LeRoi
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FILE COPY

WORK PLAN

for

STATE REMEDIAL INVESTIGATION (RI)

LeRoi Smelter Site

Northport, Washington

June 1996

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WORK PLAN
for
STATE REMEDIAL INVESTIGATION (RI)
LEROI SMELTER SITE, NORTHPORT, WASHINGTON

JUNE 96

1.0 INTRODUCTION

The former LeRoi Smelter located in Northport, Stevens County, Washington (Figure 1) was placed on the Washington State Hazardous Sites List in August, 1995, with a ranking of 1. This ranking indicates that the site is considered among the sites with the highest assessed risk to human health and the environment. The site has been identified by the Department of Ecology's (Ecology) Toxics Cleanup Program as an orphan site. This means in general that potentially liable person(s) are either financially unable, or unavailable, to conduct remedial action in an adequate or timely manner at this site. Therefore, Washington State Model Toxics Control Act cleanup funds will be necessary to complete site characterization.

The purpose of the State Remedial Investigation (RI) is to collect, develop, and evaluate the nature and extent of releases of hazardous substances [as defined by RCW 70.105D.020(7)] from a Facility [as defined in RCW 70.105D.020(3)], and to gather all necessary data to support the Feasibility Study (FS). Sufficient information must be collected, developed, and evaluated to provide for the completion of a FS and subsequent selection of a cleanup action under WAC 173-340-360.

2.0 SITE DESCRIPTION AND PREVIOUS ASSESSMENTS

2.1 Site Description

The former LeRoi Company Smelter Site is located northeast of the Town of Northport, Washington. The property is legally described as within the NW 1/4 of Section 4, Township 39 North, Range 40 East of Willamette Meridian (Figure 1). The site encompasses about 32 acres and is accessed from the Northport-Waneta Road via Highway 25. The site is relatively level and is situated at about 1,360 feet above mean sea level. As shown on Figure 1, ground surface topography across the site slopes about 6 percent from the southeast portion of the site to the edge of the Columbia River. The gradient increases to the south-southeast toward Silver Crown Mountain.

Referring to Figure 2, the site is bordered on the west by Highway 25, to the east and south by the Northport-Waneta Road, and a city park across Burlington Northern railroad tracks to the north. The site is situated about 250 feet south from the east bank of the Columbia River. The property is not paved and surface water drainage appears to flow from northeast to southwest, then north towards the Columbia River (URS, 1993a).

As described above, the site is situated within the upper Columbia River Valley. Geologic materials in the area are described as alluvial and glacial deposits. Generally, the alluvial deposits consist of sand, gravel, and silt underlying terraces. The glacial deposits include coarse sand and gravel outwash, till, and poorly sorted drift. The glacial lake deposits are comprised mostly of silt, fine sand, and clay with some thin lenses of coarser material.

Well logs for the municipal supply wells (Figure 2) located onsite indicate that the site is underlain by fine to medium-grained sand and gravels with some silt. Based on the well logs, the first groundwater may occur approximately 65 to 75 feet below ground surface (bgs). However, deeper water bearing zones, about 120 to 160 feet bgs, have been developed for the Northport municipal water supply wells. The

assumed ground water flow direction beneath the site is north northwest toward the Columbia River.

2.2 Site History

The LeRoi Company began operating the smelter in 1896. The smelter was initially designed to treat the copper and gold ores from the Rossland Mine located across the international border in British Columbia, Canada. The smelter processed about 500 tons of ore per day at its peak production in 1908 and operated until 1909 when the facility was closed.

As a result of World War I, the government demand for lead encouraged the reopening of the smelter to process lead ores. In 1914, the smelter was renovated and began processing lead ores from nearby Leadpoint, Washington. The smelter continued to operate until 1921 when the government's demand for lead dwindled. Following the second closure, the smelter was purchased by the American Smelting and Refining Company (ASARCO) in 1921. ASARCO removed the smelting equipment and left the dismantled smelter inactive.

The site remained inactive from 1921 to 1953, and was reportedly developed as a lumber mill between 1953 and 1969. JB&T Lumber was the first known lumber mill to operate on the property. In 1975, Cecil Frazier purchased the property and operated the lumber mill as Frazier Lumber. Steve Frazier, Cecil's son, reportedly purchased the property and business from his father in 1985 and began operating the facility as SSF Building Materials. SSF Building Materials is currently operating on the site.

2.3 Previous Assessments

2.3.1 Washington Department of Ecology Air Monitoring Data

An air quality study was undertaken by the Washington Department of Health in conjunction with the Washington Department of Ecology to identify the possible cause of health problems reported by residents in the Northport and Kettle Falls area. The study was conducted in two phases with Phase I running from December, 1992 through February, 1993. Phase II was conducted from August through October, 1993. Phase I focused on maximum lead concentrations in the Northport and Kettle Falls area while Phase II addressed lead, arsenic, and other metal pollutants in the air for the same general geographic area.

The outdoor air quality measured during both phases of the study indicated that no federal or state particulate standards were exceeded. However, arsenic, cadmium, and lead levels were relatively high in comparison to other parts of the state.

Phase III of the air monitoring was recently completed in the region last fall. The results have not been published, but preliminary results confirm the findings of Phase II.

2.3.2 Washington Department of Health Heavy Metals in Garden Soils

In August, 1994, the Washington Department of Health conducted a study of soil and crop samples from gardens of three Northport families. The intent of the study was to assess if metals were present in significant quantities in garden soils and vegetables and if those levels could affect the health of families who eat the vegetables from their gardens.

The study revealed that the concentrations of cadmium, lead, and manganese found in the garden vegetables did not appear high enough to be toxic to the people who eat the vegetables regularly. Arsenic was not detected in the garden vegetables, therefore, no conclusions with respect to arsenic could be drawn about the potential health impacts from eating the vegetables. Although concentrations of arsenic, cadmium, and lead in soils were elevated above background levels for the state, they were comparable to other soils near the smelter in Trail, British Columbia.

2.3.3 URS Site Inspection Report

In 1993, the United States Environmental Protection Agency (EPA) Region 10, through its contractor, URS Consultants, Inc., performed a preliminary assessment and site investigation (PA/SI) which focused on documenting the potential threats to the human health and environment.

Soil samples collected during the PA/SI indicated the presence of metals in the soil at the site. Antimony, arsenic, cadmium, and lead were detected in the soil samples above Model Toxics Control Act (MTCA) Method A and B cleanup levels. Elevated levels of copper and silver were also detected in the site samples. In addition, three public supply wells located onsite were sampled for metals during the PA/SI. Water sample results did not indicate that metals were present above laboratory detection limits in the three supply wells.

Sediments from Lake Roosevelt were not assessed during the PA/SI nor was the potential presence or quality of shallow ground water at the site. Since the PA/SI did not completely characterize the site, additional characterization of the site will be necessary to evaluate the nature and extent of contamination and develop the basis for an assessment of alternatives to select a cleanup action under the Model Toxics Control Act (MTCA) WAC 173-340.

2.3.4 SAIC Site Hazard Assessment

Ecology's contractor, SAIC, completed a site hazard assessment (SHA) in April, 1995. A summary score sheet that considers site information such as contaminants, depth to groundwater, relative distance to surface water, and proximity to receptors was used to rank the site. The site's hazard ranking was determined to be "1", where 1 represents the highest relative risk to human health and the environment and 5 the lowest risk.

3.0 SCOPE OF WORK

This proposed Scope of Work has been developed based on the limited available data related to the chemical and physical characteristics of the smelter tailings and the hydrogeologic and hydrologic conditions at the site. The objectives of the Scope of Work are intended to characterize the LeRoi Smelter site to the extent necessary. The purpose is to evaluate the physical and chemical characteristics associated with the site, and determine the potential for their environmental threat to human health and the environment. The proposed Scope of Work is divided into two phases. Phase I will be completed this year. Based on the results of Phase I, the Phase II scope of work will be revised accordingly or remain unchanged. The following tasks will be completed during Phase I:

Task 1: Background Information Collection and Site Reconnaissance
Task 2: Public Participation Plan

Task 3: Soil Characterization
Task 4: Sediment Sampling
Task 5: Laboratory Analysis
Task 6: Data Evaluation
Task 7: Report Preparation

A discussion of each task is provided below followed by the sampling and analytical procedures that will be implemented during the project.

3.1 Task 1 - Background Information Collection and Site Reconnaissance

Smelting operations generally produce large volumes of gas containing vaporized metals in addition to metal-containing byproducts such as drosses and tailings. Therefore, metals will be the predominant contaminant of concern at the site. Information regarding the usage of cyanide to treat the smelted gold mattes at the site is not available. If cyanide was used at the site, it was probably used in a bench-scale study inside one of the site buildings. Other chemicals of concern may include volatile organics (solvents) that may have been used for equipment and parts cleaning.

Historical aerial photographs, topographic maps, and information related to the site will be collected prior to initiating the field program. Portions of this information have been collected and reviewed. Additional information collected will be used to refine components of the field sampling program in the event new information is discovered.

A site reconnaissance and visit with the current site owner (Steve Frazier) will be performed to evaluate the accessibility of the site for the proposed work plan. At the time of the site visit, a review of site utility maps will be conducted. Areas that may contain smelter tailings will be identified, as will groundwater seeps and surface water drainage areas. A meeting with local utility companies to identify and mark underground utilities at the site will be completed just prior to the field work in order to minimize the potential for the utility location markings to be disturbed. A reconnaissance of the Columbia River will also be completed to assess the most appropriate and representative sediment sampling locations.

3.2 Task 2 - Public Participation Plan

As required by WAC 173-340-600 (12(a)) for a State RI, public notice and an opportunity to comment on the proposed Work Plan will be provided. The intent of the plan is to provide the public with timely information and opportunities for participation in the project. Following the 30-day comment period, the Work Plan may be amended based on public comment and finalized. A copy of the Public Participation Plan is included as Appendix A.

3.3 Task 3 - Soil Assessment

3.3.1 Health and Safety Plan

Before commencement of field activities, a site specific Health and Safety Plan that conforms to the Washington Industrial Safety and Health Act (WISHA) RCW 49.17 and all applicable Occupational Safety and Health Administration (OSHA) regulations will be developed. In particular, 29 CFR 1910.120 of the Federal Register and Chapter 296-62 WAC provide regulations for individuals who are engaged in activities involving hazardous substances. Although it is not anticipated that workers will encounter an environment with volatile organics, health and safety

equipment such as a photoionization detector will be used to screen the workers' breathing zone during any subsurface activities. The Health and Safety Plan is presented in Appendix B.

A copy of the plan will remain onsite at all times during field activities. The plan will be implemented by site personnel during site activities.

3.3.2 - Test Pits and Soil Sampling

Test pits will be used to explore the site and assess the subsurface soil conditions. In particular, the test pit program will be designed at characterizing the nature, lateral and vertical extent, and approximate volume of the smelter tailings. The test pit soils will be logged and identified according to the Unified Soil Classification System (USCS).

It is estimated that one test pit per hour can be excavated and backfilled. Based on the anticipated work schedule, up to 40 test pits will be excavated during one week of work. The number and selection of test pit locations is intended to provide site coverage of known and potential smelter tailing locations, and provide a preliminary characterization of site conditions. Based on the nature of most smelter tailings, we anticipate being able to visually distinguish the existence and contact of the tailings with native soils.

Bulk soil samples will be collected from each test pit for lithologic description, field screening, and archiving. The samples will be collected from the backhoe bucket using a stainless steel spoon and placed into laboratory provided glass jars and/or sealable plastic bags. Sampling depths will be based on the geologic conditions, visual observation, and field instrument measurements. If changes in geologic conditions, visual observations, and field instrument readings are not significant, then a sample from the tailings, where encountered, and a sample from the native soil will be collected from each test pit.

In addition to exploring the site soils at depth with test pits, the near surface soils will be assessed using a hand auger and/or shovel. The use of a hand auger and/or shovel will allow for relatively quick assessment of soils in areas between the test pits, as well as areas that test pits are not practical. The areas that will be addressed by this methodology include collection of background soil samples. Samples will be collected with a stainless steel spoon from the resulting shallow shovel excavation or from the hand auger. Samples will be collected in laboratory provided glass jars and/or sealable plastic bags.

Field screening for metals will consist of using a gamma ray spectrometer or x-ray fluorescence equipment to screen bulk samples for select metal analytes. Based on field screening results, the samples with the highest metal concentrations will be submitted for laboratory analysis. In addition to the gamma ray spectrometer, soil samples will be screened in the field using paste pH. The paste pH will provide an assessment of the acid generating potential of the tailings. Samples with a paste pH lower than 4 standard units (SU) are considered to have an acid generating potential. Select samples that have acid generating potential will be submitted to the analytical laboratory for net neutralizing potential (NNP) analysis. The separate components of NNP are neutralizing potential (NP) and acidification potential (AP). Samples with a NNP of -20 and a ratio of NP to AP less than 1 are considered to have a strong potential to generate acid and potentially

mobilize metals. Based on the neutral to basic nature of the geology (mostly carbonates) in the area, we do not anticipate submitting samples for NNP analysis.

It is anticipated that up to 20 confirmation and 10 background samples will be submitted to Ecology's Manchester Environmental Analytical Laboratory for priority pollutant total metal analyses. The priority pollutant metals include antimony (Sb); arsenic (As); beryllium (Be); cadmium (Cd); chromium (Cr); copper (Cu); lead (Pb); mercury (Hg); nickel (Ni); selenium (Se); silver (Ag); thallium (Tl); and zinc (Zn). The analyses will be performed using inductively coupled plasma (ICP) laboratory techniques with the exception of mercury which will require the use of cold vapor atomic absorption (CVAA). The ICP will provide reasonable detection limits for the analytes of concern.

Based on the total metal results of the confirmation samples, five samples containing the highest metal concentrations will be submitted for toxicity characterization leaching procedure (TCLP) metals. The TCLP metal results will help determine if the tailings may classify as a dangerous waste according to WAC 173-303, and will facilitate decisions regarding regulatory status and disposal options of the material. If the TCLP metals analysis does not classify the materials as a dangerous waste, then two representative samples of the smelter tailings will be submitted for static acute fish toxicity analysis according to WAC 173-303-110 (3)(b)(i). These results will be used to classify the materials as a dangerous waste.

In addition to the metal analyses, select soil samples will be submitted for volatile organic compounds (VOC - Method 8240) and total cyanide (Method 335.1). As stated previously field instrumentation such as a photoionization detector (PID) will be used during site activities to field screen samples. Samples that indicate a significant positive response above background during PID screening will be selected for VOC analyses. If no samples indicate a positive response above background, then a minimum of five samples that are determined to be representative of site conditions both spatially and physically will be submitted for VOC analyses.

Field screening for cyanide may consist of using cyanide field testing kits as an indicator for the presence or absence of cyanide. In conjunction with the field test kits, the soil samples may be treated with sulfuric acid and screened for gas emissions with a Mexotox gas meter. In the presence of cyanide, the sulfuric acid will produce a measurable gas emission. If no samples indicate a positive response above background, then a minimum of five samples that are determined to be representative of site conditions both spatially and physically will be submitted for total cyanide analyses.

A total of 20 confirmation soil samples, 10 background soil samples, and 3 field quality assurance/quality control (QA/QC) samples will be collected. Two QA/QC samples will be collected with the confirmation samples and one QA/QC sample will be collected with the background samples. The QA/QC sample results will be used for comparative purposes of site soils. Discussion of specific sampling and laboratory methodologies are discussed in the Sampling and Analysis Plan (SAP) presented in Appendix C. Sample locations will be marked and identified in the field with wood lath to assist in the completion of field maps and will provide the relative sample location for the site survey. The site civil survey is discussed in Section 3.6.

3.4 Task 4 - Sediment Assessment

Sediment samples will be collected from obvious drainage patterns onsite. Samples will also be collected from the near shore sediments of Lake Roosevelt to evaluate potential impact to the river from the site. At least three samples will be retrieved using a sediment coring device from near shore sediments. One sediment sample will be collected upstream of the site; one sediment sample will be collected near shore at the site; and one sample will be collected downstream of the site. The exact sample locations will be selected in the field following a reconnaissance of access to the river.

3.5 Task 5 - Laboratory Analysis

3.5.1 Chemical Analysis

Soil, sediment, and groundwater samples collected during Tasks 3 through 5 will be submitted for chemical analysis to either the Ecology Manchester Environmental Laboratory or an approved laboratory. The number of samples to be collected including field QA/QC samples is listed in Table 1. Analytical methodologies, detection limits, and quality assurance/quality control issues are discussed in Sections 1.0 and 2.0 of the SAP.

The intent of the analytical program is to determine the chemical characterization of the tailings, onsite and background soils, sediments, and groundwater. Total metals will be analyzed in all sample matrices submitted to the analytical laboratory while volatile organics and total cyanide will be analyzed in a select number of samples. Based on the total metal results of the samples, five samples containing the highest metal concentrations will be analyzed for TCLP metals.

Herbicides, pesticides, polychlorinated biphenyls (PCBs), and semi-volatile organics were not included in the analytical program because there is no evidence that suggests these types of compounds have been used at the site.

3.5.2 Physical Analysis

A selected number of tailings and soil samples will be tested for physical characteristics. Grain size distribution (ASTM D-421 and 422), Atterberg Limits (ASTM D-4318), if fine-grained component is over 15 percent, will be performed. Grain size analysis will be performed on approximately 4 samples for order-of-magnitude evaluations of the hydraulic conductivity of various lithologic units. Sediment samples will be analyzed for metals. The results of these tests will be used to evaluate potential impacts from the smelter tailings. Presented in Table 2 is a summary of the number of samples and the corresponding analyses.

3.6 Task 6 - Data Evaluation

Data collected during Tasks 1 through 5 will be evaluated and presented on spread sheets, geologic cross-sections, and plots of formation contacts. Isopach (thickness) and contour maps of the tailings will be generated, if regionally extensive. Geologic properties will be evaluated for influence on the occurrence of site groundwaters and movement of groundwater and the interaction between surface and groundwater connections.

Data validation reviews will be conducted on the laboratory results based on EPA Functional Data Validation Guidelines for Organic and Inorganic Analysis. Data validation memorandum will be prepared and will summarize the quality of the data. Laboratory data will be summarized in tables and presented on maps, as necessary. Data review for validation and completeness of laboratory analytical results packages will be performed by the laboratory QA/QC Manager.

3.7 Task 7 - Report Preparation

A draft report will be prepared summarizing the field sampling methodologies, field observations, results, conclusions, and recommendations for further work, if necessary. The draft report will be made available for a 30-day public review and comment period (WAC 173-340-600 12 ((c)(iii)). Following the comment period, a final report that incorporates the public comments will be completed.

4.0 SCHEDULE

We anticipate the performance and completion of this project will be achieved based on the assumption that the 30-day public review and comment period will commence June 26, 1996, and the final work plan can be completed two weeks following the end of the comment period. A contingency schedule will be based on the same start date for the comment period but will include a time allowance for an extensive comment and response period. The length of time for the work schedule will remain the same with a new start date. Based on these assumptions the following schedule is proposed:

- Task 1 will be conducted between July 29 through September 9, 1996.
- Tasks 2, 3, and 4 will be conducted between July 29 through September 9, 1996.
- Task 5 will be conducted between July 29 and September 9, 1996 and final laboratory results will be received by September 30, 1996.
- Task 7 will be conducted between July 29 and September 9, 1996 and a draft report will be available by November 4, 1996.

REFERENCES

EPA, 1988. Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, July.

_____ 1988a. Laboratory Data Validation Functional Guidelines for Evaluating Organic Analysis, February.

APPENDIX A

Public Participation Plan

Public Participation Plan
May 1996

I. INTRODUCTION AND OVERVIEW OF PUBLIC PARTICIPATION PLAN

The Washington Department of Ecology (Ecology) is committed to providing public participation opportunities during the investigation and cleanup of hazardous waste sites. The Public Participation Plan is intended to promote public understanding of Ecology's responsibilities, planning activities and remedial activities at hazardous waste sites. It also provides an opportunity for Ecology to learn information, from the public, that will enable the department to develop a comprehensive cleanup plan that is protective of both human health and the environment.

A. This public participation plan at the LeRoi Smelter hazardous waste cleanup site covers activities for the Remedial Investigation and the Feasibility Study, if required. It has been tailored to the needs of the public based on the stage and nature of the cleanup, the level of public concern, and the risks posed by the site.

B. The LeRoi Company began operating the smelter in 1896. The smelter was initially designed to treat the copper and gold ores from the Rossland Mine located across the international border in British Columbia, Canada. The smelter processed about 500 tons of ore per day at its peak production in 1908 and operated until 1909 when the facility was closed. As a result of World War I, the government demand for lead encouraged the reopening of the smelter to process lead ores. In 1914, the smelter was renovated and began processing lead ores from nearby Leadpoint, Washington. The smelter continued to operate until 1921 when the government's demand for lead dwindled. Following the second closure, the smelter was purchased by the American Smelting and Refining Company (ASARCO) in 1921. ASARCO removed the smelting equipment and left the dismantled smelter inactive.

The site remained inactive from 1921 to 1953, and was reportedly developed as a lumber mill between 1953 and 1969. JB&T Lumber was the first known lumber mill to operate on the property. In 1975, Cecil Frazier purchased the property and operated the lumber mill as Frazier Lumber. Steve Frazier, Cecil's son, reportedly purchased the property and business from his father in 1985, and began operating the facility as SSF Building Materials. SSF Building Materials is currently operating on the site.

In 1993, the United States Environmental Protection Agency (EPA) Region 10, through its contractor, URS Consultants, Inc., performed a preliminary assessment and site investigation (PA/SI) which focused on documenting the potential threats to human health and environment.

Soil samples collected during the PA/SI indicated the presence of

metals in the soil at the site. Antimony, arsenic, cadmium, and lead were detected in the soil samples above Model Toxics Control Act (MTCA) Method A and B cleanup levels. Elevated levels of copper and silver were also detected in the site samples. In addition, three public supply wells located on-site were sampled for metals during the PA/SI. Water sample results did not indicate that metals were present above laboratory detection limits in the three supply wells.

Sediments from Lake Roosevelt were not assessed during the PA/SI nor was the potential presence or quality of shallow ground water at the site. Since the PA/SI did not completely characterize the site, additional characterization of the site will be necessary to evaluate the nature and extent of contamination, and develop the basis for an assessment of alternatives to select a cleanup action, if necessary, under the Model Toxics Control Act (MTCA) WAC 173-340.

C. This plan was developed by Ecology's Eastern Regional Toxics Cleanup Program staff to guide public participation in remedial actions at the site. Ecology has responsibility for public participation activities at this site. This plan discusses the community's concerns and outlines public participation activities to be conducted for the phases covered by this plan. This plan will be reviewed at each phase of cleanup and amended or rewritten as appropriate.

The purpose of the public participation effort and this plan is to ensure that the affected public and governmental agencies are kept informed as the studies proceed, and that each has an opportunity to contribute information regarding the site and comment on the study and cleanup activities.

D. A concern by local citizen groups has been voiced regarding the possible cause of health problems reported by residents in the Northport and Kettle Falls area. A study of air quality was conducted in the Northport and Kettle Falls area.

The outdoor air quality measured during both phases of the study indicated that no federal or state particulate standards were exceeded. However, arsenic, cadmium, and lead levels were relatively high in comparison to other parts of the state.

A study was conducted of soil and crop samples from gardens of three Northport families. The intent of the study was to determine if metals were present in significant quantities in garden soils and vegetables, and if those levels could affect the health of families who eat those vegetables.

The study revealed that the concentrations of cadmium, lead, and manganese found in the garden vegetables did not appear high enough to be toxic to the people who eat the vegetables regularly.

E. This plan is divided into the following sections:

I. Introduction and Overview

II. Site Description
   A. Land Use
   B. Technical Aspects

III. Community Background
   A. Community Profile
   B. Key Community Concerns

IV. Public Participation Activities

V. Appendices: A. Mailing List

B. Glossary

II. SITE DESCRIPTION

The former LeRoi Company Smelter Site is located northeast of the Town of Northport, Washington. The property is legally described as within the NW 1/4 of Section 4, Township 39 North, Range 40 East of Willamette Meridian (Figure 1). The site encompasses about 32 acres and is accessed from the Northport-Waneta Road via Highway 25.

A. Land Use

A portion of the LeRoi Smelter is currently occupied by active lumber mill operations. A public park is located along the northwestern border of the site. The residential area of Northport is located south of the site and the Columbia River is located west of the site. The majority of the area north of the site and outside of town is mostly forested and undeveloped.

III. COMMUNITY BACKGROUND

A. Community Profile

The Town of Northport is comprised of about 350 people, who all live within a one-mile radius of the LeRoi Smelter site. Although there is a lumber mill operation on-site, no residents live on the site. The area is mostly rural, forest lands.

B. Key Community Concerns

The community is concerned about health problems in the northeast tri-county area. These concerns include cancer rates, inflammatory bowel disease, thyroid disease, and peripheral neuropathies. Studies have been undertaken by the Washington State Department of Health to help identify the causes of these maladies.

IV. PUBLIC PARTICIPATION ACTIVITIES

The Public Participation Plan for the LeRoi Smelter will consist of the following activities:

A. A 30-day public comment period will be held for the Remedial Investigation Scope of Work and Work Plans beginning in late Spring of 1996.

B. Another 30-day public comment period will be held in late Fall of 1996 for the Draft Remedial Investigation Report. An "open house" public meeting will be held in the Northport area at a time and place to be announced in a fact sheet.

C. Should the Remedial Investigation determine that a Feasibility Study is required, another 30-day public comment period will be held for the draft of that document, when it is completed.

D. Notification of the potentially affected vicinity, which includes the smelter site, SSF Building Materials, and a nearby Town of Northport park, will be accomplished by the mailing of a fact sheet to all parties on the site mailing list.

The attached mailing list (Appendix A) includes the addresses of known affected parties, as well as those of other individuals, environmental groups, public agencies, and private parties who have expressed an interest in the site. Those on the mailing list shall receive all site mailings.

E. Advertising the public comment periods includes a display ad in the Statesman-Examiner newspaper in Colville.

F. The public will be provided access to copies of the Work Plans, Public Participation Plan, Draft Remedial Investigation Report, other technical reports, and extra copies of the fact sheets at the following information repositories:

Department of Ecology
Toxics Cleanup Program
4601 N. Monroe, Suite 202
Spokane, WA 99205-1295
(509) 456-4461

Northport City Hall
315 Summit Ave.
P.O. Box 177
Northport, WA 99157-0177
(509) 732-4450

G. All comments received will be retained in the site files. Responses to significant comments received on documents circulated for public comment will be compiled in a Responsiveness Summary that will be sent to those who submit written comments and to the designated information repositories.

H. Persons requesting to be placed on a mailing list for the site will be provided updates on site activities as new information becomes available.

I. Should there be a need for additional public participation activities, the public shall be notified through advertisement in the Statesman Examiner newspaper. This public participation plan will also be updated and delivered to the information repositories listed above.

J. Public notice announcements regarding the site will be placed in the Site Register for each comment period.

K. Press releases may be used to notify media of the public comment periods and public meetings, as necessary.

APPENDIX A

LeRoi Smelter Mailing List - 5/16/96

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PUBLIC PARTICIPATION PLAN - APPENDIX B

GLOSSARY

Agreed order: A legal document, issued by Ecology, which formalizes an agreement between Ecology and the potentially liable persons for the actions needed at a site. An agreed order may be used for all remedial actions except for non-routine cleanup actions and interim actions that constitute a substantial majority of a cleanup action likely to be selected. Since an agreed order is not a settlement, an agreed order shall not provide for mixed funding, a covenant not to sue, or protection from claims for contribution. An agreed order means that the potentially liable person agrees to perform remedial actions at the site in accordance with the provisions of the agreed order and that Ecology will not take additional enforcement action against the potentially liable person to require those remedial actions specified in the agreed order so long as the potentially liable person complies with the provisions of the order. Agreed orders are subject to public comment. If an order substantially changes, an additional public comment period is provided.

Applicable state and federal laws: All legally applicable requirements and those requirements that Ecology determines are relevant and appropriate requirements.

Area background: The concentrations of hazardous substances that are consistently present in the environment in the vicinity of a site which are the result of human activities unrelated to releases from that site.

Carcinogen: Any substance or agent that produces or tends to produce cancer in humans.

Chronic toxicity: The ability of a hazardous substance to cause injury or death to an organism resulting from repeated or constant exposure to the hazardous substance over an extended period of time.

Cleanup: The implementation of a cleanup action or interim action.

Cleanup action: Any remedial action, except interim actions, taken at a site to eliminate, render less toxic, stabilize, contain, immobilize, isolate, treat, destroy, or remove a hazardous substance that complies with cleanup levels; utilizes permanent solutions to the maximum extent practicable; and includes adequate monitoring to ensure the effectiveness of the cleanup action.

Public Participation Plan

Cleanup action plan: A document which selects the cleanup action and specifies cleanup standards and other requirements for a particular site. The cleanup action plan, which follows the remedial investigation/feasibility study report, is subject to a public comment period. After completion of a comment period on the draft cleanup action plan, Ecology issues a final cleanup action plan.

Cleanup Level: The concentration of a hazardous substance in soil, water, air, or sediment that is determined to be protective of human health and the environment under specified exposure conditions.

Cleanup process: The process for identifying, investigating, and cleaning up hazardous waste sites.

Consent decree: A legal document, approved and issued by a court, which formalizes an agreement reached between Ecology and potentially liable persons on the actions needed at a site. A consent decree is subject to public comment and a public meeting is required. If a consent decree substantially changes, an additional comment period is provided. After satisfying the public comment and meeting requirements, Ecology files the consent decree with the appropriate superior court or federal court having jurisdiction over the matter.

Containment: A container, vessel, barrier, or structure, whether natural or constructed, which confines a hazardous substance within a defined boundary and prevents or minimizes its release into the environment.

Contaminant: Any hazardous substance that does not occur naturally or occurs at greater than natural background levels.

Enforcement order: A legal document, issued by Ecology, requiring remedial action. Failure to comply with an enforcement order may result in substantial liability for costs and penalties. An enforcement order is subject to public comment. If an enforcement order is substantially changed, an additional comment period is provided.

Environment: Any plant, animal, natural resource, surface water (including underlying sediments), ground water, drinking water supply, land surface (including tidelands and shorelands) or subsurface strata, or ambient air within the state of Washington.

Exposure: Subjection of an organism to the action, influence, or effect of a hazardous substance (chemical agent) or physical agent.

Exposure Pathway: The path a hazardous substance takes or could take from a source to an exposed organism. An exposure pathway describes the mechanism by which an individual or population is exposed or has the potential to be exposed to hazardous substances at or originating from a site.

Facility: Any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly-owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, vessel, or aircraft; or any site or area where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed or, or placed, or otherwise come to be located.

Feasibility study: Provides identification and analysis of site cleanup alternatives, and is usually completed within a year. The entire RI/FS process takes about two years and is followed by the cleanup action plan. remedial action to evaluate sufficient information regarding a site to enable the selection of a cleanup action plan.

Free product: A hazardous substance that is present as a nonaqueous phase liquid (that is, liquid not dissolved in water).

Ground water: Water in a saturated zone beneath the surface of land or below a surface water.

Hazardous site list: A list of ranked sites that require further remedial action. These sites are published in the Site Register.

Hazardous substance: Any dangerous or extremely hazardous waste as defined in RCW 70.105.010 (5) [any discarded, useless, unwanted, or abandoned substances including, but not limited to, certain pesticides, or any residues or containers of such substances which are disposed of in such quantity or concentration as to pose a substantial present or potential hazard to human health, wildlife, or the environment because such wastes or constituents or combinations of such wastes: (a) have short-lived, toxic properties that may cause death, injury, or illness or have mutagenic, teratogenic, or carcinogenic properties; or (b) are corrosive, explosive, flammable, or may generate pressure through decomposition or other means.] and (6) [any dangerous waste which (a) will persist in a hazardous form for several years or more at a disposal site and which in its persistent form presents a significant environmental hazardous and may be concentrated by living organisms through a food chain or may affect the genetic makeup of man or wildlife; and is highly toxic to man or wildlife; (b) if disposed of at a disposal site in such quantities as would present an extreme hazard to man or the environment.], or any dangerous or extremely dangerous

waste as designated by rule under Chapter 70.105 RCW; any hazardous substance as defined in RCW 70.105.010 (14) [any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the characteristics or criteria of hazardous waste as described in rules adopted under this chapter.] or any hazardous substance as defined by rule under Chapter 70.105 RCW; petroleum products.

Hazardous waste site: Any facility where there has been a confirmation of a release or threatened release of a hazardous substance that requires remedial action.

Independent cleanup action: Any remedial action conducted without Ecology oversight or approval, and not under an order or decree.

Initial investigation: An investigation to determine that a release or threatened release may have occurred that warrants further action.

Interim action: Any remedial action that partially addresses the cleanup of a site. It is an action that is technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance at a facility; an action that corrects a problem that may become substantially worse or cost substantially more to address if the action is delayed; an action needed to provide for completion of a site hazard assessment, state remedial investigation/feasibility study, or design of a cleanup action.

Mixed funding: Any funding, either in the form of a loan or a contribution, provided to potentially liable persons from the state toxics control account.

Model Toxics Control Act (MTCA): Refers to RCW 70.105D. It was approved by voters at the November 1988 general election and known as Initiative 97. The implementing regulation is WAC 173-340.

Natural background: The concentration of hazardous substance consistently present in the environment which has not been influenced by localized human activities.

National Priorities List (NPL): EPA's list of hazardous waste sites identified for possible long-term remedial response with funding from the federal Superfund trust fund. There are currently 41 sites in Washington State officially designated as final NPL sites and 4 sites pending federal Superfund designation.

Public Participation Plan

Owner or operator: Any person with any ownership interest in the facility or who exercises any control over the facility; or in the case of an abandoned facility, any person who had owned or operated or exercised control over the facility any time before its abandonment.

Potentially liable person (PLP): Any person whom Ecology finds, based on credible evidence, to be liable under authority of RCW 70.105D.040

Public notice: At a minimum, adequate notice mailed to all persons who have made a timely request of Ecology and to persons residing in the potentially affected vicinity of the proposed action; mailed to appropriate news media; published in the local (city or county) newspaper of largest circulation; and opportunity for interested persons to comment.

Public participation plan: A plan prepared under the authority of WAC 173-340-600 to encourage coordinated and effective public involvement tailored to the public's needs at a particular site.

Recovery by-products: Any hazardous substance, water, sludge, or other materials collected in the free product removal process in response to a release from an underground storage tank.

Release: Any intentional or unintentional entry of any hazardous substance into the environment, including, but not limited to, the abandonment or disposal of containers of hazardous substances.

Remedial action: Any action to identify, eliminate, or minimize any threat posed by hazardous substances to human health or the environment, including any investigative and monitoring activities of any release or threatened release of a hazardous substance, and any health assessments or health effects studies conducted in order to determine the risk or potential risk to human health.

Remedial investigation: Any remedial action which provides information on the extent and magnitude of contamination at a site. This usually takes 12 to 18 months and is followed by the feasibility study. The purpose of the remedial investigation/feasibility study is to collect and develop sufficient information regarding a site to enable the selection of a cleanup action.

Responsiveness summary: A compilation of all questions and comments to a document open for public comment and their respective answers/replies by Ecology. The responsiveness summary is mailed, at a minimum, to those who provided comments and its availability is published in the Site Register.

Risk: The probability that a hazardous substance, when released into the environment, will cause an adverse effect in exposed humans or other living organisms.

Sensitive environment: An area of particular environmental value, where a release could pose a greater threat than in other areas including: wetlands; critical habitat for endangered or threatened species; national or state wildlife refuge; critical habitat, breeding or feeding area for fish or shellfish; wild or scenic river; rookery; riparian area; big game winter range.

Site: The same as facility (see above).

Site characterization report: A written report describing the site and nature of a release from an underground storage tank, as described in WAC 173-340-450 (4)(b).

Site hazard assessment (SHA): An assessment to gather information about a site to confirm whether a release has occurred and to enable Ecology to evaluate the relative potential hazard posed by the release. If further action is needed, an RI/FS is undertaken. 173-340-320.

****Site Register:** Publication issued every two weeks of major activities conducted statewide related to the study and cleanup of hazardous waste sites under the Model Toxics Control Act. To receive this publication, please call (206) 438-3081.

Surface water: Lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the state of Washington or under the jurisdiction of the state of Washington.

SWRO: Ecology Southwest Regional Office in Tumwater.

TCP: Ecology Toxics Cleanup Program.

Underground storage tank (UST): An underground storage tank and connected underground piping as defined in the rules adopted under Chapter 90.76 RCW.

Washington Ranking Method (WARM): Method used to rank sites placed on the hazardous sites list. A report describing this method is available from Ecology.

APPENDIX B

Health and Safety Plan

DEPARTMENT OF ECOLOGY
LEROI SMELTER SITE
HEALTH & SAFETY PLAN

OVERVIEW

Location

The former LeRoi Company Smelter Site is located northeast of the Town of Northport, Washington. The property is legally described as within the NW 1/4 of Section 4, Township 39 North, Range 40 East of Willamette Meridian. The site encompasses about 32 acres and is accessed from the Northport-Waneta Road via Highway 25. The site is relatively level and is covered with brick and concrete remnants of the former smelter stacks and buildings. The ground surface generally slopes toward the Columbia River and ranges in elevation from about 1,360 feet above mean sea level (MSL) at the site to 1,290 feet above MSL, the normal pool elevation for the Columbia River.

The site is bordered on the west by Highway 25, to the east and south by the Northport-Waneta Road, and a city park across the Burlington Northern railroad tracks to the north. The site is situated about 250 feet south from the east bank of the Columbia River.

Purpose of Plan

The purpose of this plan, which was developed for this site, is to assign responsibilities, establish personnel protection standards and safety procedures, and provide for contingencies that may arise at the site during the field program. The plan complies with federal Occupational Safety and Health Administration (OSHA) regulations as set forth in 29 CFR 1910 and 1926, as well as state safety and health administration (WISHA) regulations as promulgated in Chapters 296-24, 296-62, and 296-155 of the Washington Administrative Code (WAC). This plan is to be used as a supplement to these regulations.

During the field work, the potential for accidents and injuries will be minimized by following the following procedures of this plan. The possibility for skin contact with potentially contaminated soil or water will be minimized by wearing adequate personal protective clothing and by following proper decontamination procedures. The potential for inhalation of vapors or dust particulates during drilling and sampling will be minimized by air monitoring and the use of respiratory protection if action levels are exceeded.

In addition, the potential for contact with overhead or underground utilities during drilling will be reduced by maintaining the required distance from overhead lines and having the utilities located on-site by a utility locator prior to commencement of field work. Ingestion of potentially contaminated materials will be reduced by good decontamination procedures and not eating or smoking in the work areas.

Emergency Communications

In the event of a serious physical injury at the site, it is important that the victim receive first aid/cardiopulmonary resuscitation (CPR) or professional medical treatment. If an area is life threatening, injured personnel should be moved carefully to a safe location for treatment.

In all other cases, injured personnel should not be moved until they have been evaluated by a medical professional.

Professional medical treatment can be obtained by calling: 911

Seriously injured personnel will be transported to the nearest hospital, Mount Carmel Hospital in Colville, Washington. The hospital is approximately 45 miles south of the site and is located at 982 East Columbia Street.

Responsibilities of Personnel

Project Manager

The Project Manager (PM) will ensure that there is adequate field monitoring equipment, personal protective equipment, and other materials necessary to implement this health and safety plan.

Site Safety Officer

The Site Safety Officer (SSO) has the on-site responsibility for health and safety. The SSO shall be responsible for the following:

1. Ensure implementation of the health and safety plan.
2. Maintain adequate supplies of all safety equipment.
3. Conduct the daily health and safety meetings.
4. Monitor the safety performance of site personnel.
5. Correct any work practices or conditions that may result in injury or exposure to hazardous substances.
6. Immediately stop work if safety or health hazard exists.
7. Ensure housekeeping in work areas.

Project Personnel

Project personnel will be responsible to follow the health and safety plan. They will take all reasonable precautions to prevent injuries to themselves or others. Personnel will immediately report to the SSO any accidents or unsafe conditions. They will also attend the daily safety meetings.

SITE SPECIFIC PLAN

This site specific plan will discuss the anticipated physical and chemical hazards associated with on-site field work. The physical hazards will be listed first.

Physical Hazards

The physical hazards at the site will be mitigated by maintaining a constant awareness of the surroundings, clear and concise communications, and precautionary inspections of the work areas.

Buried Utilities

Underground utilities will be located by a utility locator prior to beginning the field program. The approximate utility locations will be marked with wood stakes and paint. A site pre-inspection with the current site occupant will also be conducted to minimize the disturbance of utilities not recorded on site utility maps. In addition, prior to

excavation or drilling activities, the selected location will be surveyed using a magnetometer. If a magnetic response is detected, the test pit or boring location will be moved.

Even with these precautions, the possibility of contact with buried utilities exists. As a result, each crew completing excavation or drilling must have at least one crew member certified in cardiopulmonary resuscitation (CPR). A phone with the proper off-site emergency phone numbers will be located in a central location at the safety station.

Overhead Electrical Lines

When overhead electrical lines are present, the risk of contact depends on the elevation of the lines above grade and the power the lines are transmitting. At a minimum, a drill rig shall not set up where the boom or cables can come within 50 feet vertically or 20 feet horizontally of any energized power line. It is important to consider the effects of the wind on transmission lines and drill rig cables when making this determination. In no case is it assumed that electrical lines or systems are de-energized.

Rotating or Moving Equipment

The backhoe, drill rig, and other on-site equipment associated with the lumber mill pose a number of physical hazards. One of the hazards associated with moving equipment is being run over by the equipment. It is the responsibility of site personnel to assume that the equipment operators do not see you and will not look for you when operating their equipment. Site personnel should make contact visually and/or verbally with the operator and ensure the equipment has ceased operation prior to approaching the equipment.

Rotating and moving parts can create pinch points which may cause serious injury. In all cases, rotating parts such as shafts or gears should be covered to prevent accidental contact. In some instances such as drill rigs, rotating parts cannot be covered and only experienced operators should work around these areas. Personnel who must work around this equipment should not wear loose fitting clothing that could get caught in the equipment. Protective clothing such as tyvek coveralls and gloves should be taped at the wrist and ankles.

Falling and Tripping

The work area ground surface can be irregular or may become uneven over the course of field activities. The work area can also become cluttered with equipment or debris. These situations can create trip and fall hazards for the site workers. To reduce this risk, good housekeeping procedures in the work area should be followed.

Heat Stress

Heat stress is caused by a number of interacting factors such as environmental conditions, clothing, work load, and the individual characteristics of the worker. Wearing personnel protective clothing (PPE) can increase the risk of developing heat stress. An increase in humidity can also increase the risk of heat stress. Consequently, regular monitoring and other preventive measures are vital to prevent heat stress.

Heat stress monitoring should begin when personnel are wearing PPE including Tyvek, and ambient temperature exceeds 70 degrees Fahrenheit (F). If regular work garments are worn, monitoring should begin at 85 degrees F. The worker should be monitored for the following:

Heart Rate. Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the work period by one-third and keep the rest period the same. If the heart rate exceeds 100 beats per minute at the beginning of the next rest period, shorten the work period by one-third again and keep the rest period the same.

Oral Temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period. If oral temperature exceeds 99.6 degrees, shorten the work cycle by one-third without changing the rest period. If oral temperature exceeds 99.6 degrees after the next work period, shorten the work cycle by one-third without changing the rest period. A worker must not wear semi-permeable or impermeable PPE if his/her temperature exceeds 100.6 degrees F. Initially, the frequency of monitoring is dependent on the ambient air temperature.

The following table provides the suggested frequency of monitoring:

Adjusted Temperature*	Normal Clothing	Impermeable PPE
90 F or above	After 45 minutes of work	After 15 minutes of work
87.5 - 90 F	After 60 minutes of work	After 30 minutes of work
82.5 - 87.5 F	After 90 minutes of work	After 60 minutes of work
77.5 - 82.5 F	After 120 minutes of work	After 90 minutes of work
72.5 - 77.5 F	After 150 minutes of work	After 120 minutes of work

* - Calculate adjusted air temperature by using this equation - T_{adj} = Temp + (13 x % sunshine). Estimate the percentage of sunshine by estimating what percent the sun is not covered by clouds thick enough not to produce a shadow. 100% for no clouds and 0% for no sun.

Another measure to help prevent heat stress is the maintenance of body fluids. The site worker must maintain body fluids to help cool the body and ensure the cardiovascular system is functioning adequately. The normal thirst mechanism is not sensitive enough to ensure that enough fluids will be drunk to replace those lost by sweat. When heavy sweating occurs, encourage the worker to drink more fluids. Suggestions that may help prevent excessive fluid loss include:

- Drink about 16 ounces of fluid before starting work.
- Maintain fluid in a cool condition (50 to 60 F).
- Provide small disposable cups for drinking.

- Encourage workers to drink about 8 ounces of fluid at each monitoring break.

- Weigh workers before and after each day. If the worker weight loss is more than 1.5% of total weight, additional fluid uptake is recommended.

- Workers are encouraged to maintain good physical fitness. Workers should acclimatize to working in the heat.

Heat stress and its more serious forms heat exhaustion and heat stroke can be prevented by recognizing the early warning symptoms. The signs and symptoms of heat stress can be recognized by heat rash and heat cramps such as muscle spasms and pains in the hands, feet, or abdomen. The signs and symptoms of heat exhaustion include pale, cool, moist skin; heavy sweating; dizziness; nausea; and fainting. The symptoms of heat stroke are dizziness and confusion; strong rapid pulse; red, hot, unusually dry skin; and lack of perspiration. Heat stroke is very serious and immediate steps must be taken to cool the body, and competent medical help must be obtained.

Chemical Hazards

The chemicals of concern at the site are predominantly metals with the potential for cyanide and volatile organic compounds (VOCs) to occur in site soils. The chemicals suspected to be present have not been detected in previous sampling events (cyanide) or have not been analyzed for during sampling (VOCs). However, the field program should commence under the assumption these chemicals are present. Good work practices, proper use of PPE, and decontamination procedures contained in this safety and health plan should prevent worker exposure.

Overviews of the chemical hazards associated with exposure to on-site constituents are presented in terms of the following:

- PEL-TWA - Permissable Exposure Limit (WAC 296-62)

- TLV-TWA - Threshold Limit Value (American Conference of Governmental Industrial Hygienists (ACGIH))

- STEL - Short Term Exposure Limit (WAC 296-62)

- TLV-STEL - Short Term Exposure Limit (ACGIH)

- TLV-C - TLV Ceiling Value (ACGIH)

Personal Protective Equipment

This safety and health plan is designed for use with Modified Level D protective equipment. The following equipment will be worn during the field activities in the exclusion zone and contamination reduction zones:

1. Cloth coveralls or tyvek suit

2. Nitrile gloves

3. Rubber boots with steel toes

4. Safety glasses

5. Hard hat and ear protection near operating equipment areas.

Because the work will be probably be completed during times of high temperatures (summer), cloth coveralls may be substituted for the tyvek suit. However, additional precaution should be exercised to avoid contaminating the cloth which would result in increased dermal (skin) contact with the contaminants.

To prevent additional dermal exposure, the tyvek suit or cloth coveralls will be taped to the gloves at the wrists and the boots to the lower leg. Each site worker should have available a half-mask respirator equipped with HEPA, acid gas, organic vapor cartridges upon entering the exclusion zone. Although unlikely, if conditions requiring self-contained breathing apparatus (SCBA) are encountered, site personnel will immediately evacuate the area.

Air Monitoring Equipment

An organic vapor monitor or similar instrument will be used to detect the presence of volatile organic compounds. The monitoring will be conducted as follows:

1. Performed by site safety officer (SSO) as pre-inspection of work area.

2. Performed by the site geologist/engineer during excavation or drilling.

3. Performed by SSO at the end of each day in work area.

Since no volatile chemicals have been identified at the site, it is not anticipated that these chemicals will be encountered within the worker breathing zone (WBZ) during subsurface investigations. The respiratory protection plan will be based on preventing exposure to trichloroethene (TCE), a volatile organic compound commonly used as a degreaser. TCE has a PEL of 50 parts per million (ppm) and assuming a protection factor of 10 for a half-mask respirator.

An organic vapor monitor equipped with a photoionization detector will be used to monitor the air during subsurface investigations. A photoionization detector will have a typical response of 50 percent to TCE relative to the calibration gas of isobutylene. If readings exceed an average of 5 units for more than one minute, monitoring in the WBZ will begin immediately. A WBZ reading above 10 units for more than one minute requires the use of a respirator. A WBZ reading above 25 units requires immediate departure of the work area.

All direct reading instruments are evaluated relative to background readings, not zero. Prior to the start of work and whenever a significant shift of wind direction is observed, background readings will be obtained upwind of the exclusion zone. Site readings will be evaluated based on these background readings.

The primary activity that will potentially generate dust is the drilling. The SSO will visually monitor dust generation during drilling and will stop work if the dust becomes significant. A dust control

strategy will be implemented before work resumes. If blowing dust during wind events poses a problem, work will also be stopped.

Site Control Plan

Barricade tape and, as necessary, barricades will be used to delineate an exclusion zone around the areas of excavation and drilling. The barrier will be set in a 20-25 foot radius, as practical around the work area. Upwind of the work area, a separate entry and exit from the exclusion zone will be established. The personal decontamination station is set up at the exit from the exclusion zone. An area called the contamination reduction zone will be set around the decontamination station.

An upwind evacuation meeting point will be established by the SSO for each work area and will be communicated to site personnel during the prework safety meeting. Three blasts with a compressed gas horn will be used to signal an evacuation in the event of an emergency. Site personnel will stop work immediately and proceed to the designated evacuation area.

Decontamination Procedures

A decontamination station will be established at the contamination reduction zone. Decontamination equipment will include buckets, scrub brushes, plastic tarps, drums for decontamination water and personnel protective equipment (PPE), spray rinser, clean water supply, and chair. The following procedures will be used when exiting an exclusion zone:

1. Remove excess soil from PPE in exclusion zone.

2. Step into first bucket, and use scrub brush to remove contamination from PPE.

3. Step into second bucket, and use scrub brush to rinse contamination from PPE.

4. Remove tyvek (if used), boots, gloves, and eye protection. Place disposable material in drum.

5. Exit contamination reduction zone.

6. Wash hands and face.

General Practices

This section describes the overall general practices expected at hazardous waste sites. Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the contaminated or potentially contaminated areas. Site workers should avoid contact with potentially contaminated substances such as mud puddles, standing water, or mud. Avoid, when possible, kneeling or sitting on the ground or leaning on equipment. Do not place monitoring equipment on potentially contaminated surfaces.

Site workers should use common sense, as well as, the physical senses to alert them to potentially dangerous situations (ie. presence of strong, irritating, or nauseating odors). Workers should prevent splashing or spilling of contaminated chemicals.

Site workers should be aware of and familiar with the physical characteristics of the investigation area, including:

1. General wind direction for the site.

2. Location of other workers, equipment, vehicles, and emergency communications.

3. Location of exclusion zones.

The number of personnel in the contaminated area should be minimized to the extent necessary for safe job performance. At no time are personnel allowed to work alone in the exclusion zone. Site personnel should not enter any trench, excavation, or confined entry space. Work should generally begin in the anticipated least contaminated area first and work towards the most contaminated last.

LeRoi Smelter Site
Phase 1 Remedial Investigation
Site Safety Plan

Project Name: LeRoi Smelter Site

Project Manager: William J. Fees - Department of Ecology, Spokane

Location: Former Smelter Site, Northport, WA

Prepared By: William J. Fees - Department of Ecology, Spokane

Project Manager Approval: _____ Date:_____

Project Team:
Bill Fees - Project Manager
Guy Gregory - Site Safety Officer
John Roland - Hydrogeologist
Mark Fuchs - Hydrogeologist
Teresita Bala - Environmental Engineer

INTRODUCTION

The field work will be conducted from June 10, 1996 through August 2, 1996 by Department of Ecology personnel. The work will be completed according to this Health and Safety Plan under the framework of the Model Toxics Control Act (MTCA) Chapter 173-340 and other applicable state and federal regulations.

Physical Hazards Summary

Trip/fall, pinch point, heat stress, operating equipment from lumber mill, backhoe, drill rig, underground utilities, and noise.

Chemical Hazards Summary

Metals including antimony, arsenic, cadmium, and lead. The potential for cyanide and volatile organic compounds. The primary routes of exposure include inhalation of metal-bearing dusts and volatile vapors, dermal contact, and ingestion.

Location of Chemicals

Soil contamination may underlie a majority of the site and is surficial and in the subsurface. Ground water contamination is possible but not proven. About one-third (southern portion) of the site is currently used as a lumber mill with the remainder not in use.

Overall Physical Hazard

Moderate

Overall Chemical Hazard

Low

SUMMARY OF CHEMICAL HAZARDS

Compound	PEL/TWA	Route	Symptoms	Odor Threshold	Odor
Lead	0.05 mg/m^3	inhale/dermal	wrist droop, abdominal pain	none	none
Arsenic	10 ug/m^3	inhale/dermal	respiratory irritant,	1 ppm	none
Antimony	0.5 mg/m^3	inhale dermal	nose, throat irritant	none	none
Cadmium	0.2 mg/m^3	inhale/dermal	tight chest, headache,	none	none
Copper	1 mg/m^3	inhale/dermal	nose, throat irritant	none	none
Cyanide	5 mg/m^3	inhale/dermal	asphyxia, nausea, weak		almond

SITE SAFETY WORK PLAN

Site Control:

Limit access to work areas with caution tape and barricades as necessary. Multiple work areas are anticipated and will be designated as the field program progresses.

Action Levels for Work Zone

Organic Vapors:	>5 ppm above background for 1 minute in air - monitor WBZ >10 ppm in WBZ for 1 minute - use respirator >25 ppm in WBZ - depart work area
Oxygen:	<19.5% - depart work area >25% - depart work area
Combustible Gas:	>10% LEL - continuous monitoring >25% LEL - exit site
Dust:	>5mg/m^3 - use respirator

Air Monitoring

Instruments will be calibrated daily.

Organic vapors:	MicroTip Photoionization Detector (PID)
Oxygen:	Neonics Explosimeter
Combustible Gas:	Neonics Explosimeter

Decontamination

Disposable sampling equipment and personnel protective equipment (PPE) will be used when possible. When necessary, decontamination procedures will include a series of scrubs and washes using alconox detergent solution; rinse with carbon-free water.

Personnel decontamination procedures will be completed at decontamination stations set up in the designated work areas. The stations will consist of visqueen plastic floors to minimize and control spills of any decontamination fluids. All employees will wash their hands and face before eating or smoking, and at the end of each day.

EMERGENCY INFORMATION

Ambulance:	911	Hospital:	684-2561 Mount Carmel
Police:	911	Ecology:	456-2926
Fire:	911	Poison Center:	800-732-6985

Emergency Routes:

Depart site and proceed south (left) from site on Highway 25 and continue in southerly direction for about 35 miles to intersection with Highway 395. Turn east (left) on Highway 395 and proceed to Colville. Enter Colville and continue south along Highway 395 to Columbia Street. Turn east (left) on Columbia Street and proceed for eight blocks to Mount Carmel Hospital entrance on south side of street.

Utilities:

Locates:	800-424-5555 for WWP, US West, and PTI. 732-4450 for Town of Northport water and sewer
Emergencies:	800-255-9155 for WWP 800-954-1211 for US West

Site Resources:

Emergency Evacuation Alarm:	Sound air horn or vehicle horn three times to evacuate work area.
Water Source:	Water coolers and outside tap at SSF Materials.
Telephone:	Cellular Phone

SAFETY MEETING LOG SHEET

LeRoi Smelter Date: _____ Time: _____

Name (Printed):	Signature:

Meeting Conducted By: _____

APPENDIX C

Sampling and Analysis Project Plan (SAPP)

Quality Assurance Project Plan (QAPP)

1.0 FIELD SAMPLING PROCEDURES

The following section describes field methods for sample collection and field measurement/instrumentation procedures.

1.1 Surface Soil Sample Collection

Surface soil samples will be collected using dedicated decontaminated stainless steel spatulas/trowels, stainless steel hand augers and/or spades. All surface soil sampling procedures will be logged in the field log notebook including sampling techniques employed, sampling equipment used, decontamination procedures utilized, calibration of measuring and test equipment, preservatives added and methods utilized.

In addition, all samples taken will be given a designated identification number as specified in Section 1.5, date and time taken, depth of sample, etc. and documented on a Chain-of-Custody Form. Surface and shallow soil sampling (1 to 6 inch depth) will be performed in accordance with Method II-I from Characterization of Hazardous Waste Sites - A Methods Manual: Volume II, Available Sampling Methods, 2nd Edition (EPA-600/4-84-076).

1. Carefully remove the top layer of soil to the desired sample depth with a pre-cleaned spade or other appropriate equipment. Equipment must be decontaminated as outlined in Section 1.6 (Decontamination of Field Equipment). Place the tip of the PID probe 1" from the freshly exposed soil to be sampled and note the maximum and sustained readings over a 30-second interval. Remove an additional 1" of material and discard.

2. Transfer an adequate volume of sample for the analytical techniques specified in Table 3 into an appropriate sample bottle using the same stainless steel scoop spatula.

3. Visually check to ensure that a Teflon liner is present in the cap (if required). Secure the cap tightly. Preserve as specified by the laboratory.

4. Immediately after the sample is collected, label the sample, enter it in the field log book and fill out the sample Chain-of-Custody form.

5. Decontaminate equipment after each sample as described in Section 1.6.

6. Discard contaminated personal protective clothing (e.g., latex gloves), as required.

7. Place sample in cooler and prepare for packing as specified in Section 1.5.

1.2 Sediment Sampling

Sediment samples will be collected at three locations in the Columbia River, and if encountered, at obvious site drainage areas and ground water seeps. Sediment collection procedures are described in this section.

1. Record the date and time of arrival, general site conditions, and other applicable field observations related to the site. Sediment samples obtained at river locations will be referenced according to recognizable land features for future reference.

2. Collect sediment samples from areas at a point upstream, across, and downstream of the site. The sediment samples will be collected using a 6-inch stainless steel core tube. The core tube will be manually inserted or driven into the sediments while trying to minimize the disturbance of the sediment profile.

3. The collection device used to collect sediment samples will be decontaminated according to the decontamination procedure outline in Section 1.6. Insert the collection device tube into the sediments. Dislodge the sediments surrounding the sampler with a shovel or by hand to facilitate sediment removal. Remove the tube and place teflon caps on each end. After the tube has been dried off seal each end with teflon tape to insure an air tight container. The tubes will be placed in plastic bags to prevent possible contamination of the samples.

4. Following sample collection, each sample container will be labeled according to the sample location, date, time of collection, sampler's initials, and analytical request. Record date, time, and sample appearance and soil type in the field log book. Place samples in an ice-filled cooler. All sampling information will be recorded in the field books.

5. At a minimum, QA/QC samples will be collected from 10 percent of the sediment samples.

6. Record sample collection information and sample locations on the chain-of-custody (COC) form. The project name, location, station, date and time of collection, number of containers, types of analysis, and sampler's signature and date will be completed on the COC form. One copy of the COC will be retained by the sampler and two copies will accompany the samples to the laboratory.

7. At the completion of sampling each day, finalize field logs and check sample labels against COC forms and field log books. Verify that the sample number, request for analyses, date, and time of collection labeled on the sample container are the same as those entered on the COC forms and in the field log book.

8. Sediment samples collected each day will be shipped to the laboratory in the ice-filled coolers. Once a sample is collected, it should remain in the possession of the field sampling team. If the samples are left unattended (i.e. in a locked vehicle), chain-of-custody seals will be placed on the cooler to ensure the cooler has not been tampered with.

1.3 Calibration and Use of Measuring and Test Equipment

Equipment to be used at the Site during the field program shall include the pH meters, temperature, conductivity meters, electronic water level meters, and an organic vapor monitor. A brief summary of the use of each type of equipment listed above is provided below.

pH meters

pH meters will be used for paste pH soil analysis. Measurements obtained during the soil analysis will be used to evaluate pH levels under field conditions for evaluation of potential acidic conditions.

The pH meter should be calibrated at the beginning of each day and checked periodically throughout the day with one-point calibration checks using pH 7.0 solution. If the period checks indicate the instrument reading has drifted the meter must be fully recalibrated. Calibration is performed using the following procedure:

- Turn on the instrument and allow it to warm
- Measure and record the temperature of each of the buffer solutions.
- Place the pH probe in the pH 7.0 buffer solution and set the temperature adjustment to the temperature of the buffer solution.
- Adjust the pH meter output to 7.0 using the zero control.
- Rinse the probe with deionized water and place the probe in the pH 4.0 buffer solution.
- Adjust the unit output using the slope control.
- Verify the slope is adjusted correctly by rinsing the probe with deionized water and placing the probe in the pH 10.0 solution.
- Store the probe in pH 4.0 buffer solution when not in use.
- Record all readings in field log book.

Organic Vapor Monitors/Analyzers

Organic vapor monitors will be used for health and safety monitoring during boring and sampling efforts. Calibrations of the organic vapor analyzer/monitor are discussed in the manufacturer's manual.

General Guidelines

Equipment that has not or can not be appropriately calibrated will not be used until the deficiency is resolved. Controls to ensure that equipment is in conformance with this requirement and will perform satisfactorily in service are set forth herein. Instruments past due for calibration or maintenance will be immediately removed from service, either by physical removal from the Site, or (if this is impractical) by tagging, sealing, labeling, or other appropriate means. The calibration policies and procedures set forth in the following sections will apply to measuring and testing equipment. This includes tools, gauges, instruments, standards and other devices/systems used as criteria for well development and purging and used to monitor the safety of personnel and the environment.

All physical, electronic, or chemical measurements or calibrations performed will be traceable through equipment labeling and documentation of equipment maintenance, factory or manufacturer's calibrations, and field calibration. Calibration and tests shall be performed in accordance with manufacturer's instructions under suitable environmental conditions. Where applicable, measurements and calibrations will be referenced to recognized standards of physical constants [such as National Bureau of Standards (NBS) standards].

At a minimum, calibration and maintenance intervals for field instruments will be those recommended by the respective manufacturers, unless experience dictates a shorter interval.

1.4 Field QA/QC Samples

Table 1 presents information on the type and number of field QA/QC samples that will be collected for each sample matrix

- Field Duplicate - One field duplicate will be collected for every 10 soil samples and one for the ground water samples.

1.5 Sample Labeling, Handling, and Chain-of Custody Procedures

This section describes sample labeling, handling and Chain-of-Custody procedures.

1.5.1 Sample Labeling

Samples will be numbered using the following methodology:

- The first two characters will indicate the site. The characters will be "LR" for LeRoi.
- The third and fourth characters will identify the sample matrix. The character will be BG - Boring; MW - Monitoring Well; SS - Surface Soil; SW - Surface Water; SD - Sediment .
- The fifth through tenth characters will be the numeric month, day, and year. For example, July 16, 1996 would be "071696".
- The eleventh character will be a dash "-".
- The twelfth and thirteenth characters will be the number of the sample taken. For example, the first sample would be "01".
- A fourteenth character will be used if:
  - the sample is a field duplicate sample by adding the character "X".

Example: If a fifth surface soil sample is taken on July 18, 1996 at the LeRoi Site it would be numbered "LRSS071896-5". If a field duplicate of this sample is taken is would be numbered "LRSS071896-5X".

Each sample shall be identified in the log book and on the sample container label. The sample labels are formatted as follows:

Client/Source:	Grab/Composite
Site Name	Date/Time
Sample #	Preservative
Analysis	Collected By

The label shall be filled out as follows:

1. Client - Toxics Cleanup Program - Eastern Regional Office
2. Site Name - LeRoi Smelter Site
3. Sample # - LR, date, sample type, and location
4. Analysis - requested lab test
5. Type of Sample - composite or grab
6. Date - date of sample collection
7. Time - time of sample collection
8. Preservative - preservative if required
9. Collected By - sampler's initials

In addition to the sample label, sample tags will be attached to the sample container to avoid sample misidentification should the gummed sample label peel off. A copy of the sample tag is provided in Appendix D.

1.5.2 Sample Handling/Packaging

Samples will be immediately placed in the sample cooler. Once the cooler is filled with samples, it will be locked and securely positioned in a sampling vehicle or other secure storage facility until the completion of the day's sampling activities. The following protocol will be used for packaging of samples:

- Only waterproof ice chests and coolers will be used and will contain plastic garbage bags.
- Strapping tape and custody seals will be placed around the lid of all sample containers.
- Samples will be packed with packaging material (e.g., vermiculite or bubble wrap) for shipment so that the bottles will not dislodge and/or break during shipment.
- Approximately three inches of packaging material will be placed in the bottom of the cooler.
- The sample containers will be placed upright in the cooler in such a way that they do not touch and will not touch during shipment. In addition, all sample containers will be placed in clear, plastic, leak proof bags. Care will then be taken to ensure that sample labels are legible through the bag.
- Additional packaging material will be placed in the cooler to partially cover the sample containers. Freeze packs will be placed in plastic bags and then around, among and on top of the sample containers.

- The Chain-of-Custody Form will be placed in a waterproof plastic bag and taped on the inside of the lid of the cooler. Methodology of shipment, courier name(s), and other pertinent information will be recorded on the Chain-of-Custody Form.

- The completed shipping label will be attached to the top of the cooler.

- "This Side Up" arrow labels will be placed on two sides of the cooler, and "Fragile" labels will be placed on all four sides.

- Samples will be transported by courier in an approved, cooled shipping container, ensuring that the maximum holding times between sample collection and analysis will not be violated.

- The weight and size limitations of the shipper will be maintained and observed.

- All records pertaining to the shipment of a sample will be retained such as freight bills, post office receipts, and bills of lading.

Package labeling specifications will depend on the type of materials being sent, and will be in accordance with Department of Transportation (DOT) regulations (49 CFR, Parts 171 through 177) and CLP guidance (EPA, 1988). Samples of hazardous materials will be stored and handled in accordance with all applicable Federal and State requirements.

1.5.3 Sample Container Preparation

All containers used in the sampling of soils, ground water, surface water and sediment shall be laboratory cleaned and provided by the Manchester Analytical Laboratory or their designated analytical laboratory performing the analysis. The container type and preservative requirements shall follow the specifications provided in Section 2.0.

1.5.4 Field Log Book

A bound field log book will be maintained by the sampler to provide a daily record of events. At the beginning of each entry, the following will be recorded:

- Date
- Time
- Meteorological conditions
- Field personnel present
- Level of personnel protection
- List of on-site visitors and their level of personal protection
- Signature of the person making the entry

All documentation in field books will be in ink. If an error is made, corrections will be made by crossing a line through the error and entering the correct information. Corrections will be dated and

initialed. No entries will be obliterated or rendered unreadable. If sample locations cannot be indicated on field maps, a simple drawing of the site (not to scale) will be included in the log book to provide an illustration of all sampling points.

The cover of each log book used will contain:

- Person and organization to whom the book is assigned.
- Book number
- Start date
- End date

Entries in the log book will include at a minimum the following for each sample date:

- Site identification
- Location of sampling points
- Description of sampling points
- References to photographs (if applicable) and brief sketch of sampling points
- Sample identification number
- Number of samples taken
- Time of sample collection
- Reference to sample location map
- Number of QA/QC samples taken
- Collector's name
- Field observations
- Sample distribution (i.e. split samples, field screening trailer, analytical lab)
- All field measurements made (e.g., pH, temperature, specific conductance)

1.5.5 Sample Chain-of-Custody Record Form

In order to maintain an accurate record of sample collection, transport, analysis, and disposal, the following methodologies will be used:

- Samples will be accompanied by a Chain-of-Custody Form at all times.

- The Chain-of-Custody Form will be used by personnel responsible for ensuring the integrity of samples from the time of collection until shipment to the laboratory.

- The Chain-of-Custody Form will be signed by each individual who has the samples in his or her possession. Preparation of the Chain-of-Custody Form will be as follows:

    1. The Chain-of-Custody Form will be initialed in the field by the person collecting the sample, for every sample. Every sample will be assigned a unique identification number, to be entered on the Chain-of-Custody Form.

    2. The record will be completed in the field to indicate project, sampling team, etc.

3. If the person collecting the sample does not transport the samples to the laboratory or deliver the sample containers for shipment, the first block for "Relinquished by _____," "Received by _____" will be completed in the field.

4. The person transporting the samples to the laboratory or delivering them for shipment will sign the record form as "Relinquished by _____."

5. If the samples are shipped to the laboratory by commercial carrier, the Chain-of-Custody Form will be sealed in a watertight container, placed in the shipping container, and the shipping container sealed prior to being given to the carrier.

6. If the samples are transported directly to the laboratory, the Chain-of-Custody Form will be kept in the possession of the person delivering the samples.

7. For samples shipped by commercial carrier, the waybill will serve as an extension of the chain-of-custody record between the final field custodian and receipt in the laboratory.

8. Upon receipt in the laboratory, the Sample Receiving Supervisor will open the shipping containers, compare the contents with the chain-of-custody record, ensure that document control information is accurate and complete, and sign and date the record. Any discrepancies will be noted on the Chain-of-Custody Form.

9. In the event of discrepancies, the samples in question will be segregated from normal sample storage and the field personnel immediately notified.

10. The Chain-of-Custody Form is completed upon receipt of the samples by the analytical service. The completed Chain-of-Custody Form will be returned and maintained in the project file.

1.6 Decontamination Procedures

Following each soil sample, the spoon sampler will be decontaminated using an alconox wash, tap water rinse followed by a deionized water rinse. Quality assurance and quality control (QA/QC) measures (i.e., sample handling and preservation) will be instituted during the soil sampling and analysis program.

Field equipment used during field exploration and sampling will be decontaminated prior to use and during sampling to reduce the potential for the introduction of contamination and cross-contamination in accordance with the guidelines and procedures set forth in this document. These procedures are necessary to ensure quality control in decontamination of field equipment and to serve as a means to identify and correct potential errors in the sample collection and sample handling procedures.

Decontamination of all field sampling equipment and field instruments will be conducted in a thorough and step-wise manner as described below.

Decontamination will be conducted in the designated contaminant reduction zones specified in the HSP. New disposable latex gloves will be worn when handling clean sampling equipment and monitoring well construction materials to ensure that the equipment is not contaminated.

1.6.1 Construction Equipment

Prior to use, between locations, upon arriving on site and when leaving the site, excavation equipment and other non-sampling equipment shall be decontaminated in accordance with the following procedures:

- Move equipment to designated decontamination area;
- Clean thoroughly (inside and outside) with a high-pressure steam cleaning unit (water at 200° F and 1500 psi);
- Allow to air dry;
- Wrap in plastic sheeting or aluminum foil for storage if equipment is not intended for use; and
- Store in a clean area on plastic sheeting.

All sampling equipment used for soil and sediment sampling will be decontaminated between each sample. The decontamination procedure is provided below:

- Rinse thoroughly with potable water;
- Clean sampling equipment with potable water and phosphate-free laboratory detergent (Alconox or equivalent), using a brush if necessary to remove particulate matter and surface films;
- Rinse with deionized/carbon-free water;
- Rinse with ethanol;
- Triple-rinse with deionized water.

For equipment used to collect samples for metals analyses, the following procedure shall be employed:

- Scrub with alconox/water wash to remove any visible dirt;
- Rinse thoroughly with 1:10 nitric acid/water solution;
- Triple rinse thoroughly with deionized/carbon-free water;
- Allow to air dry.

All sampling equipment used for soil and sediment sampling for both organic and inorganic constituents will be decontaminated between each sample. The decontamination procedure is provided below:

- Scrub with alconox/water wash to remove any visible dirt;
- Rinse thoroughly with 1:10 nitric acid/water solution;
- Rinse thoroughly with deionized/carbon-free water;
- Rinse with hexane; and
- Triple rinse with deionized water.

Sampling equipment shall be stored in the same manner as non-sampling equipment described above.

The decontamination fluids will be treated as though they are contaminated, and will be contained in 55-gallon drums, marked and secured until a proper management method is developed and implemented based on analytical test results.

1.7 Waste Containment Procedures

All decontamination fluids will be contained in labeled 55-gallon drums. The drums will be stored on-site until the laboratory results are received. The drums will be labeled according to well/boring location, content, date, and number in series (i.e., 1 of 2).

2.0 LABORATORY ANALYTICAL PROCEDURES

2.1 Chemical and Physical Laboratory Procedures

Soil and sediment samples will be analyzed by EPA Method 6010/7000 for Total Metals for metals on the EPA Priority Pollutants List. Select samples will be analyzed by EPA Method 8240 for volatile organic compounds and for Total Cyanide by EPA Method 335.1. Table 3 lists the methodologies for chemical analysis.

Samples will be selected for physical testing according to American Society for Testing and Materials (ASTM) standards. The tests will be grain size distribution by ASTM Method D-421 and 422, Atterberg Limits by ASTM Method D-4318, if fine-grained component is over 15 percent. If additional information regarding hydraulic conductivity is required, triaxial permeability tests will be performed in accordance with ASTM methods.

2.1.1 Quality Assurance Objectives

The data quality objective of the Remedial Investigation (RI) at the LeRoi Smelter site is to assess the potential extent of metal contamination in soil from smelter tailings that were deposited on the site. This will be accomplished through a review of past soil analytical results, sampling and analysis of the smelter tailings and soils at the site. The necessity for soil sampling and analysis will be determined from past analytical results and the soil and sediment analytical data from samples collected during this Remedial Investigation.

The smelter tailings at the site are to be sampled and analyzed for classification under Washington State regulations. The method detection limits for the metals concentration in the ground water must be at or equal

to the Washington State MTCA Method B cleanup concentrations. Therefore, the overall Quality Assurance Objectives are to obtain analytical data to enable classification of the potential contaminating substance, the smelter tailings, and to assess the potential for metals contamination of ground water underlying the site.

2.1.2 Analytical Objectives and Rationale

The analytical objectives have been developed by reviewing analytical results from past sampling of the smelter tailings and soils at the site. The suite of metals chosen are based on this data and include the EPA Priority Pollutant metals. The analytical methods chosen for the smelter tailings and soil samples will enable classification of the tailings as either a solid waste or as a dangerous waste that is subject to Washington State dangerous waste requirements (WAC 173-303).

2.1.3 Quality Assurance Objectives for Measurement of Methodologies

Quantitative quality assurance objectives for the measurement of analytical methodologies are based on method detection limits, practical quantification limits, precision, accuracy, and completeness. Values for the method detection limits are included in Table 4. A definition of each term is provided below:

Method Detection Limit - the lowest concentration for which there is at least a 95 percent chance that an analyte will be positively detected.

Practical Quantification Limit - the lowest concentration that can be reliably determined within specified limits of precision and accuracy during routine laboratory operating procedures. The practical quantification limit is determined by multiplying the method detection limit by five.

Precision - the agreement between a set results amongst themselves and is a measure of the ability to reproduce a result.

Accuracy - the accuracy of a method is an estimate of the difference between the true value and the determined mean value. Both systematic and random errors affect accuracy.

Completeness - the total number of samples collected for which acceptable analytical results are generated divided by the total number of samples and multiplied by 100. It is a measure of the overall success of QA procedures and methods.

Qualitative quality assurance objectives include determining the representativeness, comparability, and completeness of the data collected. Representativeness is established by selecting procedures that maximize the accuracy and precision of assessment of the measured matrix and conditions. Proper protocols for sample collection, handling, tracking, and analysis help establish representativeness. Comparability of data is maintained by following a standardized set of protocols and procedures for each sample collected. Definitions of the terminology are provided below:

Representativeness - the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling location, or an environmental condition.

It is the qualitative parameter that is most affected by the design of the sampling program.

Comparability - expresses the confidence with which one data set can be compared to another.

2.2 Analytical Detection Limits

Analytical detection limits will be achieved for each methodology as specified in SW-846 and ASTM. The method detection limits of this analysis must be less than or equal to the Washington State MTCA Method B cleanup concentrations for the particular analyte.

2.3 Sample Containers, Preservation, and Holding Times

Table 3 lists the sample containers, preservatives, and holding times for each analysis that will be analyzed during sampling and analysis. Pre-cleaned sample containers will be provided by the laboratory for the field sampling effort.

2.4 Data Validation

All laboratory sample results will be validated in accordance with EPA Functional Guidelines for Data Validation of Organic and Inorganic Analysis. Ecology's chemists will prepare memoranda outlining QA/QC parameters that will be evaluated such as holding time, matrix spike and surrogate recoveries. The data will be qualified if QC criteria is not met.

TABLE 1
QA/QC SAMPLING PROGRAM

Sample Type	No. of Samples	Field Duplicate	Total Samples
Test Pits	20	2	22
Background	10	1	11
Sediment	4	0	4

TABLE 2
ANALYTICAL PROGRAM

Sample Type	Metals	TCLP	VOC	Cyanide
Test Pits	22	5	5	5
Background	11	0	0	0
Sediment	4	0	0	0

TABLE 3
SAMPLING AND ANALYSIS REFERENCE TABLE

Analysis	Method	SOIL	
		Container (chill to 4°C)	Holding Time
Metals (total)	6010/7000	8 ounce glass jar	6 months
Total Cyanide	335.1	4 ounce glass jar	14 days
Volatile Organics	8240	4 ounce septa jar	7 days

TABLE 4
METHOD DETECTION LIMITS FOR SOILS

Analyte	Method Detection Limits [A] for Soils (mg/Kg)	Laboratory Detection Limits [B] for Soils (mg/Kg)
Antimony	32	3.0
Arsenic	20[1]	3.0
Beryllium	0.8[2]	0.1
Cadmium	2[1]	0.2
Chromium (total)	100[1]	0.5
Copper	2,960	1.0
Lead	250[1]	2.5
Mercury	1.0[1]	0.005
Nickel	1,600	1.0
Selenium	400	4.0
Silver	400	0.3
Thallium	5.6	5.0
Zinc	24,000	1.0

[A] From MTCA Method B Cleanup Levels for Soils
[B] From Test Methods for Evaluating Solid Waste, US EPA SW-846 (Sept. 1987)
[1] From MTCA Method A Cleanup Level for Soils
[2] From Natural Background Soil Metal Concentrations in Washington State