska Hazard Ranking Model for PA sites. He also led the CERCLA PA/SI for the lead ore loading facility at Skagway.

For the Alaska DEC, he oversaw the RI/FS at the Alaska Pulp Corporation (APC) Mill in Sitka. He reviewed work plans, conceptual site models, and final reports prepared by the mill's contractor and worked with other contractors to ensure that State policies and regulations were integrated into the cleanup. The complex site has contaminated marine sediment, tidally influenced groundwater, and historical air deposition of contaminants. Mr. Richards developed position papers for the treatment of dioxin data in risk assessment documents, the use of probabilistic risk assessment techniques, the application of statistical approaches to determine if risk-based cleanup levels had been exceeded, and the use of split sampling strategies to verify results obtained by the mill's contractor. He also represented the Alaska DEC in meetings with APC's contractor and the general public.

Miner's Ridge Copper Mine, Glacier Peak Wilderness Area, Washington. For the USDA Forest Service, Mr. Richards was lead environmental scientist for E & E's investigation of this former copper mine, located in a remote wilderness area of Washington's North Cascades. Site access required a 20-mile hike. With the project geologist, Mr. Richards conducted three days of fieldwork to locate abandoned mining debris, adits, tunnels, and trenches; collect surface water and sediment samples; and generate detailed maps of surface features. He was the primary author of the site assessment report, which detailed the potential risks to human and ecological receptors from acid mine drainage, sediment contaminated with heavy metals, and abandoned debris. The Forest Service used the report in its valuation of the property, which became part of one of the largest, high-profile land exchanges in the Pacific Northwest.

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ALEXANDER H. WHITMAN, JR., P.E. — FS Lead

EDUCATION

M.B.A., Rutgers University

B.S., Civil Engineering, magna cum laude, Lehigh University

CERTIFICATIONS

Registered Professional Engineer, States of Alaska, Idaho, Oregon, Pennsylvania, and Washington

Licensed Professional Engineer, States of Colorado, Illinois, Michigan, Nevada, and Utah

A key E & E design manager since joining the company in 1986, Mr. Whitman has directed all of E & E's engineering activities in the western United States since 1991. He oversees all corporate engineering work and has provided QA and engineering reviews for all of E & E's engineering work in Alaska and the western United States. A skilled construction services manager, he has directed construction projects requiring familiarity with earthwork/excavation, tunneling, rock support, grouting, concrete construction, water and wastewater piping, electrical and mechanical systems, and automated controls; as well as computer-assisted modeling and design.

Facilities Environmental Compliance Program, Alaska. For the Federal Aviation Administration (FAA), Mr. Whitman provided QA for the Moses Point, Johnstone Point, Fairbanks Airport, and Cold Bay tank replacement projects; the RCRA corrective measures study at Lake Minchumina; and the preparation of a remedial system operation and maintenance manual for each of these sites. He also oversaw PCB abatement at Annette Island.

START Program, Washington, Oregon, Idaho, and Alaska. Mr. Whitman has provided key engineering support to EPA Region 10 under E & E's three successive Superfund Technical Assessment and Response Team (START) programs. In Idaho, Mr. Whitman was E & E's principal design engineer for channel relocation and tailing embankment erosion protection at Clayton Silver Mine, the design of stream protection and a mine tailings repository at Monarch Stamp Mill at Atlanta, and the design of a repository cap at Minnie Moore mine. He also provided senior-level engineering guidance for the START response to the Talache Mine tailing dam failure and for channel reconstruction at the Stibnite Mine in Idaho. In Oregon, he, led the design of a repository and slope stability improvements at Black Butte Mine, and oversaw engineering evaluations for the Formosa Mine. He also provided in senior-level engineering support for the Cinnabar Mine waste removal action in Alaska.

Region 10 AES Contract, Washington, Oregon, Idaho, and Alaska. Under E & E's Architect and Engineering Services (AES) contract to provide Superfund site assessment, engineering, and response support to EPA Region 10, Mr. Whitman was principal engineer for the Sweeney Mill cover design (part of the Bunker Hill Superfund project) in Kellogg, Idaho; and for the design of the Wyckoff West beach exposure barrier and sediment cap extension at Bainbridge Island, Washington.

USDA Forest Service Mine Sites, California and Arizona. For the USDA Forest Service, he was senior engineer in charge for engineering evaluation/cost analyses (EE/CAs) for Gibraltar Mine, Black Bob Mine, Minnesota Ridge Mine, and Golinsky Mine in California. At two of these sites, E & E recommended use of a treatment wetland to remediate acid mine drainage. In addition, Mr. Whitman determined the cause of seepage at the Atlanta Idaho Mine tailing repository and recommended alternative solutions. He was the principal design engineer for the design of a diversion channel at the Walker Mine in California. For the Turkey Creek Mine site in Arizona, he oversaw the removal design for tailing pile relocation and capping.

BLM Mine Sites, Western US and Alaska. Mr. Whitman was a key member of the teams that provided value engineering reviews of five EE/CAs prepared by DOI's Bureau of Land Management (BLM). He also served on E & E's value engineering team for the Ute Ulay mine site in Colorado. He was principal engineer for designs of the repository expansion at the Manning Canyon mine site in Utah, the Caselton Mine channel armoring project in Nevada, the Ute Ulay repository in Colorado, and the Saginaw Mine stabilization project in Arizona. In California, he was also principal engineer for E & E's evaluations of the Oat Hill and Rathburn-Petray mine sites; as well as for the Rand Historical Mining Complex, which includes the Kelly silver mine, Yellow Aster gold mine, and Johannesburg area mines.

Defense Environmental Restoration Program, Alaska. For the Alaska District of the United States Army Corps of Engineers (USACE), he reviewed all design documents and engineering analyses and many other studies associated with E & E's multisite design contract. He provided QA oversight for design reports addressing the removal of PCB- and fuel-contaminated soil at Wildwood Air Force Station (AFS); plans and specifications for PCB remediation at the Roosevelt Road site; and soil cleanup recommendations and cost estimates for Cape Sarichef/Scotch Cap, Umiat, and Katmai National Park. He provided engineering QA for the cap design for Haines Landfill, RI/FS and RD for Umiat AFS, UST removal at Katmai, remedial programs for Nike Sites B and C near Eielson Air Force Base (AFB), and RD projects for four abandoned North Slope DEW line stations. At Fort Wainwright, he provided overall engineering direction and QA for several remedial investigation/feasibility studies (RI/FSs) and risk assessments, as well as for the removal design for Birch Hill tank farm.

Cleveland Mill, Silver City, New Mexico. As manager of E & E's West Coast engineering operations, Mr. Whitman conducted the final review of the FS, including the assessment of various treatment options and site remedial measures, for this abandoned silver mine.