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March 19, 1990
W.O. 2121-04

Mr. David South, P.E.
Senior Engineer
Hazardous Waste Investigations & Cleanup Program
Department of Ecology
Northwest Regional Office
4350 - 150th Avenue N.E.
Redmond, Washington 98052-53-1

Dear Mr. South,

Enclosed please find five copies of the revised Phase I Maralco RI/FS Work Plan. I have incorporated the changes to the sampling and analyses sections that we discussed in our telephone conversations of March 14 and 15, 1990. If you should have any questions, do not hesitate to call myself or Alan Parker.

Sincerely,

MK-ENVIRONMENTAL SERVICES

Susan Evans

C. Susan Evans
Project Hydrogeologist

PHASE 1 MARALCO RI/FS

WORK PLAN

KENT, WASHINGTON

MARCH 1990

prepared for:

Washington Department of Ecology

prepared by:

MK-Environmental Services, Inc.

1300 114th Avenue S.E.
Suite 112
Bellevue, Washington
(206) 453-1110

and:

International Aluminum, Incorporated
7817 South 202 Street
Kent, Washington

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MARALCO RI/FS WORK PLAN

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ATTACHMENT 3 Resumes of Project Personnel
ATTACHMENT 4 Pilot Plant Proposal

SECTION 1

Section 1

INTRODUCTION

This document presents the work plan for performing a Phase 1 Remedial Investigation/Feasibility Study (RI/FS) to evaluate the extent to which contamination exists in the soil and ground water at the Maralco Aluminum Site and to determine the feasibility of various interim response measures including a processing technique developed by International Aluminum Company Inc.

The work plan has been prepared by M-K Environmental Services, (MK-Environmental) who will provide the necessary resources and personnel to complete this RI/FS. M-K Environmental will be supported by Shapiro & Associates, a subcontractor who will provide support for public participation issues.

The work plan will be performed in a series of tasks which are described in Section 4 of this document. Key personnel are discussed in Section 5. The project budget and schedule are presented in Section 6. Resumes of project personnel are presented in Attachment 3.

SECTION 2

Section 2

SITE BACKGROUND AND SETTING

The Maralco Aluminum Site, as shown in Figures 1 and 2 (from the preliminary assessment report provided by Ecology), is a 13 acre industrial property located in Kent, Washington. Maralco Aluminum Company, Inc. (Maralco) operated an aluminum recycling/refinery facility at the site from 1980 to 1986. The recycling facility produced aluminum alloy ingots from aluminum cans and aluminum scrap. The production was sold to both foreign and domestic markets until November 1986 when the facility was abandoned.

Waste products were also produced from the operation. These included furnace slag and baghouse dusts. During the first year of operation, the waste products were transported off-site to a landfill. After 1981, however, the material was deemed a dangerous or hazardous waste and Maralco began storing the waste products on-site.

The recycling process used by Maralco involved melting and processing the aluminum scrap in rotary barrel and reverberatory furnaces. The rotary barrel furnace was charged with aluminum scrap and salt (KCl and NaCl). The salt acted as a flux to remove the impurities and also prevent oxidation of the aluminum.

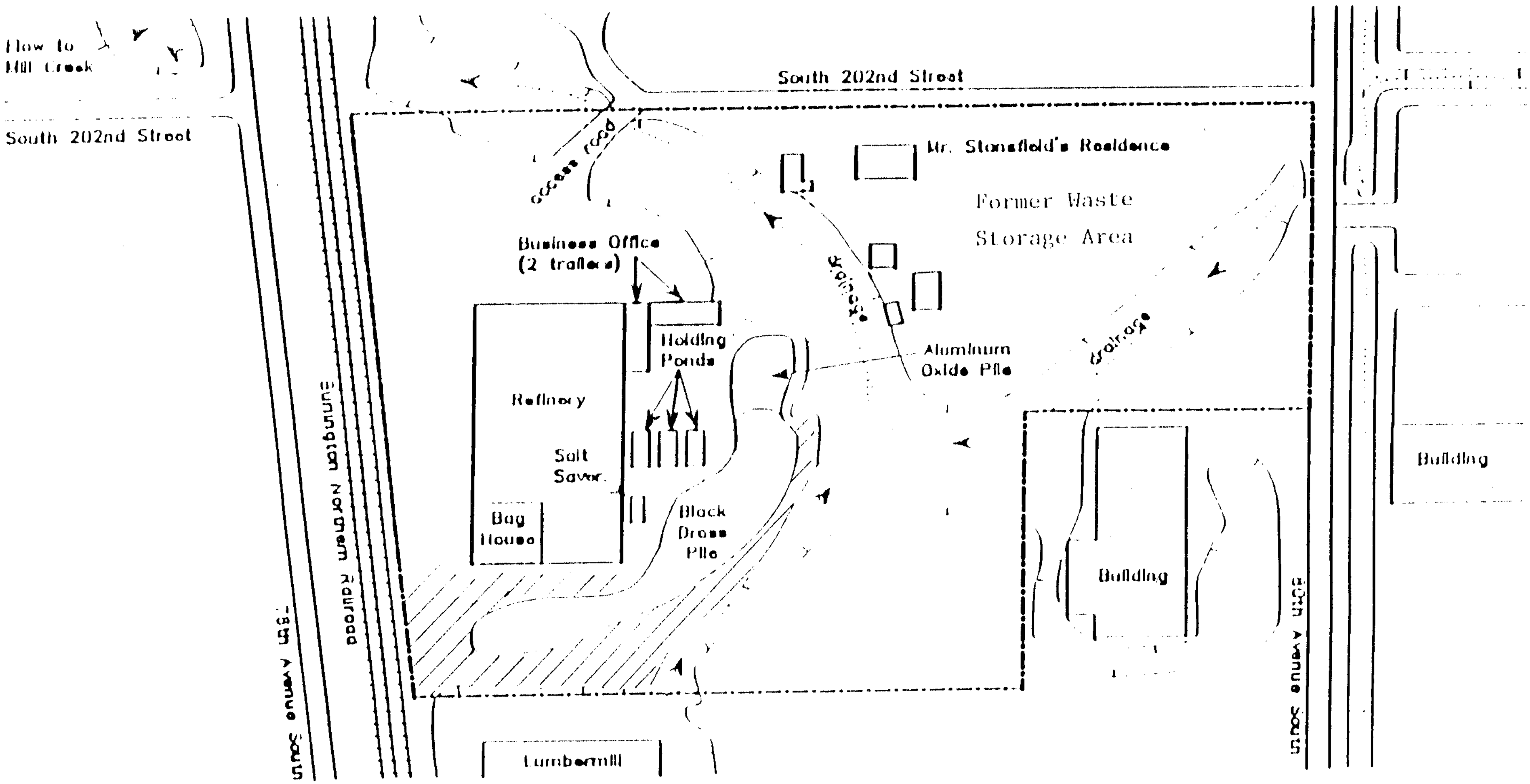
Metallic silicon, copper and zinc were added to the melt in the approximate percentages of 7%, 1% and 1.5% to produce aluminum alloys. This comprised about one-half the product line. The other half of the product line was aluminum sows produced from used beverage containers (UBCs). The scrap used contained varying amounts of associated heavy metals. Average production was about 1.5 million pounds of produce per month over the approximately 69 months of operation. More accurate production figures are contained in records obtainable from Phil Stansfeld of International Aluminum, Incorporated (IAI).

When the charge material was melted, the rotary barrel furnace was stopped and the salt and impurities (identified as black dross) were separated from the molten aluminum. The black dross was taken from the furnace and stored in an outside pile. Particulate materials from the smelting operations were collected in a baghouse. These materials were also discharged onto the black dross pile.

dross = waste or impurities

Maralco filed for bankruptcy in May of 1983 following a series of cost overruns, accumulation of debt, high interest rates, and a worldwide metals recession. The property is being managed by a bankruptcy examiner. The site remediation activities are funded by the State of Washington, Toxic Controls Account.

The State of Washington, Department of Ecology (Ecology) has entered into a court agreement with the secured creditors on this property to begin RI/FS activities. As part of this agreement, Ecology will receive half of the proceeds from any sale of the property.



LEGEND
- Site boundary
- Drainage direction
- Depressed area

0 50 100 150 200
scale in feet

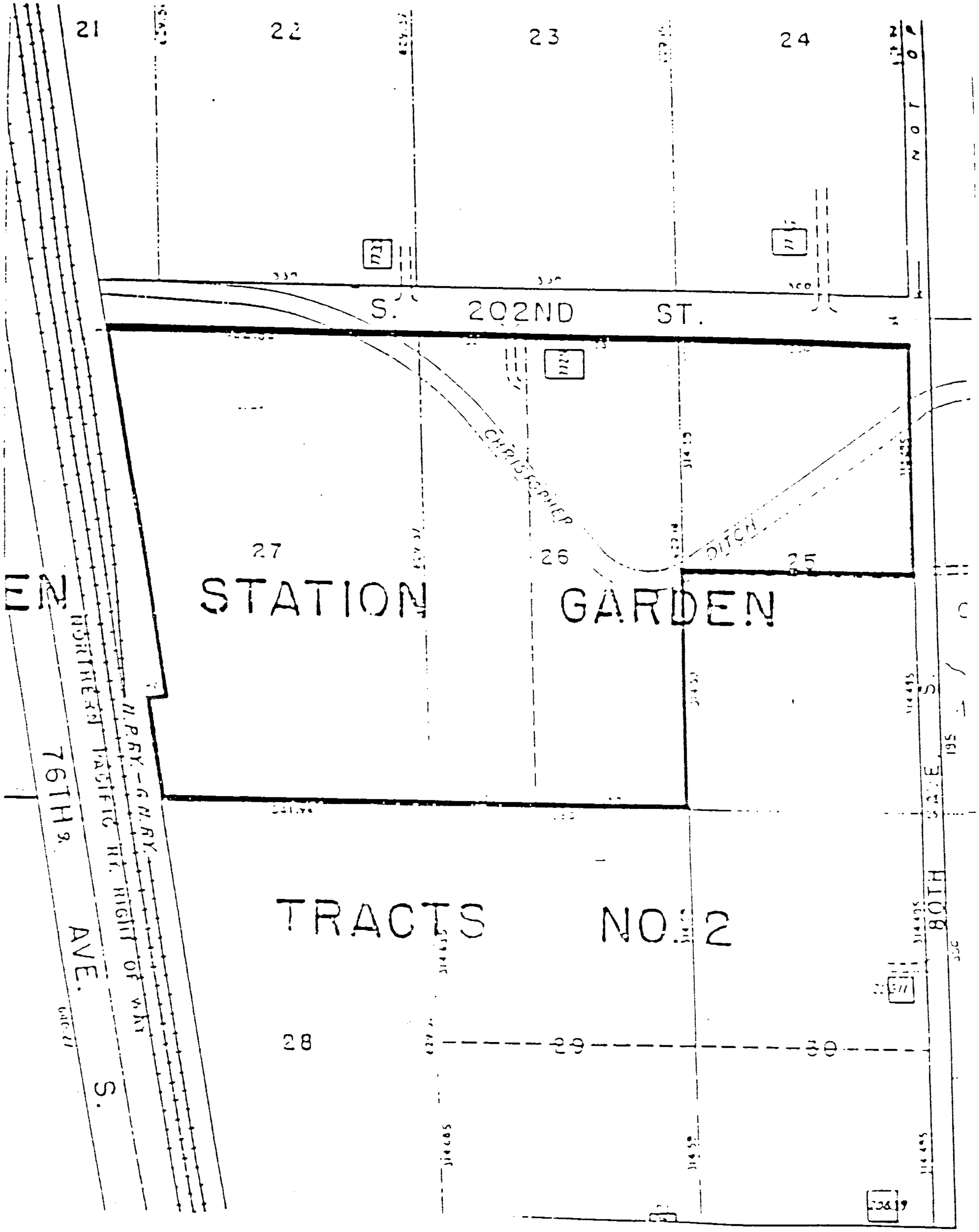
Surface Area Covered by Black Dross

MW-1 Monitor Well

N

Figure 1

From Ecology and Environment 1987, Figure 2



Received from Mike Lazenby, Seafirst Business Recovery Systems, undated.

Maralco Aluminum Company Plat Map

WASHINGTON STATE DEPT OF ECOLOGY

Figure : 2

SECTION 3

Section 3

WORK PLAN RATIONALE

The findings of the preliminary assessment work performed by Ecology and Environment, Inc. and the assessment of Ecology indicates that there are four materials of primary interest at the Maralco site. They include an estimated 50,000 tons of black dross, 10 tons of Kawecki-Berylco, Inc. (KBI) dross, 5,000 tons of aluminum oxide, and 500 pounds of baghouse dusts. The black dross is a dangerous waste under Chapter 173-303 WAC, "Dangerous Waste Regulations". The baghouse dust is an extremely hazardous waste. A 50,000 gallon underground diesel storage tank is also subject to State and Federal regulations.

Limited sampling and analyses performed by Ecology and Environment, Inc. in 1987 shows that concentrations of priority pollutant metals in soils exceeded applicable background soil concentrations by up to three orders of magnitude. These compounds were generally characterized by antimony concentrations from 2.9 ppm to 107 ppm, chromium concentrations from 21 ppm to 975 ppm, copper concentrations from 241 ppm to 861 ppm, nickel concentrations from 15 ppm to 438 ppm, and zinc concentrations from 1760 ppm to 16,500 ppm.

Sediment samples collected by Ecology and Environment, Inc. in 1987 from the seasonal creek which trisects the Maralco site indicate a contamination of the creek by the black dross and/or aluminum oxide piles located immediately adjacent to the creek. In addition, the off-site migration of the compounds via the creek was analytically substantiated.

The four waste materials cover a limited area within the 13 acre site and probably impact less than 5 acres. The eastern portion of the site appears to have been isolated from most of the operation and associated waste products and may be uncontaminated or easily remediated. A buyer has expressed an interest in this eastern section of the Maralco property, and its earliest disposition is of benefit to all parties involved in the site activities.

International Aluminum, Inc. (IAI), a local company, has proposed a process that may be useful as a remediation method for the black dross pile. According to IAI, bench scale tests have been completed, and the results indicate that the black dross material could be processed and transported off-site. The process would require that International Aluminum Inc. receive and maintain a permit to discharge waste water to the Renton treatment plant.

Based on the foregoing, MK-Environmental proposes a work plan that will:

- Determine the extent of the contamination on the eastern portion of the site and remediation methods that will allow for the earliest transfer of that property.
- Survey the property to define the site boundaries, landmarks, information, and data to the extent needed to perform the activities in the work plan.
- Begin to characterize the nature, and extent of contamination of soil groundwater and surface water identified at the Maralco site.
- Evaluate the feasibility of the International Aluminum process to clean up the waste pile as an Expedited Response Action.

- Recommend additional areas of work to be completed in future studies.

The remedial investigation and feasibility study work plan is centered around a cost effective, phased approach. The objective of the RI/FS work plan is to gather information sufficient to support an informed risk management decision regarding the limits and/or the extent of the contamination and the remedial options for the Maralco site.

SECTION 4

Section 4

WORK PLAN TASKS

4.1 TASK 1 - DEVELOP HEALTH AND SAFETY AND QA PLAN

4.1.1 Health and Safety Plan

Certain elements of the Health and Safety Plan for Phase I, RI/FS at Maralco, are definable through review of existing data, published guidance documents, and past experience with similar projects. A draft health and safety plan has, therefore, been created and appears as Attachment I.

4.1.2 QA Plan

The Quality Control and Sample Analysis plan are included as Attachment 2 to this work plan.

4.2 TASK 2 - LAND SURVEY

This task will involve acquiring property ownership plats, obtaining and reviewing a title search, acquiring current zoning maps and ordinances, and contacting appropriate agencies to acquire descriptions and published values for geodetic control monuments and benchmarks situated in and about the Maralco site. The title search will be provided to MK by David South of Ecology. MK-Environmental will subcontract the surveying services of a registered land surveyor.

The final survey will produce a definition of precise property boundaries and landmarks. A volumetric survey of the black dross pile will be completed to determine the quantity of waste. Sample, borings and well locations will also be surveyed. Topography of the drainages will be surveyed so that the water storage volume of the ditches can be calculated. The subtasks involved in this activity are described in Sections 4.2.1 through 4.2.3.

4.2.1 Land Surveying for Property Boundaries and Plat Boundaries

A land survey will be conducted to define property boundaries at the Maralco site, particularly Plats 25 and 26 on the eastern portion of the site, for potential property transfers. This survey would involve setting property corners (or monuments), platting, and filing a record of survey as required by the State of Washington.

4.2.2 Topographic Surveying for Volume Calculations of Black Dross Pile

The volume of the black dross pile must be determined for estimating remedial action alternatives for the material. A topographic survey will be conducted based on a volume accuracy of five (5) percent. Cost of the survey is proportional to the accuracy of the volume estimate. The data points generated from the survey will be input to a computer program which will calculate the waste pile volume. The survey may be performed by aerial photographic analyses if the cost of obtaining photographs and performing the analyses is comparable to land surveying.

4.2.3 Planimetric and Topographic Surveying of Site

A base map will be developed for the Maralco site indicating buildings and other structural features, the diesel tank fill pipe, and locations and elevations of borings, sample locations and wells. A topographic survey combined with a planimetric survey will show processing facilities, residence and farm buildings, and engineered features related to the creek (e.g., diversion box and weir) and will provide contour lines to indicate elevations of site features. By combining data from these surveys with recent aerial photos, a detailed and accurate base map will be developed. The survey will include topography of all drainage ditches, and locations of storm drains and sanitary sewers.

4.3 TASK 3 - EVALUATION OF SOIL AND GROUNDWATER CONTAMINATION

This task is based on the Sampling Plan outlined by Ecology in discussions on November 29, 1989 and includes soil, groundwater, surface water and sediment sampling. The sampling and analysis plan outlined herein has been designed as a first phase to determine the extent of environmental contamination resulting from past practices at the site, and from the continued presence of the uncontained waste pile on the site. This task has been divided into several subtasks, as described below. The various subtasks described in this work plan constitute Phase I of a site Remedial Investigation. The Phase I remedial investigation will be used to focus Phase II investigations for delineating the extent of soil and groundwater contamination.

Objectives

The Phase I Remedial Investigation is focused on determining: 1) the environmental and regulatory status of the eastern portion of the property, so that it can be released for sale, 2) determining the groundwater flow rates, flow directions, and extent of contamination in soils underlying the site and in the uppermost water-bearing unit beneath the site; and 3) the type of contamination of surface water and sediments in the creeks which pass through the site. The specific objective of each sampling and analysis subtask is noted in the description of that subtask. This investigation does not address other aspects of the site which may have an effect on the environment. These are discussed in Section 4.3.6, Suggested Phase II Environmental Investigations.

4.3.1 Task 3a - Evaluation of Existing Data

Existing data will be reviewed and evaluated to determine the current status of knowledge about the site and to identify data gaps. This will include inter- and intra-agency reports regarding the site, the Ecology and Environment October 1987 report, as well as environmental reports prepared for Maralco (if available). The items listed below will be based upon evaluation of historical data. The sampling and analysis plan described in Sections 4.3.2 through 4.3.4 may be modified based upon this data review and evaluation. This task will include conducting interviews with former MARALCO employees (as available) regarding past operations and disposal practices at the site. Interviews will be also conducted with former land owners to determine if any past practices may have affected environmental quality at the site.

Determination of Contaminants of Interest

Based on the review of available data and the types of wastes disposed, a list of contaminants of interest will be developed. Preliminary contaminants of interest are listed in Table 4-1.

TABLE 4-1
Preliminary Contaminants of Interest
Maralco Site

Chromium	Antimony	MgCl
Hexavalent Chromium	Copper	NaCl
Nickel	Zinc	KCl
Lead	Chloride	Cyanide
		pH

Determination of Sample Type

Sample types to be collected include surface soil, subsurface soils, groundwater, surface water, and drainage sediments. Each sample type is discussed in Sections 4.3.2 through 4.3.4.

Determination of Sample Locations and Frequency

Sample locations and frequencies are discussed for each sample type in Sections 4.3.2 through 4.3.4.

Preparation and Sample Handling

Sample collection and handling are discussed briefly in the specific sample sections. Details of sample collection and handling procedures are discussed in Attachment 3, Sampling Protocols.

Specification of Sampling Procedure

Sampling procedures for soils and ground water samples are described in Attachment 3, Sampling Protocol.

4.3.2 Task 3b - Property Transfer Evaluation of Eastern Portion of Property (Plats 25 & 26)

A property transfer environmental evaluation of Plats 25 and 26 (Figure 2) will be conducted to determine the status of these plats for resale. The evaluation will include the following items and will be integrated into the overall report. A separate report on the environmental evaluation will be issued within ten working days of receipt of analytical results for samples collected in this portion of the site.

4.3.2.1 Title Search

A title search will be obtained from Ecology on Plats 25 and 26 and will be reviewed for evidence of any past industrial owners or activities that may have affected environmental media at the site.

4.3.2.2 Historical Aerial Photograph Review

Historical aerial photographs will be reviewed for indications of past on-site activities which may have had a detrimental effect on the environment, such as service stations or other industrial activity. To the extent that they are available, pairs of stereo photographs will be examined by a geologist trained in aerial photograph interpretation. If items of interest are noted, copies of the appropriate photographs will be obtained.

4.3.2.3 Agency File Review

The objective of this subtask is to determine activities on the site or surrounding properties which may have had a detrimental effect on the environment, and whether they may have impacted soils or groundwater underlying the site. For example, an upgradient, off-site, leaking underground tank or other industrial facility may have affected groundwater which is flowing beneath the site. Available environmental files from Ecology, EPA and King County will be reviewed for the presence of known environmental problems on or near the site. This file review will include actions on leaking underground storage tanks, RCRA, and CERCLA sites, etc. A wind rose will be obtained from reports available on nearby sites. If not available, a wind rose for the area will be constructed. Interviews with Mr. Phil Stansfeld on the history of the site during operations will also be conducted. Appropriate sections of the files reviewed will be attached to the report as an appendix.

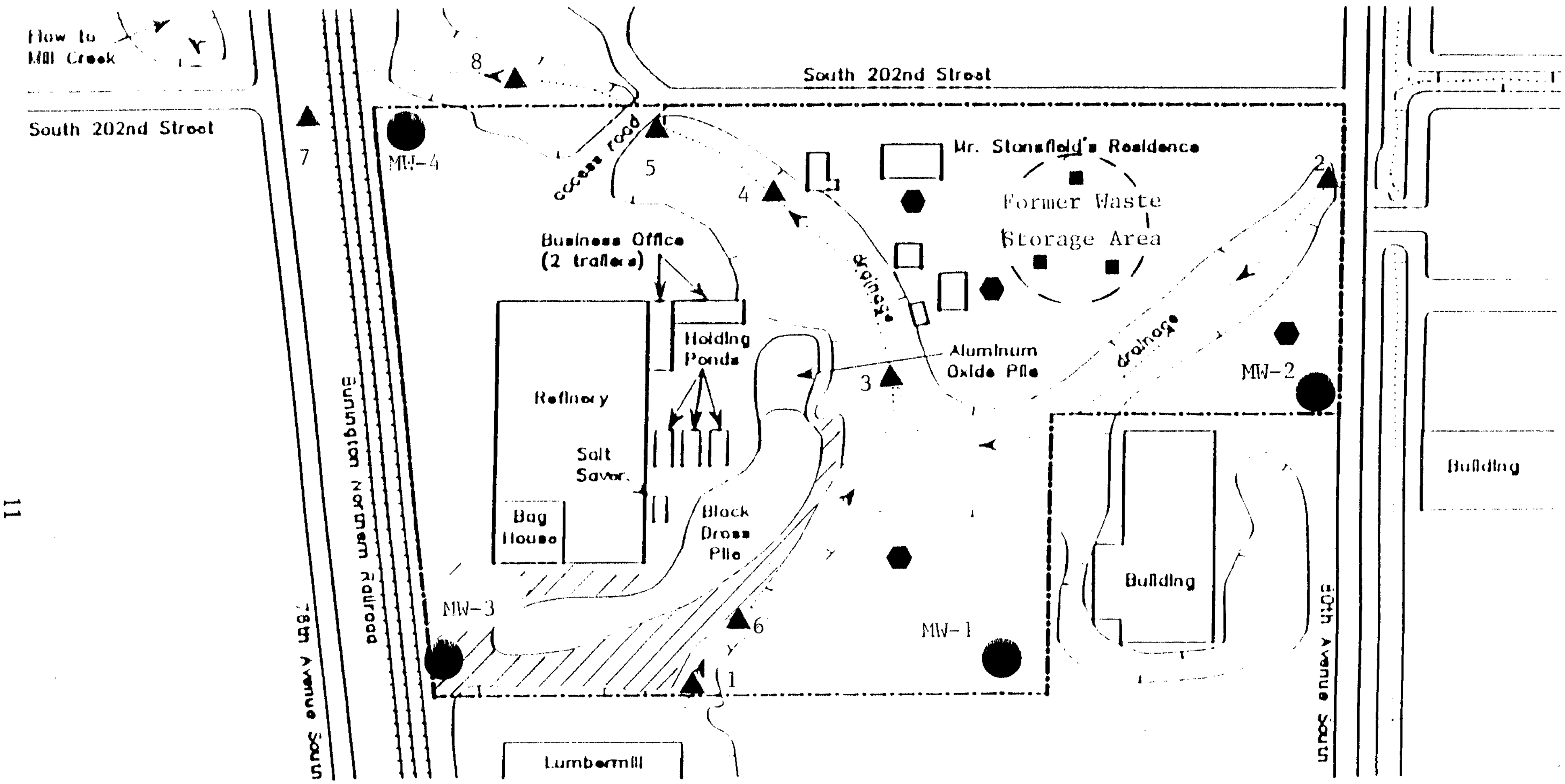
4.3.2.4 Site Examination Walk Through

An experienced geologist or environmental engineer will walk over Plats 25 and 26 and note in detail items which indicate that past or continuing activities on-site may have had a detrimental effect on human health or the environment. Waste piles, areas of stained soil, stressed vegetation, etc. will be noted on the base map developed under Section 4.2. Locations for the "upgradient" monitor well and for shallow soil samples will be staked. Preliminary sample locations are shown in Figure 3. These areas will then be evaluated and addressed in the appropriate phase or work plan. This walk-through will be scheduled so that Mr. David South, Ecology site manager, can accompany MK personnel. All sampling locations will be approved by Ecology in the field.

Soil sampling and installation of monitor wells are discussed in the following sections. All soil and subsurface samples collected in Plats 25 and 26 will be included in the environmental evaluation report. These samples will be collected first, to facilitate completion of the environmental evaluation as quickly as possible.

4.3.2.5 Soil Sampling

Both surface and subsurface soil samples will be collected from Plats 25 and 26 to determine the presence and extent of soil contamination on-site. General locations and collection techniques are described below. The soil sampling will be performed in two stages. Analytical results from Stage I will be utilized to narrow the suite of analytical parameters to indicator compounds and species. This phased approach is aimed at controlling analytical costs.



LEGEND

- Site Boundary
- Drainage Direction
- Depressed Area

0 50 100 150 200

Scale in Feet

- Surface Area Covered by Black Dross
- MW-1 Monitor Well
- Surface Water/Stream Sediment Sample
- Miscllaneous Soil Sample Location-Subject to Change
- Former Waste Storage Area Sample Location

N

Figure 3
Sampling and Monitor Well Locations
MARALCO SITE
Kent, Washington

(from Ecology and Environment, 1987, Figure 2)

4.3.2.5.1 Surface and Shallow Soil Sampling

Waste Storage Area (Stage I samples):

East of the residence, within Plats 25 and 26, is an area where black dross was temporarily stored during facility operations. This area is now covered with a thin (1 inch) layer of topsoil and appears as an area of stressed vegetation. Three hand augered borings will be sampled in this former waste storage area to a nominal depth of three feet, or to one foot below the base of visible contamination. Borings will be advanced and samples will be collected from each boring at the following two intervals: 0-6" or within any visible contamination, and one foot below the base of contamination. The purpose of these samples is to determine the approximate extent of contamination beneath this former waste storage area. If no contamination is observed below the immediate surface, the number of samples may be reduced to two per boring. All samples will be analyzed for waste characteristics (Table 4-2). One of the 8 samples will be analyzed for priority pollutant organics. The decision as to which sample to analyze for organics, or whether to have the laboratory composite several samples for this analysis will be made in the field. The analytical scheme for these samples discussed in Section 4.3.6 of Attachment 2.

Miscellaneous Soil Sample Locations (Stage II samples):

Surface and shallow (to 3 feet) soil samples will also be collected from at least four miscellaneous areas identified during the site inspection. These locations will include areas where soils are oil stained or discolored, or vegetation appears stressed. Old machinery in and around the residence outbuildings implies that one or more of the buildings may have been utilized as a shop for machinery repair, oil changing, or other activities which may have resulted in discharging of hazardous materials to soils or groundwater. Three samples will be collected from each boring at the following intervals; 0-6", 6" above the base of visible contamination, and 1 foot below the base of contamination. The purpose of these samples is to determine the approximate vertical extent of contamination beneath areas of visible surface contamination. All of these samples will be analyzed for indicators of waste characteristics. One sample or composite sample per boring will be analyzed for priority pollutant organics.

Surface and Shallow Soil Sample Collection Techniques:

Surface and shallow soil samples will be collected using a stainless steel hand auger. The auger will be decontaminated between holes with a distilled water and alconox wash, followed by a distilled water rinse. One equipment blank will be collected each day to confirm that decontamination has been complete. Fresh latex or PVC disposable gloves will be worn by the sampling personnel for collection and handling of each individual sample to prevent contamination of the sample or cross-contamination between samples. All borings will be logged, and descriptions will be recorded in field logbooks according to the procedures in Attachment 3. Standard sample handling and Chain of Custody Procedures, as described in Attachment 3, will be followed.

4.3.2.5.2 Subsurface Borings

In accordance with the Scope of Work requested by Ecology in discussions November 29, 1989, and January 2, 1990 two subsurface borings will be drilled on the east portion of the site during Phase I. These borings will be drilled as part of the Stage II sampling. Both of the borings will be completed as groundwater monitor wells. One of these well borings will be located to serve for collection of background soil and groundwater data. Proposed well locations are shown in Figure 3. Well locations

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August 14, 1990

Jeri A. Sivertson
Contracts Officer
Department of Ecology/Woodland Square
Mail stop PV-11
Olympia, Wa. 98504-8711

Dear Jeri:

The purpose of this letter is present the results of the Stage 1 sampling program and to request approval for an increased scope for the Stage 2 sampling program. The increased scope for Stage 2 sampling is based on the results of the Stage 1 sampling.

The Stage 1 results are presented in Attachment I. They indicate elevated heavy metal contamination in most areas where sampling occured. The presence of high lead, copper, and chrome readings are of concern to MK. Based on our knowledge of heavy metal contamination and the associated health hazards, there is a clear need to define the extent of heavy metal contamination. This is further stressed given the fact that an occupied residence is present on the Maralco site.

The Stage 2 program is presented in Attachment II. Attachemnt II includes the rationale for the sampling program, manhours and costs for the additional work, and a map showing the sample locations. Objectives of the Stage 2 sampling are to gain a better understanding of the nature and distribution of shallow soil contamination related to past practices at Maralco, and to better characterize the black dross pile in terms of distibution of heavy metals, salts, and baghouse dust. Characterization of the dross pile is very important and will allow MK to identify productivity improvements which could result in substantial cost savings.

Results from Phase I sampling will be used to focus the Phase II investigation and to begin to characterize the risk to health and the environment posed by the site. The additional Phase I soil and waste sampling presented herein was discussed with David South in our August 10, 1990 meeting on labratory results and indicator parameters. Mr. South agreed with the need for the additional sampling and with the technical rationale for each of the proposed samples as outlined in Attachment II.

The proposed Stage 2 sampling changes the manhour and budget for Task 3, Remedial Investigation. The changes in manhours and costs are shown in Attachment II, Table 1. The additions to the Stage 2 sampling will require an 367 manhours.

In addition MK has incurred 84 hours of delay time associated with problems relating to the Stage 1 sampling, as explained in the August 1, 1990 Memorandum sent to Dave South. These hours are also identified in Attachment II, Table 1.

The Stage 2 sampling work is currently scheduled for September 4,5,6,7,8,11,and 12, however it can be rescheduled for a later date if more time is needed for your review and approval.

Very Truly Yours,

MK ENVIRONMENTAL SERVICES

Alan M. Parker

Alan M. Parker
Project Manger

cc: Dave South, WDOE
Susan Evans, MK
Marian Allen, MK
File

ATTACHMENT I

MEMORANDUM

Date: August 2, 1990

To: David South, State of Washington Department of Ecology

From: Marian Allen and Alan Parker, MK-Environmental Services

Re: Indicator Parameters, Maralco Site, Kent, Washington

The following presents the tabulated preliminary results from the Stage I sampling event at the Maralco Site in Kent, Washington, the preliminary indicator parameters selected for Stage II sample analyses, and proposed changes in the sample collection and analytical plans. The rationale for selection of the indicator parameters, proposed analytical adjustments and sample number increase will be discussed more thoroughly in our meeting scheduled August 10, 1990.

Analytical Results

The analytical data received from the Stage I sampling event at the Maralco Site has been compiled and entered into summary tables. Attached are copies of the draft data tables for your review.

Metals, particularly aluminum, barium, chromium, copper, lead, manganese, potassium, sodium, and zinc, were elevated in soil and sediment samples in the area of or adjacent to the current or former waste piles and near the railroad spur area. Because of the high total metal contents, all soil and sediment samples will be resubmitted to the Manchester Laboratory for metals leachate analyses. Extraction Procedure Toxicity (EP TOX) methodology was specified in the Maralco Site Work Plan. However, Toxicity Characteristic Leaching Procedure (TCLP) methodology has been promulgated since issuance of the Work Plan. It is thought that TCLP methodolgy more closely mimics leaching in a landfill than does EP TOX. For purposes of this investigation, EP TOX should adequately, if not conservatively, characterize the leaching potential of metals in the soil and sediment samples. We may wish to discuss this issue in our upcoming meeting.

It is requested that the composite sample from the black dross pile, BD-1, be resubmitted for hexavalent chromium analysis at the same time as the EP TOX samples. This analysis was not included under the original scope of work, but it is urged for health and safety concerns that the chromium in the waste pile be speciated with an expedited analytical turn around time.

Indicator Parameters

Preliminary indicator parameters have been selected from the Stage I analytical results. These parameters will be used as a cost-effective measure for the Stage II analytical program. As outlined in the Work Plan, there are four basic groups of analytical parameters. Indicator parameters have been selected for two of these (waste characteristic inorganics and organic priority pollutants) and are outlined by media type below. The other parameter groups (water quality and field measurements) will not be adjusted.

WASTE CHARACTERISTIC INORGANICS: INDICATOR PARAMETERS

Soil / Sediment	Surface Water
Aluminum	Aluminum
Barium	Barium
Chromium	Calcium
Copper	Copper
Lead	Magnesium
Manganese	Manganese
Potassium	Potassium
Sodium	Sodium
Zinc	Zinc
Cyanide	Cyanide
Ammonia (w/ total organic calculation)	Ammonia (w/ total organic calculation)
Chlorine	Chlorinity

ORGANIC PRIORITY POLLUTANTS: INDICATOR PARAMETERS

Soil / Sediment*	Surface Water**
Volatile Organics	Polycyclic Aromatic Hydrocarbons
Decane	
Silane, Silanol	
Polycyclic Aromatic Hydrocarbons	

* Due to compounds detected in the sediments during Stage I sampling, particularly soils and sediments from the black dross pile and soils from the area of the former waste pile, some soils and sediments from Stage II sampling will be analyzed for the Priority Pollutant list for volatile organic compounds and base/neutral acids (BNA).

** Base/neutral acid holding times were exceeded during analysis of Stage I surface waters. It is recommended that some, if not all, surface waters be resampled and analyzed for the Priority Pollutant BNA list.

Stage II Sampling

Stage II sampling is scheduled for the week of September 3, 1990. In addition to the sampling program outlined in the Work Plan, it is recommended that 20 sediment samples be taken along transects on the waste pile and 20 additional hand auger soil samples be collected. The waste pile is not likely to be homogenous in nature. Samples from pile transects will help characterize the distribution of salts and heavy metals in the black dross. Ten additional hand auger locations, including the base of the waste pile, adjacent to onsite domestic structures, the perimeter areas of the former waste pile, and background locations will enable a more valid basis for characterizing the contaminants and distribution during the Phase I Investigation. It is proposed that ten sediment samples from the waste pile and one background soil sample would be submitted to the laboratory for analysis of the Target Analyte List and indicator parameters. Four waste pile samples would be submitted for hexavalent chromium determination. All other additional soil and sediment samples would be submitted for inorganic parameters only.

Soil borings and monitoring wells will be installed during the Stage II field effort. Groundwater samples will be analyzed for the Target Analyte List, the Organic Priority Pollutant List, and the other inorganic indicator parameters (including chlorinity). It is also recommended that one soil sample from within the saturated zone in each of the four borings be submitted for the same analytical parameters.

Anticipated Analytical Problems

The Stage II analytical program can expect similar problems to those encountered in the laboratory during Stage I analyses. Sample matrix problems, presumably caused by the high salt content found in many of the samples, caused difficulties with recovery and interference (verbal communication with Manchester Laboratory). Sample preparation techniques may need to be modified or developed to mitigate such matrix effects. Potential matrix problems will be noted on Stage II sample labels.

attachments
cc: C.S. Evans
project file

DRAFT

MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:

Table
Results of Laboratory Analyses of Sediment Samples
Selected Parameters
Maralco Site, Kent, Washington

SAMPLE LOCATION: SAMPLE ID: DESCRIPTION: SAMPLE DATE: ANALYSIS DATE: UNITS:	SW-1 198294 soil 5-10-90 6-18-90 mg/Kg	SW-3 198299 soil 5-10-90 6-18-90 mg/Kg	SW-4 198297 soil 5-10-90 6-18-90 mg/Kg	SW-6 198296 soil 5-10-90 6-18-90 mg/Kg	SW-7 198292 soil 5-10-90 6-18-90 mg/Kg	SW-8 198289 soil 5-09-90 6-18-90 mg/Kg	SW-18 198290 soil 5-09-90 6-18-90 mg/Kg	BD-1 198301 soil 5-10-90 6-18-90 mg/Kg
Total Cyanide	<0.43	0.29	9.54	<0.27	0.83	2.02	0.93	0.66
Total Kjeldahl Nitrogen	595.2	438.85	340.45	990.12	781.27	464.31	457.57	
Total Ammonia	252.7	97.6	27.9	263.9	76.1	20.8	39.8	211.3
Cation Exchange Capacity	487.8	163.7	608.8	224.8	243.2	175.7	163.5	313.2

Table
Results of Laboratory Analyses of Sediment Samples
Selected Parameters
Maralco Site, Kent, Washington

MKE W.O.No: 2121.03.320
Date Issued: 7-25-90
Revised:

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SAMPLE LOCATION:	HB-1 0-0.5'	HB-1 1.5 - 2'	HB-2 0-0.5'	HB-2 1.5 - 2'	HB-3 0-0.5'	HB-3 1.5 - 2'
SAMPLE ID:	198281	198282	198283	198284	198285	198286
DESCRIPTION:	soil	soil	soil	soil	soil	soil
SAMPLE DATE:	5-09-90	5-09-90	5-09-90	5-09-90	5-09-90	5-09-90
ANALYSIS DATE:	6-18-90	6-18-90	6-18-90	6-18-90	6-18-90	6-18-90
UNITS:	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Total Cyanide	0.48	<0.22	0.57	<0.25	<0.28	<0.24
Total Kjeldahl Nitrogen	689.7	177.17	1235.07	390.38	992.89	361.69
Total Ammonia	62.4	10.2	121.1	42.2	212.8	66.2
Cation Exchange Capacity	179.6	1.0	394.9	158.9	286.5	115.5

NOTES:
(1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively.

DRAFT

MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:

Table
Results of Laboratory Analyses of Surface Water Samples
Selected Parameters
Maralco Site, Kent, Washington

SAMPLE LOCATION: SAMPLE ID: DESCRIPTION: SAMPLE DATE: ANALYSIS DATE: UNITS:	SW-3 198300 water 5-10-90 6-18-90 mg/L	SW-4 198298 water 5-10-90 6-18-90 mg/L	SW-6 198295 water 5-10-90 6-18-90 mg/L	SW-7 198293 water 5-10-90 6-18-90 mg/L	SW-8 198287 water 5-09-90 6-18-90 mg/L	SW-18 198288 water 5-09-90 6-18-90 mg/L
Total Cyanide	0.020	0.013	<0.004	<0.004	<0.004	<0.004
Total Kjeldahl Nitrogen	162.89	2.06	121.04	0.88	1.60	1.41
Total Ammonia	188.2	<0.5	108.4	0.6	<0.5	<0.5

NOTES:

(1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively.

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MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:

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Table
Results of Laboratory Analyses of Sediment Samples
Total Metals Analyses (Target Analyte Metals)
Maralco Site, Kent, Washington

SAMPLE LOCATION:	SW-1	SW-2	SW-3	SW-4	SW-6	SW-7	SW-8
SAMPLE ID:	198294	198280	198299	198297	198296	198292	198289
DESCRIPTION:	soil	soil	soil	soil	soil	soil	soil
SAMPLE DATE:	5-10-90	5-09-90	5-10-90	5-10-90	5-10-90	5-10-90	5-09-90
ANALYSIS DATE:	6-21-90	6-21-90	6-21-90	6-21-90	6-21-90	6-21-90	6-21-90
UNITS:	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Aluminum	39400	9970	25600	17200	77900	132000	93700
Antimony	4.1 N	0.2 N	0.83 N	4.09 N	1.5 N	7.4 N	6.6 N
Arsenic	3.1	2.2	3.9	53.4	4.4	4.4	6.8
Barium	74.9	45.0	59.1	115	130	169	188
Beryllium	0.8	0.2	0.5	0.5 U	1	3.5	3.7
Cadmium	1.4	1.0	0.9	6.9	1.3	6	7.4
Calcium	4140 B	3860 B	5060 B	6350 B	6970 B	6110 B	4260 B
Chromium	54.7	15.7	27.7	58.5	87.5	150	127
Cobalt	5.8	4.8	5.6	11.2	5.6	7.4	5.4
Copper	562	59.0	231	183	883	1330	1050
Iron	10600	18700	19500	43300	17700	21000	40600
Lead	61	22	24	89	61	246	261
Magnesium	7060	3030	4530	5420	8860	17400	12100
Manganese	285	201	286	396	608	539	305
Mercury	0.10	0.03	0.1 U	0.27	0.06	0.49	0.73
Nickel	22	13	15	31	33	65	46
Potassium	41900 B	525 B	17900 B	2600	27400 B	3390 B	4500 B
Selenium	1.2 N,U	0.6 N,U	0.7 N,U	3.3 N,U	0.7 N,U	0.8 N,U	2.2 N,U
Silicon	2570 B	1570 B	1830 B	4590 B	2410 B	2880 B	4480 B
Silver	0.9	0.3 U	0.3 U	1.5 U	0.5	1.3	1.2
Sodium	44300	1700	20700	7900	330000	4190	6270
Thallium	0.5 N,U	0.2 N,U	0.3 N,U	1.3 N,U	0.3 N,U	0.3 N,U	0.9 N,U
Tin	17 B	5 B	7 B	25 B	19 B	42 B	39 B
Vanadium	91.2	43.2	58.3	58.1	166	196	205
Zinc	528	135	203	1200	678	1150	957

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MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:

Table
Results of Laboratory Analyses of Sediment Samples
Total Metals Analyses (Target Analyte Metals)
Maralco Site, Kent, Washington

SAMPLE LOCATION:	SW-18	BD-1	HB-1, 0-0.5'	HB-1, 1.5-2'	HB-2, 0-0.5'	HB-2, 1.5-2'	HB-3, 0-0.5'	HB-3, 1.5-2'
SAMPLE ID:	198290	198301	198281	198282	198283	198284	198285	198286
DESCRIPTION:	soil	soil	soil	soil	soil	soil	soil	soil
SAMPLE DATE:	5-09-90	5-10-90	5-09-90	5-09-90	5-09-90	5-09-90	5-09-90	5-09-90
ANALYSIS DATE:	6-21-90	6-21-90	6-08-90	6-21-90	6/21/90	6-21-90	6-21-90	6-21-90
UNITS:	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Aluminum	82400	188000	138000	12800	150000	19700	165000	13000
Antimony	8.2 N	20.6 N	1.79 N	0.2 N	5.4 N	0.2 N	8.0 N	0.1 N
Arsenic	6	8.7	3	1.0	6.2 U	1.9	6.6 U	1.6
Barium	123	167	133	33.0	123	50.6	125	39.1
Beryllium	3	2.9	1.4	0.2	3.3	0.3	2.3	0.2
Cadmium	4.4	4.5	0.7	0.2 U	1.5	0.2 U	1.0	0.2 U
Calcium	4090 B	10400 B	6660 B	3780 B	8140 B	4920 B	7260 B	3780 B
Chromium	95	380	83.0	12.4	167	26.3	228	12.4
Cobalt	5.3	6.1	5.0	4	5.6	4.9	5.1	4.6
Copper	851	2940	713	24.1	17100	91.8	1480	35.2
Iron	40100	7700	10900	11400	9620	13300	8690	11600
Lead	172	373	55	1.7	160	6.2	128	2.3
Magnesium	9900	27000	21800	2500	23500	3540	33800	2510
Manganese	260	1200	1220	141	1530	209	2340	151
Mercury	0.24 U	0.06 U	0.05 U	0.04 U	0.04 U	0.05 U	0.06 U	0.04 U
Nickel	31	160	24	9	71	12	59	9
Potassium	4160 B	19700 B	3300 B	2210 B	6360 B	2420 B	12400 B	2100 B
Selenium	2.7 N,U	0.6 N,U	0.6 N,U	0.5 N,U	0.6 N,U	0.6 N,U	0.7 N,U	0.5 N,U
Silicon	6020 B	2090 B	2030 B	1710 B	2220	1430 B	2530 B	1700 B
Silver	1.8 U	5	0.4 U	0.3 U	1.8 B	0.2 N,U	0.7	0.3 U
Sodium	9000	18500	6540	2390	11200	3360	19600	2290
Thallium	1.1 N,U	0.2 N,U	0.2 N,U	0.2 N,U	0.2 N,U	0.2 U	0.3 N,U	0.2 N,U
Tin	40 B	51 B	13 B	5 B	61 B	5 B	43 B	4 B
Vanadium	149	117	60.1	39.6	78.9	44.0	112	39.3
Zinc	813	1960	442	27.9	2660	67.8	1030	34.3

NOTES:

(1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively. USEPA Analytical Method ____ was used.

(2) Data qualifiers:
- U = not detected above these levels
- N = SRM recovery not within control limits
- B = compound detected in blank (sample value is less than 10 times that value)

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Table
Results of Laboratory Analyses of Surface Water Samples
Total Metal Analysis (Target Analyte Metals)
Maralco Site, Kent, Washington

SAMPLE LOCATION:	SW-3	SW-4	SW-6	SW-7	SW-8	SW-18	SW-28
SAMPLE ID:	198300	198298	198295	198293	198287	198288	198291
DESCRIPTION:	water	water	water	water	water	water	water
SAMPLE DATE:	5-10-90	5-10-90	5-10-90	5-10-90	5-09-90	5-09-90	5-09-90
ANALYSIS DATE:	6-21-90	6-21-90	6-21-90	6-21-90	6-21-90	6-21-90	6-21-90
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	24000	315	662	216000	5620	1570	10 U
Antimony	100 U	1 U	200 U	1.2 J	1 U	1 U	1 U
Arsenic	100 U	2 J	100 U	83 J	1.5 U	1.5 U	1.5 UJ
Barium	3590	48.7	1200	33.9	22.7	13.4	2.7 J
Beryllium	2 U	2 U	2 U	2.2 J	2 U	2 U	2 U
Cadmium	28.9	0.25 J	33.7 J	11.1	0.59	.16 J	.1 U
Calcium	540	24400	18900	94100	16300	15700	89 B
Chromium	5 U	5 U	5 U	18 J	5 J	5 U	5 U
Cobalt	1500 U	15 U	1500 U	51.1 J	15 U	15 U	15 U
Copper	2090	10.6 JB	268	268	35.6	14.7	99.7
Iron	78000	16.6	796	3230	23200	13500	18 JB
Lead	134	3.7 JB	180 U	14.2	8.1	1.8 J	1 U
Magnesium	176000	5850	159000	31700	6230	6030	2 UJ
Manganese	24200	1040	5260	3170	747	233	15.8 B
Mercury	.02 U	.02 U	1.4	.06 J	.02 U	.02 U	.02 U
Nickel	40 U	40 U	40 U	121 J	40 U	40 U	40 U
Potassium	16500	73700	15700	253000	31300	33400	300 U
Selenium	200 U	2 U	200 U	2 U	2 U	2 U	2 U
Silicon	9960	6750	1,500 U	16900	12000	10300	44.5 J
Silver	7.4 J	3 U	5.1 J	3 U	3 U	3 U	3 U
Sodium	20900	88500	19600	163000	33400	34900	81.7
Thallium	200 U	2,5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U
Tin	5000 U	104 J	5,000 U	50 U	50 UJ	50 U	54 J
Vanadium	4 U	4 U	4 U	7.0 B	4.6 J	6.7 JB	6.7 JB
Zinc	2610	56.1	65.4	1740	95.6	33.8	94.9

NOTES:

(1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively. USEPA Analytical Method _____ was used.

(2) Data qualifiers:

U = not detected above these levels

J = estimated value (between the detection limit and the reporting limit)

B = compound detected in blank (sample value is less than 10 times that value)

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MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:
Page: 1 of 1

Table
Results of Laboratory Analyses of Surface Water Samples
Dissolved Metals Analysis (Target Analyte Metals)
Maralco Site, Kent, Washington

SAMPLE LOCATION:	SW-3	SW-4	SW-6	SW-7	SW-8	SW-18
SAMPLE ID:	198300	198298	198295	198293	198287	198288
DESCRIPTION:	water	water	water	water	water	water
SAMPLE DATE:	5-10-90	5-10-90	5-10-90	5-10-90	5-09-90	5-09-90
ANALYSIS DATE:	6-21-90	6-21-90	6-21-90	6-21-90	6-21-90	6-21-90
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	25600	55 B	420	207000	85 B	71 B
Antimony	200 U	1 U	200 U	1 U	1 U	1 U
Arsenic	107 J	1.5	100 U	1.5 U	1.5 U	1.5 U
Barium	3480	33.3	1140	32	9.1 B	8.9 B
Beryllium	2 U	2 U	2 U	4.3 J	2 U	2 U
Cadmium	38 J	0.1 U	39 J	10.9	0.1 J	0.17 J
Calcium	565000	25900	196000	96300	15800	15700
Chromium	5 U	5 U	5 U	9.0 J	5 U	5 U
Cobalt	15 U	15 U	15 U	45.9 J	15 U	15 U
Copper	2150	2 U	364	308	6.2 JB	4.5 JB
Iron	77000	3130	41.7 JB	716	2530	1330
Lead	127 J	2.0 JB	60 U	16.2 B	1.4 JB	3.6 JB
Magnesium	192000	5790	171000	32000	5710	5670
Manganese	24.9	583	5350	3195	41.5	43.9
Mercury	0.21	0.02 U	0.02 U	.07 J	0.02 U	0.02 U
Nickel	44 J	40 U	40 U	121 J	40 U	40 U
Potassium	17900	69700	16240	239000	28000	30000
Selenium	200 U	2 U	200 U	2 U	2 U	2 U
Silicon	NA	6.7	6970	19.3	10.4	10.7
Silver	3 U	3 U	3 U	3 U	3 U	3 U
Sodium	22120	88200	19700	166000	32800	34100
Thallium	304 J	2.5 U	250 U	2.5 U	2.5 U	2.5 U
Tin	NA	50 U	4,000 U	50 U	50 U	50 U
Vanadium	4 U	4 U	4 U	4 U	4 U	4 U
Zinc	2680	19.1	52 B	1810	12.2 J	10.9 J

NOTES:

(1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively. USEPA Analytical Method _____ was used.

(2) Data qualifiers:
- U = not detected above these levels
- J = estimated value (between the detection limit and the reporting limit)
- B = compound detected in blank (sample value is less than 10 times that value)

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Table
Results of Laboratory Analyses of Surface Water Samples
Priority Pollutant Volatile Organic Analyses (PP VOA)
Maralco Site, Kent, Washington

SAMPLE LOCATION:	SW-7	SW-8	SW-18	SW-28	BD-21
SAMPLE ID:	198293	198287	198288	198291	198302
DESCRIPTION:	water	water	water	water	water
SAMPLE DATE:	5-10-90	5-09-90	5-09-90	5-09-90	5-10-90
ANALYSIS DATE:	5-17-90	5-17-90	5-17-90	5-17-90	5-17-90
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Chloromethane	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U
Acetone*	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)	5 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U	5 U	16
1,2-Dichloroethane	5 U	5 U	5 U	5 U	5 U
2-Butanone*	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U	5 U
Carbon tetrachloride	5 U	5 U	5 U	5 U	5 U
Vinyl acetate	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	5 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U	5 U
Dibromochloromethane	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U	5 U
Benzene	5 U	5 U	5 U	5 U	5 U
trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U
Bromoform	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	5 U	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U	5 U
Toluene	5 U	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	5 U	5 U
Styrene	5 U	5 U	5 U	5 U	5 U
Xylene (total)	5 U	5 U	5 U	5 U	5 U

NOTES:

1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively. USEPA Analytical Method 8240 was used.
2) Data qualifiers:
   U = not detected above these levels
3) SW-18 is a duplicate of SW-8
   SW-28 and BD-21 are equipment blanks

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Table
Results of Laboratory Analyses of Sediment Samples
Priority Pollutant Volatile Organic Analysis (PP VOA)
Maralco Site, Kent, Washington

MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:

SAMPLE LOCATION:	SW-1	SW-1	SW-2	SW-4	SW-4	SW-7	SW-8	SW-18
SAMPLE ID:	198294	198294 (RE)	198280	198297	198297 (DL)	198292	198289	198290
DESCRIPTION:	soil	soil	soil	soil	soil	soil	soil	soil
SAMPLE DATE:	5-10-90	5-10-90	5-09-90	5-10-90	5-10-90	5-10-90	5-09-90	5-09-90
ANALYSIS DATE:	5-22-90	5/23/90	5-22-90	5-23-90	5-23-90	5-23-90	5-23-90	5-23-90
UNITS:	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Chloromethane	26 U	26 U	13 U	59 U	290 U	18 U	43 U	50 U
Bromomethane	26 U	26 U	13 U	59 U	290 U	18 U	43 U	50 U
Vinyl chloride	26 U	26 U	13 U	59 U	290 U	18 U	43 U	50 U
Chloroethane	26 U	26 U	13 U	59 U	290 U	18 U	43 U	50 U
Methylene chloride	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
*Acetone	48 B	34 U	26 B	1700 E	5400 D	33	230	190
Carbon disulfide	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
1,1-Dichloroethene	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
1,1-Dichloroethane	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
1,2-Dichloroethene (total)	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Chloroform	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
1,2-Dichloroethane	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
*2-Butanone	26 U	26 U	13 U	240	820 D	18 U	43 U	50 U
1,1,1-Trichloroethane	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Carbon tetrachloride	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Vinyl acetate	26 U	26 U	13 U	59 U	290 U	18 U	43 U	50 U
Bromodichloromethane	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
1,2-Dichloropropane	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
cis-1,3-Dichloropropene	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Trichloroethene	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Dibromochloromethane	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
1,1,2-Trichloroethane	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Benzene	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
trans-1,3-Dichloropropene	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Bromoform	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
4-Methyl-2-pentanone	26 U	26 U	13 U	59 U	290 U	18 U	43 U	50 U
anone	26 U	26 U	13 U	59 U	290 U	18 U	43 U	50 U
chloroethene	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
1,1,2,2-Tetrachloroethane	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Toluene	13 U	13 U	7 U	74	63 DJ	9 U	22 U	25 U
Chlorobenzene	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Ethylbenzene	13 U	13 U	7 U	17 J	150 U	9 U	22 U	25 U
Styrene	13 U	13 U	7 U	29 U	150 U	9 U	22 U	25 U
Xylene (total)	13 U	13 U	7 U	170	160 D	9 U	22 U	25 U
Silanol, trimethyl	360 J							
Silane methylenebis[trineth]								
Octane				120 J	180 J			
Nonane				310 J	350 J			
Unknown C9H16				88 J	180 J			
Unknown C9H18					240 J			
Unknown C9H18					290 J			
Cyclohexane, propyl-				190 J	350 J			
Unknown hydrocarbon				190 J	350 J			
Unknown hydrocarbon					290 J			
Unknown C10H22				650 J				
Unknown C10H22				190 J				
Unknown C10H20				220 J	760 J			
Benzene, trimethyl-				460 J	290 J			
Decane				1300 J	1400 J			
Disiloxane, hexamethyl-								

DRAFT

MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:

Table
Results of Laboratory Analyses of Sediment Samples
Priority Pollutants & Volatile Organic Analyses (PP VOA)
Maralco Site, Kent, Washington

SAMPLE LOCATION:	BD-1	BD-1	HB-1, 0-0.5ft	HB-1, 0-0.5 ft
SAMPLE ID:	198301	198301 (RE)	0" - 6"	198281 (DL)
DESCRIPTION:	soil	soil	soil	soil
SAMPLE DATE:	5-10-90	5-10-90	5-09-90	5-10-90
ANALYSIS DATE:	5-23-90	5-23-90	5-23-90	5-23-90
UNITS:	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Chloromethane	14 U	14 U	13 U	66 U
Bromomethane	14 U	14 U	13 U	66 U
Vinyl chloride	14 U	14 U	13 U	66 U
Chloroethane	14 U	14 U	13 U	66 U
Methylene chloride	7 U	7 U	7 U	33 U
Acetone*	14 U	14 U	13 U	66 U
Carbon disulfide	7 U	7 U	7 U	33 U
1,1-Dichloroethene	7 U	7 U	7 U	33 U
1,1-Dichloroethane	7 U	7 U	7 U	33 U
1,2-Dichloroethene (total)	7 U	7 U	7 U	33 U
Chloroform	7 U	7 U	7 U	33 U
1,2-Dichloroethane	7 U	7 U	7 U	33 U
2-Butanone*	14 U	14 U	13 U	66 U
1,1,1-Trichloroethane	7 U	7 U	5 J	150 D
Carbon tetrachloride	7 U	7 U	7 U	33 U
Vinyl acetate	14 U	14 U	13 U	66 U
Bromodichloromethane	7 U	7 U	7 U	33 U
1,2-Dichloropropane	7 U	7 U	7 U	33 U
cis-1,3-Dichloropropene	7 U	7 U	7 U	33 U
Trichloroethene	7 U	7 U	7 U	33 U
Dibromochloromethane	7 U	7 U	7 U	33 U
1,1,2-Trichloroethane	7 U	7 U	7 U	33 U
Benzene	7 U	7 U	7 U	33 U
trans-1,3-Dichloropropene	7 U	7 U	7 U	33 U
Bromoform	7 U	7 U	7 U	33 U
4-Methyl-2-pentanone	14 U	14 U	13 U	66 U
2-Hexanone	14 U	14 U	13 U	66 U
Tetrachloroethene	7 U	7 U	7 U	33 U
1,1,2,2-Tetrachloroethane	7 U	7 U	7 U	33 U
Toluene	7 U	7 U	7 U	33 U
Chlorobenzene	7 U	7 U	7 U	33 U
Ethylbenzene	7 U	7 U	7 U	33 U
Styrene	7 U	7 U	7 U	33 U
Xylene (total)	7 U	7 U	7 U	33 U
Silanol, trimethyl	85 J	82 J	290 J	6100 J
Silane methylenebis[trineth			46 J	170 J
Octane				
Nonane				
Unknown C9H16				
Unknown C9H18				
Unknown C9H18				
Cyclohexane, propyl-				
Unknown hydrocarbon			32 J	
Unknown hydrocarbon			99 J	
Unknown C10H22				
Unknown C10H22				
Unknown C10H20				2200 J
Benzene, trimethyl-				
Decane				
Disiloxane, hexamethyl-	9.7 J	29 J		

NOTES:

1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively. USEPA Analytical Method 8240 was used.
2) Data qualifiers:
   - U = not detected above these levles
   - B = compound detected in blank
   - J = estimated value (between the detection limit and the reporting limit)
   - E = concentration exceeded instrument calibration range
   - D = surrogates out
   - * = common laboratory contaminant
3) SW-18 is a duplicate sample of SW-8.
4) The initial analyses of samples 198281, 198294 and 198301 showed surrogate recoveries and/or internal standard recoveries outside QC limits. The samples were reanalyzed (RE) and showed the same recovery problems, indicating a matrix problem. Sample 198281 contained a high ash content and it's rerun was at a 5:1 dilution (DL). This dilution did not help the internal standard/surrogate problem. All results are included in the table.
5) The initial analysis of 198297 contained acetone at a concentration greater than the calibration range of the instrument. The sample was reanalyzed at a 5:1 dilution (DL). Both results are included in this table.

DRAFT

\123\SMI-VOA.WK1

Table
Results of Laboratory Analyses of Sediment Samples
ority Pollutant Semivolatile Organic Analysis (PP VOA)
Maralco Site, Kent, Washington

MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:

SAMPLE LOCATION:	SW-1	SW-2	SW-4	SW-7	SW-8	SW-18	BD-1	HB-1, 0-0.5'
SAMPLE ID:	198294	198280	198297	198292	198289	198290	198301	198281
DESCRIPTION:	soil	soil	soil	soil	soil	soil	soil	soil
SAMPLE DATE:	5-10-90	5-09-90	5-10-90	5-10-90	5-09-90	5-09-90	5-10-90	5-09-90
EXTRACTION DATE:	5-21-90	5-21-90	5-21-90	5-21-90	5-21-90	5-21-90	5-21-90	5-24-90
ANALYSIS DATE:	6-01-90	6-04-90	6-01-90	6-01-90	6-04-90	6-01-90	6-04-90	6-08-90
UNITS:	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Phenol	1700 U	880 U	3800 U	140 J	2800 U	3300 U	900 U	870 U
bis(2-Chloroethyl)Ether	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2-Chlorophenol	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
1,3-Dichlorobenzene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
1,4-Dichlorobenzene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Benzyl Alcohol	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
1,2-Dichlorobenzene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2-Methylphenol	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
bis(2-Chloroisopropyl)Ether	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
4-Methylphenol	1700 U	880 U	3800 U	1200 U	340 J	590 J	900 U	870 U
N-Nitroso-Di-n-Propylamine	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Hexachloroethane	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Nitrobenzene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Isophorone	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2-Nitrophenol	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2,4-Dimethylphenol	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Benzoic Acid	8200 U	4300 U	19000 U	320 J	14000 U	16000 U	4300 U	4200 U
bis(2-Chloroethoxy)Methane	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2,4-Dichlorophenol	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
1,2,4-Trichlorobenzene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Naphthalene	1700 U	880 U	3800 U	1200 U	520 J	520 J	900 U	870 U
4-Chloroaniline	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Hexachlorobutadiene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
4-Chloro-3-Methylphenol	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2-·ethylnaphthalene	1700 U	880 U	1900 J	270 J	590 J	890 J	900 U	870 U
...hlorocyclopentadiene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
...-Trichlorophenol	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2,4,5-Trichlorophenol	8200 U	4300 U	19000 U	5700 U	14000 U	16000 U	4300 U	4200 U
2-Chloronaphthalene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2-Nitroaniline	8200 U	4300 U	19000 U	5700 U	14000 U	16000 U	4300 U	4200 U
Dimethyl Phthalate	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Acenaphthylene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2,6-Dinitrotoluene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
3-Nitroaniline	8200 U	4300 U	19000 U	5700 U	14000 U	16000 U	4300 U	4200 U
Acenaphthene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2,4-Dinitrophenol	8200 U	4300 U	19000 U	5700 U	14000 U	16000 U	4300 U	4200 U
4-Nitrophenol	8200 U	4300 U	19000 U	5700 U	14000 U	16000 U	4300 U	4200 U
Dibenzofuran	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
2,4-Dinitrotoluene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Diethylphthalate	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
4-Chlorophenyl-phenylether	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Fluorene	1700 U	880 U	1100 J	1200 U	2800 U	340 J	900 U	870 U
4-Nitroaniline	8200 U	4300 U	19000 U	5700 U	14000 U	16000 U	4300 U	4200 U
4,6-Dinitro-2-Methylphenol	8200 U	4300 U	19000 U	5700 U	14000 U	16000 U	4300 U	4200 U
N-Nitrosodiphenylamine*	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
4-Bromophenyl-phenylether	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Hexachlorobenzene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Pentachlorophenol	8200 U	4300 U	19000 U	5700 U	14000 U	16000 U	4300 U	4200 U
Phenanthrene	1700 U	880 U	3100 J	1100 J	2800 U	2100 J	900 U	870 U
Anthracene	1700 U	880 U	3800 U	1200 U	940 J	3300 U	900 U	870 U
Di-n-Butylphthalate	1700 U	880 U	3800 U	170 J	2800 U	3300 U	900 U	870 U
Fluoranthene	1700 U	120 J	1900 J	2300	1100 J	1800 J	900 U	870 U
Pyrene	210 J	160 J	3300 J	3900	2200 J	3800	900 U	870 U
Butylbenzylphthalate	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
3,3-Dichlorobenzidine	3400 U	1800 U	7700 U	2400 U	5700 U	6600 U	1800 U	1700 U
Benzo(a)Anthracene	1700 U	880 U	690 J	910 J	2800 U	3300 U	900 U	870 U
Chrysene	1700 U	880 U	3800 U	1600	1400 J	1400 J	900 U	870 U
bis(2-Ethylhexyl)phthalate	510 J	510 J	14000	11000	11000	22000	290 J	870 U
Di-n-Octyl Phthalate	1700 U	880 U	3000 J	1200 U	2800 U	3300 U	900 U	870 U
Benzo(b)Fluoranthene	1700 U	880 U	3800 U	1600	2800 U	790 J	900 U	870 U
Benzo(k)Fluoranthene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Benzo(a)Pyrene	1700 U	880 U	3800 U	840 J	2800 U	3300 U	900 U	870 U
...no(1,2,3-cd)Pyrene	1700 U	880 U	3800 U	1100 J	2800 U	3300 U	900 U	870 U
...nz(a,h)Anthracene	1700 U	880 U	3800 U	1200 U	2800 U	3300 U	900 U	870 U
Benzo(g,h,i)Perylene	630 J	880 U	3800 U	1400	2800 U	3300 U	900 U	870 U

NOTES:

(1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively. USEPA Analytical Method 8270 was used.

(2) Data qualifiers:
U = not detected above these levels
J = estimated value between the detection limit and the reporting limit)

(3) * = cannot be separated from diphenylamine.

DRAFT

2123WTR-SVOA.WK1

MKE W.O.No: 2121.03.320
Date Issued: 7/25/90
Revised:

Table
Results of Laboratory Analyses of Surface Water Samples
Priority Pollutant Semivolatile Organic Analysis (PP BNA)
Maralco Site, Kent, Washington

SAMPLE LOCATION:	SW-7	SW-7	SW-8	SW-18	SW-24	SW-28	BD-21
SAMPLE ID:	198293	198293 (RE)	198287	198288	198303	198291	198302
DESCRIPTION:	water	water	water	water	water	water	water
SAMPLE DATE:	5-10-90	5-10-90	5-09-90	5-09-90	5-10-90	5-09-90	5-10-90
EXTRACTION DATE:	5-18-90	6-5-90	5-18-90	5-18-90	5-18-90	6-5-90	5-18-90
ANALYSIS DATE:	5-25-90	6-08-90	5-25-90	5-25-90	5-25-90	6-08-90	5-25-90
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Phenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroisopropyl)Ether	10 U	16 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Benzoic Acid	50 U	78 U	50 U	50 U	50 U	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
[illegible]thylnaphthalene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
[illegible]hlorocyclopentadiene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2,[illegible]-Trichlorophenol	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	78 U	50 U	50 U	50 U	50 U	50 U
2-Chloronaphthalene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	78 U	50 U	50 U	50 U	50 U	50 U
Dimethyl Phthalate	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	50 U	78 U	50 U	50 U	50 U	50 U	50 U
Acenaphthene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	78 U	50 U	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	78 U	50 U	50 U	50 U	50 U	50 U
Dibenzofuran	10 U	16 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	16 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	78 U	50 U	50 U	50 U	50 U	50 U
4,6-Dinitro-2-Methylphenol	50 U	78 U	50 U	50 U	50 U	50 U	50 U
N-Nitrosodiphenylamine*	10 U	16 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	50 U	78 U	50 U	50 U	50 U	50 U	50 U
Phenanthrene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	16 U	10 U	10 U	10 U	10 U	10 U
3,3-Dichlorobenzidine	20 U	31 U	20 U	20 U	20 U	20 U	20 U
Benzo(a)Anthracene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)Fluoranthene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)Fluoranthene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
B[illegible]nzo(a)Pyrene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
[illegible]o(1,2,3-cd)Pyrene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
[illegible]nz(a,h)Anthracene	10 U	16 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)Perylene	10 U	16 U	10 U	10 U	10 U	10 U	10 U

NOTES:

(1) Analyses performed and reviewed by Weyerhauser Laboratories and EPA/Ecology Manchester Laboratory, respectively. USEPA Analytical Method 8270 was used.

(2) Data qualifiers:
U = not detected above these levels

(3) * = Cannot be separted from diphenylamine.

(4) (RE) = Re-extract. The initial analysis of the sample showed surrogate recoveries and/or internal standard recoveries outside QC limits, so the sample was re-analyzed.

ATTACHMENT II

STAGE 2 SAMPLING PROGRAM

Thirteen hand augered borings (30 samples) and twenty waste sample locations in 6 transects (25 samples) are included in this sampling (Figure 1). Two of the hand augered borings were included in the original Stage 2 field work. Two are for collection of background data. Additional hand auger locations are focused on specific areas of the site related to Stage 1 sample results and/or waste disposal practices.

Sample location rationale

<u>Transects of Waste Pile Rationale</u> (Total of 25 Samples)

Transects A and B	Near old Bag House, probable bag house dust disposal area. This portion of the pile may contain more heavy metals and be more acidic.
Transects C and D	Across main pile. An attempt will be made here to collect samples several feet below the surface to eliminate weathering effects.
Transects E and F	Characterization of the north end of the pile and of the sludge lagoon.

<u>Hand Augered Soil Sample Locations</u> (Total of 30 Samples)

HB-4	Depressed area near fence. Part of original Stage 2 environmental audit samples.
HB-5	Area of no vegetation near house. Part of original Stage 2 samples.
HB-6	Vegetable garden soil, potential injestion exposure pathway.
HB-7, HB-14	Background soil data, necessary to evaluate elevated concentrations.
HB-8	Site of Stream Sediment sample location with high heavy metal concentrations. Necessary to determine depth of contamination to 2 feet below drainage.
HB-9, HB-10	Base of dross pile. Determine depth of soil contamination, Characterize sediment runoff into creek.

HB-11, HB-12	Area of potential baghouse dust disposal. Water is commonly ponded here in winter. Necessary to characterize shallow soil contamination in this area.
HB-13	Characterize shallow soil contamination adjacent to dross pile.
HB-15	Characterize shallow soil contamination near the "chlorine" area and at the railroad tracks, where oily surface soils are observed.
HB-16	Characterize shallow soil contamination at pond. This was the site of high stream sediment and surface water heavy metal contamination.

Table 1

Additional Phase I Sampling, Maralco Site

TASK 3 REMEDIAL INVESTIGATIONS	Project Manager	Hydro-Geologist	Engineer	Techician	Secretarial/ Drafting	Total Hours	Remarks
	29.5673	21.2596	16.2981	[illegible]?	10.2404		
STAGE 1 LAB ISSUES							
Original Data Aquistion	8	32	10	0	0	50	See August 1 Memorandum
Lab issue Meetings	4	24	0	0	6	34	July 27 and August 10, 1990
	12	56	10		6		
STAGE 2 SAMPLING							
Lab visit	8	16	0	0	0	24	Planned for August 22, 1990
Stage 2 Sample Plan/Budget	6	14	0	0	3	23	
Waste Sampling	4	40	40	40	0	124	See Figure 1
Soil Sampling	1	20	20	20	0	61	See Figure 1
Diesel Tank	0	2	2	2	0	6	Per Dave South's Request
Surface Water	1	5	5	5	0	16	Resample Stage 1
Sediment	0	1	1	1	0	3	Resample Stage 1
Lab Coordination	0	12	0	0	4	16	
DATA EVALUATION	8	48	8	0	30	94	
Total Hours	40L	214L	86L	68L	43L	451	

$1,182.69
4,549.55
1,401.64
?
440.34

354.81
1,190.54
102.98
61.44
$1,709.77
x 30%
$512.93 ← unallowable fee since this is for additional
[illegible]

COST ESTIMATE

Direct Labor		$8,795
Overhead	82.23%	~~$7,274~~ 7,232
Other Direct Costs		$1,262
G&A (4.09%)		~~$709~~ 707
Fee		~~$2,638~~ 2,125
Insurance (1.69%)		~~$349~~ 346
Total Cost		~~$21,027~~ $20,467.00

7232		
707		
346		
8285		

DL	8,795
OH	8,285
Fee	2,125
ODC	1,262
	20,467

Direct Costs

Field Supplies	8 days @	$30	$240
Auger Rental	8 days @	$10	$80
pH meter	8 days @	$10	$80
OVA rental	8 days @	$50	$400
PPE	8 days @	$30	$240
Sample Shipping			$150
Mileage	300 Miles @	$0	$72

Total Estimated Direct Costs			$1,262

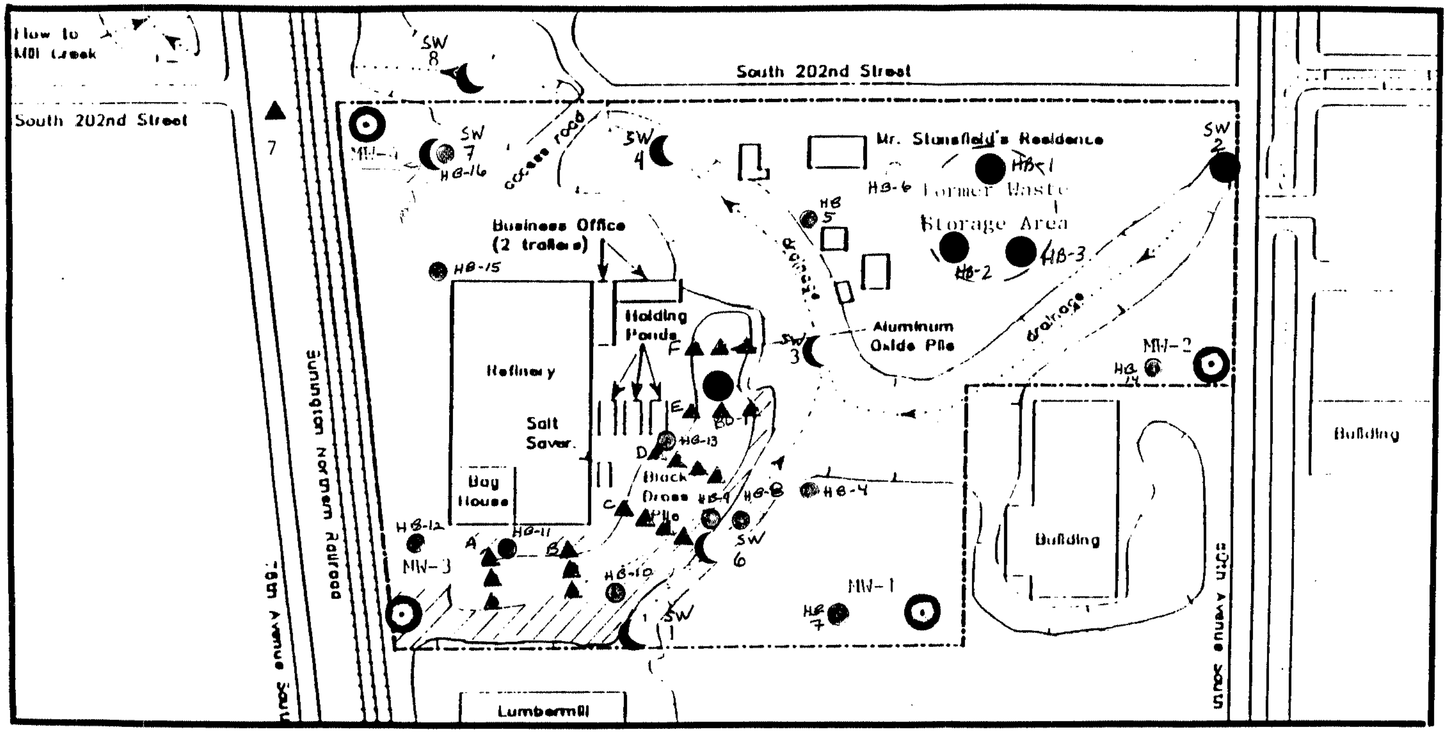
642,435
20,467
622,952

67,801
8,795
76,596

93,878
8,335
[illegible]

20,338
2,125
22,463

18,356
1,262
19,618



LEGEND

- Site Boundary
- Drainage Direction
- Depressed Area

0 50 100 150 200

Scale in Feet

- Surface Area Covered by Black Dross
- MW-1 Monitor Well
- Surface Water/Stream Sediment Sample
- Miscllaneous Soil Sample Location–Subject to Change
- Former Waste Storage Area Sample Location

N

MK-ENVIRONMENTAL SERVICES
BELLEVUE, WASHINGTON

FIGURE NO.: 4

MARALCO SITE ENVIRONMENTAL SAMPLING AND MONITOR WELL LOCATIONS

will be staked during the site walk-over and will be approved by Ecology. Both borings will be drilled to a depth of ten feet below the water table and will be sampled continuously. From the samples collected, two soil samples per boring will submitted for laboratory analyses. The analytical scheme for soil samples from all monitor well borings is discussed in Section 4.3.6. It is assumed at this time that samples collected from the MW-1 boring will represent background or "upgradient" soil and groundwater conditions. Drilling and monitor well installation are described in Section 4.3.3.

The need for additional boring and sampling to generate a statistically valid background data base will be evaluated as a Phase II RI Task.

Data from the "background" monitor well will be used both for the property transfer evaluation information and for the site as a whole. The boring will be sampled for background soils data as discussed in Attachment 2. Groundwater samples will be collected and analyzed from both wells as discussed in Section 4.3.3.

4.3.2.6 Data Evaluation and Report

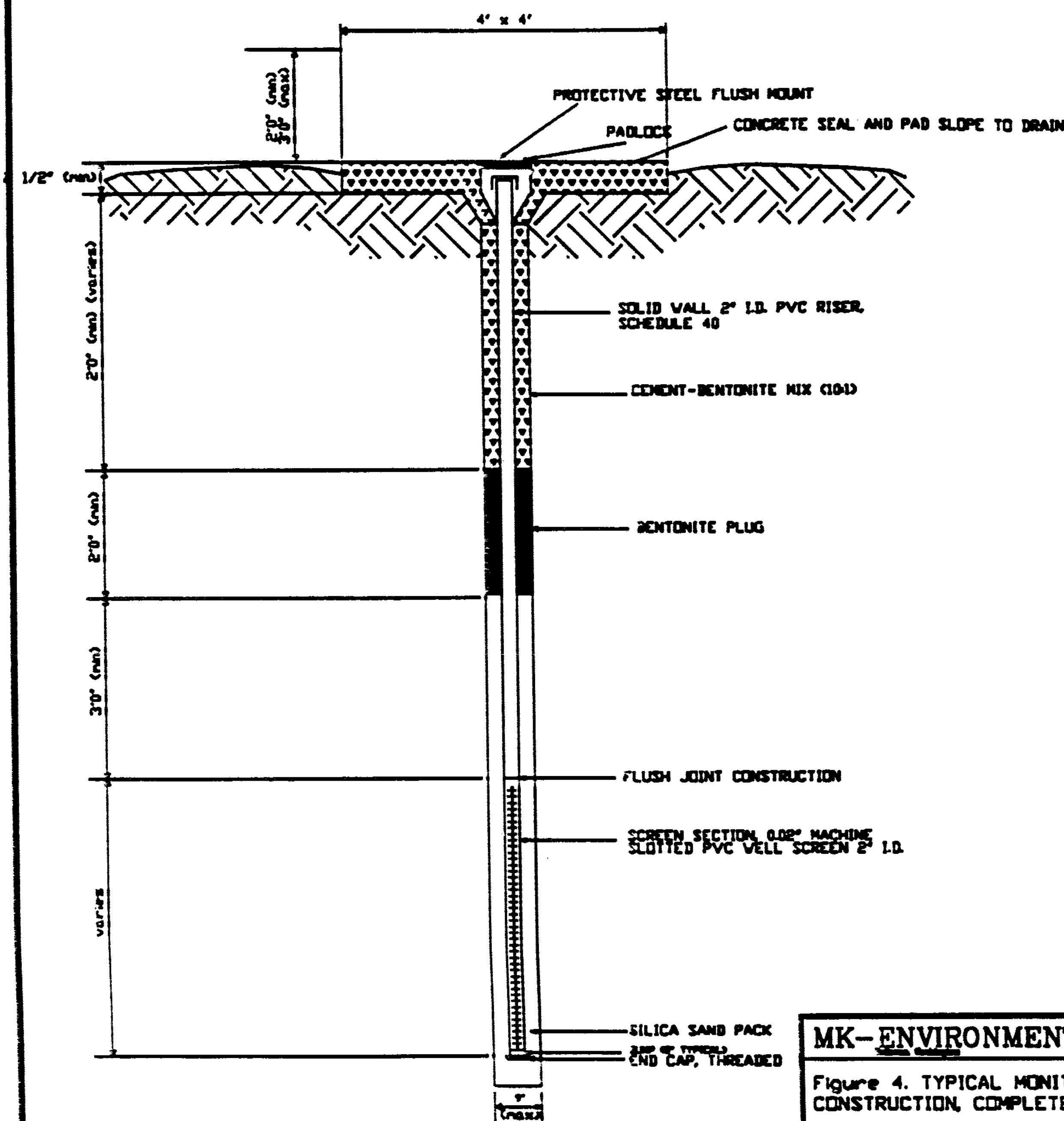
Data collected from the above tasks will be compiled into a report on the environmental and regulatory status of Plats 25 and 26. The report will include data tables for all soil and groundwater analyses and a site map showing sample locations.

4.3.3 Task 3c - Monitor Wells

Four groundwater monitor wells will be installed on-site. The purpose of these wells is to establish a local regional hydraulic gradient, the presence or absence of groundwater contamination at the property boundaries, and to identify any local shallow geologic units.

Monitor wells will be drilled with a 6 inch diameter hollow stem auger. A special bit will be used when drilling through pavement or concrete is necessary. Soils will be sampled continuously with a split spoon sampler. Boreholes will be logged by an experienced on-site geologist. Logs will include well completion details as well as lithologic descriptions. All wells will be drilled and completed as described below to 10 feet below the saturated zone and screened one foot above the estimated seasonal high water table. Monitor well completion details are shown in Figure 4 and will be as follows:

- Total depth of about 20-25 feet
- Maximum six inch borehole
- Two inch I.D. Schedule 40 PVC riser with threaded couplings
- Two inch I.D. Schedule 40 PVC well screen, slot size 0.01", 10 feet in length, set to screen one foot above the seasonal high water table
- Sand pack (washed silica sand) from the well bottom to about two feet (one foot minimum) above the slotted screen interval
- Two feet thick (as placed) bentonite pellet plug above sand pack.
- Above the bentonite plug, the annular space of the well will be grouted to the surface with a 3-5% Portland cement: bentonite grout. All grout will be machine mixed with 6.5 gallon water to 94 lb. cement
- 4' x 4' concrete pad around well protective casing at ground surface, sloped to promote run-off
- Locking protective steel casing at ground surface



MK–ENVIRONMENTAL

Figure 4. TYPICAL MONITOR WELL CONSTRUCTION, COMPLETED AT GRADE

MARALCO SITE
KENT, WASHINGTON

2121.04 | VELLCOMP

This design is consistent with the generally accepted guidelines for monitor well design and should provide reasonable protection from pollutant migration via the well casing or borehole.

All soil cuttings generated during drilling operations (including hand-augered borings) will be placed in 55 gallon drums. Each drum will be labeled with the boring numbers. The drums will be stored on pallets inside the building. Determination of cutting disposal options will be based upon analytical results of the samples obtained from each boring.

Purge water from well development and sampling will also be contained in drums. Each drum will be labeled with the appropriate monitor well and date. Drums will be stored inside the on-site building on pallets. All drums containing wastes generated during the RI will be clearly labeled, stored on pallets inside, and isolated from the various old drums scattered throughout the building.

All monitor wells are to be developed by bailing and surging the water in the well with a sand filled bailer until the pH and specific conductivity values are stable and the water is clear. To the extent possible, based on current knowledge of the site, wells will be completed at a sufficient distance from hydraulic boundaries, such as streams, to minimize local groundwater level effects. All monitor wells will be sampled once following well development. Well sampling procedures are described in Attachment 2.

The monitor wells will be located to maximize the retrievable amount of information or data. The upgradient monitor well will be located on the southeast corner of plate 26 as shown in Figure 3. A second well on the east portion of the site will be located on the eastern border of the property, south of the creek. If access is not available for the drill rig, the well will be located north of the creek. The third well will be located north of the underground tank in the northwest corner of the property. The fourth well will be located in the southwest corner of the site near the west end of the black dross pile. This well will be located away from the standing water observed around the pile during the site visit. Analytical soil and groundwater samples at this site will also address potential migration of contaminants from the dross pile into the immediately adjacent soils. Sampling will address water quality and the potential for off-site migration. Drawdown and recovery "slug" tests will be conducted on each of the monitoring wells.

A monthly groundwater level monitoring plan will be initiated following well development and will continue through July 1990. This will identify some of the seasonal changes in groundwater levels and facilitate in the planning of any remedial action, if necessary.

Additional monitoring wells may be required to establish a hydraulic gradient. The intermittent drainages on-site may influence, to some degree, the local hydraulic gradient. Damming of the creek on the northern border of the property as an interim remedial measure may have resulted in groundwater mounding which would effectively mask the regional gradient. Although the four wells will be located with these considerations in mind, additional wells may be required to define the hydraulic gradients on the site.

<u>Groundwater Analyses</u>

The proposed groundwater analytical scheme is discussed in Section 4.3.6

4.3.3.1 Soil Borings

Upon recommendation from Ecology, and due to limited available budget, additional soil borings are not proposed at this time. Future soil borings to further define migration and soil contamination, if necessary, will be addressed in separate phases. Soil borings beneath the black dross pile are deferred until such time as the pile has been remediated.

4.3.4 Task 3d - Surface Water Contamination

Surface water contamination in the intermittent streams may have resulted from: 1) erosion and subsequent deposition of black dross, salts, and/or aluminum oxide into the creek; 2) airborne transport and subsequent deposition of these substances, and; 3) site runoff carrying these and other substances such as oils and greases into the creek. The objective of this task is to evaluate the types and extent of such contamination, and the direction(s) of migration.

A minimum of eight surface water samples will be collected under this task. Because of damming of the creek at the historical site discharge point, and a possible change in surface water flow direction on-site (i.e. discharge to the northeast), locations for the sampling points may change upon site inspection. The current flow direction will be established from a combination of on-site observations and topographic survey. Preliminary locations are as follows:

1) A background water quality sample, (not obtained in the Ecology and Environmental study because of stagnant water conditions), collected on the southern border of the site;

2) A water sample collected from the pond behind the dam (weir) on the northwest corner of the site;

3) A sample documenting the quality of water leaving the site to the northeast;

4) at the confluence of the drainages in the center of the site;

5) A weir overflow sample.

6) Immediately adjacent to the black dross pile where it abuts the drainage;

7) The pond west of the Burlington Northern railroad tracks, off-site between the access road and the railroad tracks.

8) Off-site between the access road and the railroad tracks.

This configuration will monitor water quality at the drainage system's main points. The analytical scheme for these samples is discussed in Section 4.3.6. Approximate sample locations are shown in Figure 3. The direction of surface water runoff and directions of flow in these on-site drainages will be evaluated during this task.

4.3.5 Task 3e - Stream Sediment Sampling

Stream sediments will be sampled at the eight surface water sampling points listed above. Analytical results from these samples will be integrated into an understanding of the general surface water quality distribution. It should be noted that an adequate definition of the relationship between surface water and groundwater contamination can only be determined over a sampling period. Ideally, this would be at least one per quarter for a year.

One additional sample is recommended to be collected from the creek sediments off-site immediately to the northeast. At the direction of Ecology, this sample will be deferred to a separate phase. Phase I will include only one time on-site sampling. An initial assessment as the degree of off-site migration due to stream transport will be made based upon analytical results from the initial sampling. Sediment samples will be collected with a stainless steel spoon or bucket on the end of a rod. Analytical protocol and quality control will be as discussed in Attachment 2.

4.3.6 Sample Analyses

To control analytical costs, the sampling and analysis plan for this Phase I Maralco RI has been subdivided into two stages. Stage I includes very limited sampling where the highest concentrations of waste-related consitiuents are expected. These samples will be anlayzed for the entire hazardous substance list (HSL) for metals and inorganics and for the priority pollutant volatile and base/neutral/acid extractable organic compounds.

Stage I analytical results and available waste analysis reports will be reviewed for selection of indicator parameters. Available data on pollutant plumes from other nearby sources which may affect groundwater at the site will also be reviewed. The indicator parameters for both inorganics and organics will be chosen based on abundance in the waste, mobility, solubility, and toxicity. Assuming a two week turn-around on laboratory analysis, and one week to evaluate the data, this approach will delay the overall RI process by about three weeks. The selection of indicator parameters will be discussed with David South of Ecology. A memo will be written to Ecology to document the selection of indicator parameters.

Stage II analytical parameters will be a subset of the Stage I parameters based on the factors listed above. The indicator parameter suite may differ somewhat between media. There are four basic groups of parameters for which analyses will be performed. These groups are: waste characteristic inorganics, organic priority pollutants, water quality parameters, and field measurements.

Waste characteristics are those elements and compounds associated with the main black dross pile. In Stage I sampling the concentration of Total Hazardous Substance List (HSL) metals in soils, stream sediments and surface water will be measured to assess the degree to which these metals have entered these media from the waste pile. Extraction Procedure Toxicity (EP-TOX) analyses will be performed on those soil and sediment samples having a sufficient concentration of one or more of the HSL metals to cause them to be classified as dangerous waste assuming all of the metal of interest is extracted. Stage I results for HSL metals and inorganics will be evaluated for indicator parameters. Salt content will be measured to assess the degree to which salt is contaminating the soil. Sodium and potassium concentrations are measured as part of the HSL metals. All samples will be analyzed for ammonia and cyanide because these compounds are associated with chemical reactions occurring in the pile black dross. Ammonia, with calculations for total organic nitrogen will assess the potential for conversion of contaminants in the black dross pile to ammonia.

Organic parameters are those associated with petroleum hydrocarbons, chlorinated solvents, and pesticides. There is currently no definite indication that any of these classes of compounds have entered environmental media from operations which occurred at Maralco. However, these contaminants are often associated with industrial operations. Sufficient investigations and analyses will be performed to assess the presence or absence of organic constituents.

All environmental media will be field-screened for the presence of organic compounds detectable by a flame ionization organic vapor analyzer (OVA). This will be done during sample collection. The soil samples sent for laboratory analyses will be selected based on visual observation and field OVA screening.

All ground water samples will be analyzed for Priority Pollutant Volatile Organic (PP VOA) and Priority Pollutant Base/Neutral and Acid (PP BNA) Compounds. This is because the presence of these compounds in ground water is one of the primary concerns at any cleanup site involving heavy industry and because nearby sites are currently implementing cleanup action plans to recover some of these compounds.

Water Quality parameters are of interest to Ecology regarding the general chemistry of surface and groundwater. Measurement of these parameters is Ecology standard operating procedure when sampling water to ensure data are available for classification of the chemical provenance of the water and to enable comparison with waters in other aquifers, should such comparison become necessary as the investigation proceeds. Field measurements include the use of an organic vapor analyzer, measurements of pH, conductivity temperature and dissolved oxygen.

Measuring soil conductivity is not a standard test. It is planned to mix the soil with an equal weight of distilled water and shake the mixture vigorously for one minute. At the end of this time the soil will be allowed to settle and the conductivity and temperature of the water measured. This procedure will be developed as a field screening test for salt contamination of the soil. Soil pH may be measured using standard agricultural techniques. It will be measured using a Hach kit.

4.3.7 Sampling and Analysis Schedule

Stage I sampling includes collection and analyses of the following samples:

- Soils under the former black dross pile (eastern portion of property); A total of six samples will be collected from three hand augered borings. These samples will be analyzed for the HSL metals and inorganics, as well as other parameters shown in Table 4-2. One sample or a laboratory composite from the 3 borings will be analyzed for priority pollutant organics.

- Surface water samples: All samples will be colected and analyzed for the entire Stage 1 metals and inorganics suite. Stage I water analyses are shown in table 4-3. Two samples will be analyzed for priority pollutant organics. If organics are detected in these samples, the remaining locations will be re-sampled during Stage II and analyzed for indicator organic compounds.

TABLE 4-2
STAGE I SOIL SAMPLING PLAN
AND ANALYTICAL COST ESTIMATE
MARALCO SITE
Kent, Washington

Chemical Analyses	USEPA Analytical Method	Soil Beneath Former Black Dross Pile	Stream Sediments	Total Media Samples	Field Duplicates (5% of total)	Equipment Rinsate Blanks One/day per eqpt	TOTAL SOIL SAMPLES	Soil Sample Preparation ($/sample)	Analysis $/sample)	Estimated Cost ($)
Total HSL Metals (Note 1)	ICAP/GFAA	6	8	14	0.7	2	17	$3.50	$425.00	$7,284.50
EP Toxicity (Note 2)		6	8	14	0.7		15	na	$136.00	$2,040.00
Ammonia w/ total organic N calculation	350.2	6	8	14	0.7		15	na	$12.00	$180.00
Cyanide	335.2	6	8	14	0.7		15	na	$60.00	$900.00
Cation Exchange Capacity		6	8	14	0.7		15	na	$30.00	$450.00
PP VOA's (Note 3)	8240	1	5	6	0.3	2	8	na	$225.00	$1,800.00
PP BNA's (Note 3)	8270	1	5	6	0.3	2	8	na	$600.00	$4,800.00
STAGE I LABORATORY COST FOR SOILS ANALYSES	**$17,455**									
Conductivity (Note 4)	Field	6	8	14						
pH (Note 4)	Field	6	8	14						

Note 1: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Th, Sn, V, Pb, Zn, Si.
Note 2: Perform EP Toxicity only if triggered by results of Total HSL metals analysis.
Note 3: Screen media with organic vapor analyzer for qualitative indication of the presence of contamination.
Note 4: Field test soil and sediment media using Hach kit.

TABLE 4-3
STAGE I
WATER SAMPLING PLAN
AND ESTIMATED ANALYTICAL COST
MARALCO Site
Kent, Washington

Chemical Analyses	USEPA Analytical Method	Surface Water	Total Media Samples	Field Duplicates (5% of total)	One/day per Equip	Trip Blanks for Water Analyses	Spikes (10% of total)	Duplicates (10% of total)	TOTAL WATER SAMPLES	Sample Preparation ($)	Analyses ($/sample)	Estimated Cost ($)
WASTE CHARACTERISTICS												
Total HSL Metals (Note 1)	ICAP/GFAA	8	8	0.4	2		0.80	0.80	11	$0.50	$425.50	$4,686.00
Ammonia w/ total organic N calculatio	350.2	8	8	0.4			0.80	0.80	9	$0.00	$25.00	$225.00
Cyanide (Note 3)	335.2	8	8	0.4			0.80	0.80	9	$0.00	$60.00	$540.00
ORGANIC ANALYSES												
PP VOA's	8240	2	2	0.1	1	1	0.20	0.20	4	na	$200.00	$800.00
PP BNA's	8270	2	2	0.1	1		0.20	0.20	3	na	$550.00	$1,650.00

STAGE I
TOTAL LABORATORY ANALYTIC FOR WATER SAMPLES **$7,901**

FIELD MEASUREMENTS		
Conductivity	Field	8
pH	Field	8
Temperature	Field	8
Dissolved Oxygen	Field	8
Turbidity	Field	8

Note 1: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Th, Sn, V, Pb, Zn, Si.
Note 2: Both total and dissolved metals analyses are included for cost estimating
Note 3: Field test for sulfate and chloride; if present, perform field preservation.

- Stream sediment samples: Samples 1,2,4,7,8 will be collected and analyzed for the entire Stage I suite. Samples 3,5, and 6 will be collected in Stage II, and analyzed for indicator parameters only. Stream sediment analyses are shown in Table 4-2. If organics are detected in Stage I samples, site 3,5 and 6 will be re-sampled in Stage II and analyzed for indicator organic compounds.

Stage II sampling includes collection of all other soil, sediment, surface and groundwater samples disucssed in Sections 4.3.2.5 through 4.3.5 of this Work Plan. The first samples to be collected in Stage II will be those necessary to complete the environmental audit of the eastern portion of the site.

4.3.8 Preliminary Suggested Phase II Environmental Investigations

Several other items besides the main black dross pile may pose a threat to human health and the environment. At Ecology's suggestion, these items are not addressed in the Phase I Remedial Investigation. However, to remediate the site so that it is eventually available for other uses, these items will need to be addressed. Items that were noted during the November 29, 1989 site visit and mentioned in subsequent discussions are briefly outlined below. Additional items may be identified during the historical data review and during the Phase I investigations.

Underground Tank Investigations

To comply with existing federal and state regulations, an investigation of the status of the underground diesel tank on the northwest corner of the property must be performed. This investigation should include analyses of any product within the tank, and soil borings around the tank to determine weather the tank has leaked. It is recommended that the tank be removed during Phase II.

Baghouse Dusts, Sampling and Disposal Options

A statistically valid sampling plan for the baghouse dusts inside the plant is necessary for disposal. Though a composite sample of the dust did pass EP Toxicity testing, 96% mortality occurred at the 100 ppm level fish toxicity test. Disposal of this waste will require a statistically valid characterization plan.

Drums in Northwest Corner of Property, Sampling and Disposal

The majority of drums on-site are empty and lie on their sides. Some drums, however, contain some amount of fluid. Composition of the fluids within the drums range from rainwater to an undiluted contained substance. These drums need to be manifested and contents inventoried from drum labels. Those drums without labels containing fluids must be sampled. All drums will be screened with an organic vapor analyzer and a combustible gas indicator before being transported off-site for shredding or crushing and disposal at an appropriate landfill.

Sampling of Dust Coating Building Interior

The thick layer of dust, coating the building interior may contain hazardous components of both baghouse dust and black dross. Sampling and analysis of this dust must be performed to determine if it is a Washington Dangerous Waste or a RCRA hazardous waste. No washing of building walls or demolition of the building can occur until this waste is characterized.

Removal or Disposal of Refuse in Interior of Building

Refuse, garbage, and drums are scattered throughout the interior of the building. Components must be removed and/or disposed of properly. Drums will be removed according to the above listed procedures; other refuse may require sampling before disposal.

Further Evaluation of Off-Site Contamination

Two monitor wells will be placed on the downgradient border of the property in Phase I. Sampling of groundwater from these wells will address water quality at the property boundary. If off-site migration does exist, Phase II will determine the extent of the groundwater plume through boreholes and the installation of monitor wells. Phase II will also implement a stream sediment and water quality sampling plan to determine the extent of surface water contamination.

Soil and Groundwater Sampling Under the Black Dross Pile and Oxide Lagoon

Soil and groundwater sampling under the black dross pile and oxide lagoon is required to identify the contaminant source. Identification of the source is necessary for any design of remediation plans. Boreholes and monitor wells will sample the soils and groundwater immediately below the pile and hydraulically upgradient of the pile to delineate the source. Analytical results will be compared to those of the dross pile and oxide lagoon to further distinguish the source.

4.4 TASK 4 - EVALUATE PROPOSED INTERIM RESPONSE

MK-Environmental will evaluate the technology proposed by International Aluminum, Inc. The Subtasks will include:

4.4.1 Task 4a - Preliminary Identification of ARAR's

This subtask will be a preliminary identification of potential applicable and relevant or appropriate requirements (ARAR's) and to be considered information that; 1) may impact or dictate the nature and extent of the interim response; 2) will be useful in discussions with the various agencies approving the interim response; and 3) allow for improved planning of field and operating practices.

The ARAR's will be identified under appropriate categories. The ARAR's dealing with chemical-specific requirements will define acceptable exposure limits and will be used to determine the extent of the remediation goals. The ARAR's dealing with location-specific requirements will be identified to determine any restrictions on specific locations such as floodplain or areas involving contaminated surface water discharge.
(ARAR's) dealing with action-specific requirements will be identified to determine any controls or restrictions that may be placed on the operation of the facility or the disposal activities.

4.4.2 Task 4b - Evaluation of International Aluminum, Inc. Proposal

International Aluminum Inc. (IAI) has developed a process to separate the salt from the oxides and allow for the removal of the black dross from the Maralco site. MK-Environmental proposes to evaluate this process and determine its feasibility as an interim response relating to the black dross. MK-Environmental's evaluation will consider the following areas:

How long after the 5-Month Pilot study is the evaluation due by Kr.? At what point after the pilot study is the eval. due

1) Chemical characterization of the waste

2) Flow sheet analysis with fatal flaw review to establish whether the performance of the IAI process has been sufficiently designed and documented.

3) De-watering of the final product

4) Evaluation of construction, operating and discharge permits and limitations associated with those permits.

5) A review of the pilot plant operation and results to determine whether the IAI process is well proven and can be scaled up to a "full size operation".

6) A review of the estimated capital expenditure, operating costs, and contingencies for the IAI process to reduce cost uncertainties and to establish an overall cost of the process.

When is the mkt-study due... Carol will be wanting the so she can ans g's the leg. is likely to ask re alternatives

7) Determine the market potential for the aluminum oxide. Several buyers have expressed an interest in the IAI product, however, bulk samples have never been delivered for testing. MK-Environmental will assist IAI in contacting various buyers and shipping samples of the IAI product. In order to do this MK-Environmental will pay IAI a fee to have 100 tons of washed product shipped to interested parties. The fee has been ~~estimated~~ actual at $74.00 per ton. 2> MK pd. to IAI

6/90

Phil pd. transportation to site ($40/ton) Processed product during bench run in '89

After tests have been completed a quality, quantity, and delivery schedule will be determined for interested buyers. The end result of the market analysis will be to enter into a long term contract with one or more buyers to supply them with the IAI product.

MK-Environmental will oversee the market assessment and assist IAI in making shipping arrangements. This will include performing a toxicity test on the aluminum oxide to determine the nature of the material, hazardous or nonhazardous.

8) Provide a comparison for assessing the viability and costs of alternate technologies.

4.5 TASK 5 - PILOT STUDY

MK-Environmental recommends that a pilot test of a process developed by IAI be performed as a part of the RI/FS study. IAI's process consists of washing the salt from the black dross, decanting the resulting brine to a sanitary sewer connected to Metro's Renton Treatment Plant, and drying the remaining metallic oxides for sale to cement manufacturers. Success of the process requires that the brine be acceptable to Metro and that the remaining metallic oxides be suitable for recycling.

IAI'S PROCESS

A pilot test will greatly assist in MK's evaluation of IAI's process by physically testing its technical and economic performance. The pilot test will also determine the production rate of the final processing plant based on waste water discharge limits.

Metro has issued a discharge permit to IAI; however, the discharge rate is subject to the effect the IAI waste water has on the overall performance of Metro's Renton Treatment Plant. The operation of a pilot plant would support an estimate of upper limit discharge rates and, consequently, the maximum production rate for the facility.

IAI proposes to perform a phased pilot study of five months duration. The pilot study will be directed by Mr. Phil Stansfeld throughout its duration. Mr. Robert Kovacevich will perform legal and accounting functions for IAI during this time. Six wage employees will operate the process.

During the first month a single process line, Process Line A, will be installed and brought to operating condition. Two wage employees, an operator and an assistant operator, will be brought on staff at this time to perform this work. One shift per day will be scheduled.

During the second month 204 tons of black dross from the main black dross pile will be processed by Process Line A. A second operator will be brought on staff and trained in operation of the process. Operations will continue on a one shift per day schedule.

During the third month 408 tons of black dross from the main black dross pile will be processed by Process Line A. A second process line, Process Line B, will be installed. An assistant operator and two helpers will be trained, bringing the wage employee staff to full strength. Shifts will increase to two per day, which schedule will be maintained to the end of the pilot project.

During the fourth month 816 tons of black dross from the main black dross pile will be processed by Process Line A and B. A third process line, Process Line C, will be installed. Wage personnel will remain at six.

During the fifth month 1,223 tons of black dross from the main black dross pile will be processed by Process Lines A, B, and C. This is anticipated to be the maximum processing rate based upon limits set by Metro on the rate of brine discharge. A specific objective during the fifth month is to operate at the maximum discharge rate allowed by Metro.

IAI's total operating cost for the pilot study is $399,163.

During the pilot study, IAI will also perform two projects identified by the City of Kent in the City's mitigated Determination of Nonsignificance regarding the environmental impact of the pilot study. These tasks, not directly related to the pilot study, total $17,000.

The first Kent project is to ensure that the storm drain system at the plant is functioning properly. This project will be done during the first month of the phased pilot study and will entail inspecting the drains and culverts and cleaning out the holding pond on the northwest part of the site. The holding pond is filled with dross-contaminated sediment. This sediment will be removed with a backhoe and stored in Ecology-block enclosures in the building on site until such time as it can be run through IAI's process. Cost for this work is $5,000.

The second Kent project is to pave 202nd Avenue on the north side of the site. This will be done during the fourth month of the project and will cost $12,000.

Attachment 4 presents a detailed breakdown of IAI's cost by month. IAI will submit invoices monthly, through MK-Environmental, to Ecology for the amounts listed in the row "Total Monthly Expenses". The invoice will document that the scope of work outlined for each month was accomplished. modify

IAI shall give every assistance to MK-Environmental in observing the pilot process and documenting its technical and economic performance by measurement, analysis, and access to both technical and financial records.

Ecology shall retain the right to stop the pilot study at any time, for any reason. Should this right be exercised, costs will be paid only for that part of the pilot study performed. Study months will be considered to begin on the date on which the study commenced. Should termination occur in the middle of a study month, costs will be paid on a prorated basis.
All work will be performed in accordance with WISHA regulations governing health and safety and uncontrolled hazardous waste sites.

4.6 TASK 6 - PUBLIC PARTICIPATION PLAN

This Public Participation Plan recommends a program to be implemented by Ecology during the RI/FS. Ecology will be assisted in plan implementation by the consultant team's public involvement staff. The public participation program is designed to support the technical activities of the RI/FS.

Phase I, Public Participation will consist of compiling a mailing list of interested parties. One to three mailings regarding site activities will be distributed.

Information Sources

To provide accurate and coordinated information about activities occurring during the RI/FS, Ecology should designate one spokesperson to act as the key contact for project-related inquiries. This person will be the liaison between the public, the media and Ecology. since Ecology has a dual role in this project, it may decide a member of the consultant team would be an appropriate choice to act as liaison.

The designated spokesperson will keep a record of all inquiries, including the specific questions and the answers given. Names and addresses will be sought to add to a mailing list to receive project-specific information.

Information Repositories

Information repositories are convenient locations where documents and other information about the site and investigations are placed for public review. it is recommended that repositories for this project be established at the Kent Library.

As documents are completed during the RI/FS process, they should be made available at the repository. The public involvement staff will be responsible for maintaining the repositories, including preparing an information control sheet to accompany each document. The control sheet will briefly describe the contents of the documents and list a person who may be contacted for further information. Publicity about the repositories will be included in all mailing fact sheets produced during the RI/FS.

Mailing List

A computerized mailing list will be established for use in sending out fact sheets, and/or public meeting announcements.

Fact Sheets

The purpose of fact sheets is to educate and inform the public about issues and investigations, explain findings, and inform them of the schedule and opportunities for public input. The number of fact sheets would be determined by the level of public interest and concern, as determined in the previously mentioned interviews. It is recommended that at least two fact sheets be prepared: one at the beginning of the RI to give the history of the site, preliminary findings, and schedule of activities; and a second toward the end of the FS to explain potential remediation activities and announce a public meeting. A third fact sheet may be prepared to use as a handout at the public meeting. If interest in the RI/FS is high, additional fact sheets could be written by the technical and public involvement staffs. Ecology would review and approve all fact sheets prior to distribution.

Public Participation Plan Documentation

The public involvement staff will prepare a brief report outlining the activities conducted during the Public Participation Plan and, if desired, will make recommendations for continued public participation during remediation activities.

4.7 TASK 7 - PREPARE RECOMMENDATIONS AND SUMMARY REPORT

At the conclusion of Phase I as defined by Ecology, M-K Environmental will provide a report summarizing the results of the investigation and recommending areas of further study. The report will describe the site background, the nature and extent of the contamination at the Maralco site, a site map locating all important features and property boundaries, a compilation of data obtained from the site, an assessment of the IAI technology, suggested interim remedial actions, and recommendations for future work activities.

The report will be prepared by each of the respective project staff members and subcontractor personnel. The Project Manager will be responsible for overall coordination of the report development.

4.8 TASK 8 - PROJECT MANAGEMENT

M-K Environmental will provide a Project Manager who will be responsible to Ecology and for organizing, directing, and documenting the activities associated with this work plan. The Project Manager will also be responsible for tracking and controlling the project budget, overall communication, coordinating progress reports, and close-out meetings with Ecology. The project management subtasks are described as follows:

4.8.1 Planning and Review Meetings

M-K Environmental plans to have six planning and review meetings with Ecology. The first meeting will be to initiate the project activities and finalize the work plan tasks. Four review and coordination meetings are planned during the execution of the project and a final close-out meeting will be held to transfer project records to Ecology and discuss recommendations for future work.

4.8.2 Project Control

The Project Manager and designated project personnel will review expenditures on a weekly basis. This will include a review of personnel hours expended, professional service charges, subcontractor billings and direct charges. A comparison of budget allocation versus actual expenditure will also be made.

4.8.3 Monthly Progress Reports/Invoices

The Project Manager and designated project personnel will prepare monthly progress reports describing job progress, upcoming work, anticipated problems, problems solved and schedule and budget performance. The Project Manager will also oversee the preparation of invoices covering direct labor charges, professional service charges, subcontractor billings and direct charges.

4.8.4 Subcontract Administration

The Project Manager or a designated project staff member and a subcontracts administrator will oversee the selection, award, Ecology approval and management of subcontractors. M-K Environmental plans to award three subcontracts for surveying, drilling, and public participation services. The subcontractor awards will be based on a minimum of three telephone quotes for each of the services to be rendered. The subcontractor selection will not depend solely on price but will also involve minority and women owned businesses, as well as reputation, knowledge and quality of work.

4.9 TASK 9 - HOUSEKEEPING

Ecology has identified various housekeeping tasks which IAI may be able to perform during the course of its pilot study. These housekeeping tasks are not part of the pilot study and include such items as:

- Sweeping the north end of the plant building,
- Installation of ECO-block wall so that damaged part of the plant building may be isolated from vehicular traffic,
- Removal of approximately 150 lbs. of metallic sodium, currently stored in kerosene in a drum inside the building,
- General plant cleanup.

This task establishes a housekeeping fund of $10,000 to accomplish these tasks and others which Ecology may require. Any expenditures from this fund will require submission by IAI of a letter detailing the scope of work to be accomplished, the estimated cost, and the schedule. No work will be performed by IAI until Ecology approves the scope of work contained in the letter. MK-Environmental has no oversight role for these tasks and assumes no liability related to performance of these tasks by IAI.

SECTION 5

Section 5

KEY PERSONNEL

M-K Environmental proposes to provide the following personnel:

Name	Title	Role
Barbara Trenary	Project Manager	Project Sponsor
Alan M. Parker	Project Manager	Project Manager
Susan Evans	Senior Engineer	Senior Hydrogeologist
Scott Bender	Field Engineer	Hydrogeologist
John Delaney	Principal Engr.	Metallurgist
Sam Artis	Administrator	Subcontracts Administrator
Lynn Higgins	Environmental Engr.	Regulatory Specialist
Erik Creagh	Industrial Hygienist	Site Safety Officer
John Cowan	Environmental Specialist	Quality Control Coordinator

Key personnel for IAI:

Name
Phil Stansfeld

Resumes for these individuals are included in Attachment 3.

SECTION 6

SECTION 6

PROJECT BUDGET AND SCHEDULE

6.1 PROJECT BUDGET

A detailed project budget has been prepared for each task and subtask which addresses the following costs areas:

- Direct Labor
- Travel
- Materials
- Special Testing and Equipment
- Subcontracts

A summary of project costs are presented in Table 6.1 and the details are presented in Table 6.2. Task 5, Pilot Study is shown as a separate item since the funding is not available for this part of the RI/FS. Task 9, Housekeeping, is included as a line item in the subcontractor costs.

6.2 PROJECT EXECUTION SCHEDULE

An overall project schedule has been prepared. Tasks are shown in weeks from approval. The environmental study activities are estimated to require a total of 16 weeks. The design, permitting and start-up of the pilot plant are estimated to take 4-8 weeks. The pilot plant will run for 5 months following start-up. The overall schedule is shown in Figure 6-1.

TABLE 6.1

Client: WDOE

ESTIMATED COST SUMMARY	INCLUDING TASK 5		WITHOUT TASK 5
MK-ES Labor	$150,922		$111,013
MK-ES Direct Expenses	$15,197		$9,047
Subcontracting Costs	$483,430		$51,643

Total Estimated Costs	$649,549	$171,703

TABLE 6.2

M-K ENVIRONMENTAL BUDGET FOR MARALCO SITE

Task Number	Task/Subtask	Alan Project Manager	Susan Senior Hydrogeologist	Supervising Hydro-Geologist	Metallurgist	Professional Staff	Secreterial	Graphics	Total Hours
TASK 1									
1.1	Prepare Final H&S Plan	0	4	0	0	32	8	0	44
1.2	Prepare Final QA Plan	0	4	0	0	8	12	0	24
TASK 2	LAND SURVEY								
2.0	Land Survey	8	8	8	4	24	0	0	52
TASK 3	SOIL AND GROUND WATER CONTAMINATION								
3.1	Evaluation of Existing Data	0	16	8	0	16	6	0	46
3.2	Property Transfer Eastern								
3.2.1	Title Search	0	0	0	0	15	3	0	18
3.2.2	Historical Areal Photograph Review	0	4	8	0	0	0	0	12
3.2.3	Agency File Review	0	4	16	0	8	5	0	33
3.2.4	Site Examination Walk Through	0	12	12	0	0	0	0	24
3.2.5	Surface and Shallow Soil Sampling	0	12	12	0	10	0	0	34
3.2.6	Data Evaluation and Report	0	16	16	0	24	16	16	88
3.3	Monitor Wells	0	16	60	0	48	0	8	132
3.4	Surface Water Sampling	0	4	10	0	10	0	0	24
3.5	Stream Sediment Sampling	0	4	10	0	10	0	0	24
	Total Task 3 hours								435
TASK 4	EVALUATE PROPOSED INTERIM RESPONSE								
		140	40	100	120	0	0	0	400
TASK 5	PILOT TEST OF INTERIM RESPONSE	120	60	160	120	40	80	20	600
	1/3 and 2/3 Complete Meetings	24	16	0	24	0	2	0	66
TASK 6	PUBLIC PARTICIPATION PLAN	2	0	0	0	0	0	0	2
TASK 7	PREPARE RECOMMENDATIONS A	60	64	44	24	32	80	60	364
TASK 8	PROJECT MANAGEMENT								
7.1	Planning and Review Meetings	48	48	8	0	24	0	0	128
7.2	Project Control	16	4	0	0	8	0	0	28
7.3	Monthly Progress Reports/Invoices	32	10	0	4	8	24	0	78
7.4	Subcontract Administration	24	8	16	0	0	0	0	48
	Total Hours	474	354	488	296	317	236	104	2269
	Total Labor Costs [TOT HRS*24+34.19+7.2] (P.C. OH Fee)	$148,370							
	DPPE	$2,552 ODC							
	ESTIMATED MK LABOR W/TASK 5	$150,922							
	ESTIMATED MK LABOR WO/TASK 5	$111,013							

TABLE 6.2 (continued) MK ENVIRONMENTAL SERVICES DIRECT EXPENSES BY TASK

ALL DIRECT EXPENSE SUBTOTALS
INCLUDE 2% MARKUP and DPPP (1.72%)

TASK 1	FINALIZE H&S AND QA PLANS	Xerox	200	pages @	$0.15	$30

	SUBTOTAL TASK 1 DIRECT EXPENSES					$31
TASK 2	LAND SURVEY	Mileage	200	miles @	$0.24	$48

	SUBTOTAL TASK 2 DIRECT EXPENSES					$50
TASK 3	SOIL AND GROUNDWATER CONTAMINATION	Mileage	100	miles @	$0.24	$24
	3.1 Evaluation of existing data	Xeroxing	200	pages @	$0.15	$30
	3.2 Environmental Assessment					
	3.2.2 Hist. Areal Photograph Review	Mileage	200	miles @	$0.24	$48
		Photographs				$100
	3.2.3 Agency File Review	Mileage	200	miles @	$0.24	$48
	3.2.4 Site Examination Walk Through	Mileage	100	miles @	$0.24	$24
	3.2.5 Surface and Shallow Soil	Mileage	200	miles @	$0.24	$48
	Sampling	Field Supp	2	Day @	$50	$100
	3.2.6 Data Evaluation and Report	Xeroxing	300	pages @	0.15	$45
		Phone				$25
		Shipping				$30
		Miscelaneous				$50
	3.3 Monitor Wells	Mileage	300	miles @	$0.24	$72
		Field Supp	3	Days @	$50	$150
		Bailers	3	Bailers @	$75	$225
	3.3/3.5 Surface water and sediment	Mileage	150	miles @	$0.24	$36
	sampling	Field Supp	2	Days @	$50	$100

	SUBTOTAL TASK 3 DIRECT EXPENSES					~~$1,198~~ $1,155
TASK 4	EVALUATE PROPOSED REMEDIAL ACTION	Plane Fare	4	Trips @	$350.00	$1,400 ?
		Per Diem	10	Days @	$75.00	$750
		Car Rental	10	Days @	$50.00	$500

	SUBTOTAL TASK 4 DIRECT EXPENSES					$2,650
TASK 5	PILOT TEST PROPOSED REMEDIAL ACTION	Plane Fare	9	Trips @	$350.00	$3,150 ?
	(includes 1/3 and 2/3 meetings)	Per Diem	24	Days @	$75.00	$1,800
		Car Rental	24		$50.00	$1,200

	SUBTOTAL TASK 5 DIRECT EXPENSES					$6,150
TASK 6	PUBLIC PARTICIPATION					
	no direct expenses					

TASK 7	PREPARE DRAFT AND FINAL REPORT	Xerox	2000	pages @	0.15	$300
		phone				$100
		shipping				$50
		misc				$100

	SUBTOTAL TASK 7 DIRECT EXPENSES					~~$571~~ $550

TASK 8	PROJECT MANAGEMENT					
	TRAVEL	Plane fare	4	Fares @	$350	$1,400
		Per Diem	20	Days @	$90	$1,800
		Car Rental	20	Days @	$50	$1,000
		Phone				$50
	Project control/reports	Xerox	50	Pages @	$0.15	$8
		Phone				$25
		Misc				$100

	SUBTOTAL TASK 8 DIRECT EXPENSES					~~$4,547~~ $4,383
	All Subcontractor Subtotals include 2% Markup and DPPP (1.7%)					

TOTAL DIRECT EXPENSES	
WITH TASK 5	~~$15,197~~ $14,969
WITHOUT TASK 5	~~$9,047~~ $8,819

— Should Be a Fee

TABLE 3 ALL SUBCONTRACTOR EXPENSES
INCLUDE 2% MARKUP AND DPPP (1.7%) — Ins

Includes the 2% + 1.69%

TASK 2	4.2 Land Survey	Boundary Survey				$11,050
		Topographic (dross pile)				$700
		Topographic (site)				$4,500

	SUBTOTAL TASK 2 SUBCONTRACTOR EXPENSES					$16,860
TASK 3	3.3 Monitor Wells	Mob/Demob	1	Charge @		$250
	Drill 4 Wells	Drill/Inst.	32	Hour @	$170	$5,440
	Develop wells	Drill Supp.	4	Well @	$300	$1,200
	Sample Wells	Field Supp.	3	Day @	$30	$90
		55 GAL DRU	8	Drums @	$20	$160
		Protective Pa	4	Wells @	$125	$500

	SUBTOTAL TASK 3 SUBCONTRACTOR EXPENSES					$7,408
TASK 4	EVALUATION OF PROPOSED REMEDIAL ACTION					
	Investigate/document markets		100	Hours @	$50	$5,000
	Purchase Washed Product from IAI		100	Tons @	$74	$7,400

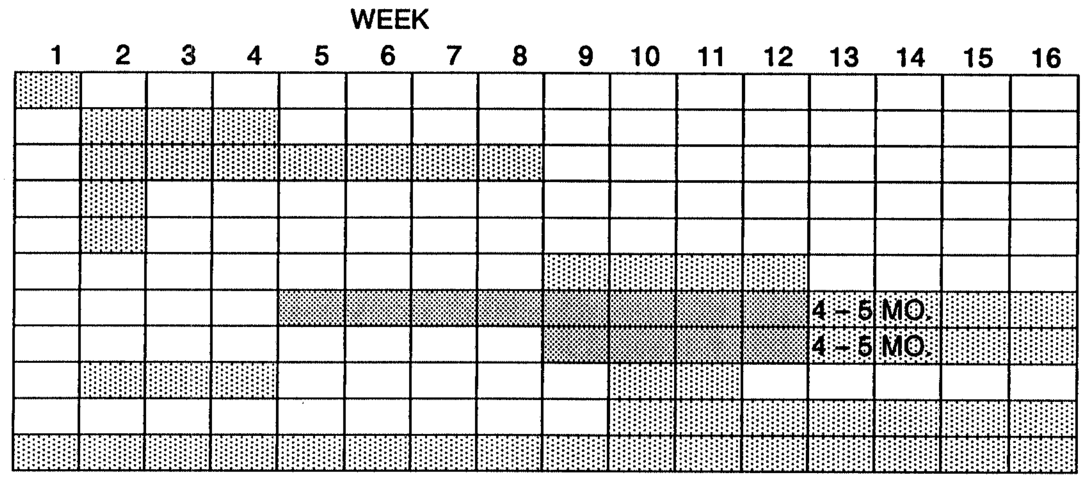
	SUBTOTAL TASK 4 SUBCONTRACTOR EXPENSES					$12,866
TASK 5	PILOT TEST OF INTERIM RESPONSE					
	Operate Pilot Plant for 5 month period				$416,163	$431,787
	(see attached IAI Cost Breakdown)					
TASK 6	PUBLIC PARTICIPATION PLAN		1	Plan @	$3,984	$4,134
TASK 9	HOUSEKEEPING				$10,000	$10,375

TOTAL	TOTAL SUBCONTRACT EXPENSES	
	WITH TASK 5	$483,430
	WITHOUT TASK 5	$51,643

FIGURE 6–1

M–K ENVIRONMENTAL TIME LINE FOR MARALCO SITE

Task Number	Task/Subtask
1	PREPARE FINAL H&S PLAN
2	LAND SURVEY
3	SOIL AND GROUND WATER CONTAMINATION
3.1	Evaluation of Existing Data
3.2	Property Transfer Evaluation
3.2.6	Data Evaluation and Report (Environmental Audit)
4	EVALUATE PROPOSED INTERIM RESPONSE*
5	PILOT TEST PROPOSED INTERIM RESPONSE*
6	PUBLIC PARTICIPATION PLAN
7	PREPARE RECOMMENDATIONS AND FINAL REPORT
8	PROJECT MANAGEMENT



* Task 4 and Task 5 will continue for 4 to 5 months past the environmental portion of the program

APPENDIX

ATTACHMENT 1

HEALTH AND SAFETY PLAN

ATTACHMENT 1
MARALCO ALUMINUM
SECONDARY ALUMINUM REFINERY

KENT, WA.

DRAFT SITE SAFETY PLAN

MK Work Order Number:	2121
Project Manager:	Alan Parker
Site Safety Officer:	Erik M. Creagh
Date of Issue:	12/21/89

1.0 INTRODUCTION

This draft project safety plan delineates the basic safety requirements for Phase I of the Remedial Investigation/Feasibility Study at the Maralco Secondary Aluminum Smelter Site located in Kent, Washington. It will be refined as additional information becomes known.

The provisions set forth in this plan will apply to the employees of MK-Environmental Services, their subcontractors working on this project, and any authorized visitors. The subcontractors may elect to modify these provisions, but only with the written concurrence of MK-Environmental Services.

This project safety plan will address the expected potential hazards that may be encountered for this project. Field activities are planned to begin in April or May 1990 with the duration estimated at approximately six months. If unanticipated changes in site or working conditions occur as the activities progress, addenda to this plan will be provided by MK-Environmental Services.

2.0 PROJECT SAFETY AUTHORITY

Personnel responsible for the project safety are the Project Manager and the Site Safety Officer.

The Project Safety Officer is responsible for the development and submittal of this plan to the Project Staff, and for advising the Project Staff on health and safety matters. He or she has the authority to provide for the auditing of compliance with the provisions of this plan, suspend or modify work practices, and to initiate action for individuals whose conduct does not meet the requirements set forth herein.

The Project Safety Officer is responsible for the dissemination of the information contained in this plan to all MK Environmental Services personnel assigned to the project, to the responsible representative of each subcontractor firm, and to authorized visitors. The Project Safety Officer will also act as the Site Safety Officer and as such, is responsible for ensuring the following elements are addressed:

- Safety Supplies and Equipment Inventory
- Medical Surveillance Program/Physical examinations
- Training Programs/Hazard Communication
- Accident/Incident Reporting Procedures

- Decontamination/Contamination Reduction Procedures
- Air Monitoring Programs
- Emergency Response Procedures

The Site Safety Officer has the authority to suspend work at any time if there is an imminent threat to the health and safety of project personnel or the general public. The Site Safety Officer will also inform the Project Manager of the conduct of individuals that is not in conformance with the requirements of the plan.

3.0 MEDICAL SURVEILLANCE

MK-Environmental Services personnel and sub-contractors engaged in project execution will participate in the Medical Surveillance program, and must be approved by the examining physician(s) to wear respiratory protection devices and protective clothing for protection from exposure to hazardous materials. The applicable requirements under the appropriate sections of the final rule governing Hazardous Waste Operations (29 CFR 1910.120) will be observed.

Medical surveillance testing will be required for personnel both pre-project, and post project. The specific test parameters will be consistent with the contaminants anticipated to be encountered, and will be so delineated by the physicians responsible for administering the medical testing.

An episodic examination will be required if any worker develops signs or symptoms related to over-exposure to hazardous substances on-site or in the event an unprotected worker is potentially exposed in an emergency situation. The scope of any episodic examinations will be left to the discretion of the examining physician.

4.0 TRAINING

4.1 Basic OSHA Training

All personnel will have received the health and safety training as described in this action before being allowed to participate in field activities that could expose them to hazardous substances, safety hazards, or health hazards. This training is required pursuant to (29 CFR 1910.120).

- <u>Forty-Hour Hazardous Waste Operations Health and Safety Training</u>
  Forty hours of classroom instruction and simulated field exercises regarding the following topics: 1) biology, chemistry, and physics of hazardous materials; 2) toxicology; 3) industrial hygiene; 4) hazard evaluation and control; 5) personal protective equipment; 6) medical surveillance; 7) decontamination; 8) legal and regulatory aspects; 9) emergency response.

- <u>Eight-Hour Manager/Supervisor Hazardous Waste Operations Health and Safety Training</u>
  Eight hours of additional specialized instruction on managing/supervising employees engaged in hazardous waste operations. Required of on-site supervisors who are directly responsible for or who supervise employees engaged in hazardous waste activities.

- <u>Eight-Hour Annual Hazard Waste Operations Health and Safety Refresher Training</u>
  Eight hours of refresher training annually, as necessary.

4.2 Site and Task Specific Training

Field personnel from MK-Environmental Services and their subcontractors will attend a project-specific training program for safety issues and project work task review before beginning work. The meeting will be conducted by the Site Safety Officer. Periodic safety briefings or (tail-gate sessions) will be conducted before the start of work. All training programs, safety meetings, and daily safety briefings will be documented by agenda and signature of each attendee.

4.3 First Aid and CPR Training

There will be at least two workers at the site with current, valid certification in first aid and cardiopulmonary resuscitation (CPR) training from the American Red Cross (or the equivalent).

5.0 HAZARD ANALYSIS AND CONTROL

The site investigation is conducted to assist in determining the nature and extent of hazardous substances at the site.

Historical information regarding the types of wastes that exist at the site will be utilized in establishing requirements for the medical surveillance program, monitoring/sampling equipment, and personnel protective equipment. As the site investigation proceeds, and more detailed information regarding the type, quantities, and extent of hazardous substances becomes known, the Health and Safety Plan will be modified accordingly.

It will be necessary to perform certain evaluations of airborne contaminants prior to a final decision on the level of protection required for the RI/FS field work.

5.1 Chemical Hazards

According to a site assessment report prepared by Ecology and Environment, Inc. (October 1987), the major repositories exhibiting concentrations of priority pollutant metals exceeding background soil concentrations are as follows: black dross piles, Kawecki-Berylco, Inc. (KBI) dross, "aluminum oxide" pile, and baghouse dusts. These compounds are generally characterized by high concentrations of antimony, chromium, copper, lead, nickel, and zinc.

Most of the black dross generated by Maralco is located in a 50,000 ton pile to the south- east of the refinery building. Ten tons of KBI dross are located in a concrete bin inside the refinery in the southwest corner of the building.

The aluminum oxide pile weighing approximately 5,000 tons, is located about 60 feet due east of the refinery building at the north end of the black dross pile.

Baghouse dusts are located in each of eight metal ash receptacles below the baghouse hoppers in the southwest corner of the refinery. These dusts are considered to be corrosive in nature.

Other potentially hazardous substances that have been identified on the Maralco premises are a pile of grey, sandy material (appearance similar to that of black dross) located at the northeast quadrant of the site (approximately 40 yards east of a housing residence); brine solution noted in the salt saver holding

ponds on the east side of the refinery building; and yellow colored patches of unknown chemical composition randomly distributed throughout the black dross pile.
The black dross, KBI dross, aluminum oxide and baghouse dusts will be suspect in representing an airborne inhalation hazard until background air monitoring has shown otherwise.
At the northwest quadrant of the property lies an underground diesel storage tank. The contents and condition are unkown. A specific health & safety work plan will be drawn up to support investigative activities. Approval from the Site Safety Officer is required before any RI/FS activities can occur in the tank vicinity.

There is also the possibility that some areas within the site may contain patches or small spills of unknown organic chemicals. Metal drums of unknown contents may also be found. Old lead vehicle batteries have also been found on-site.

5.2 Physical Hazards

There are various physical hazards that project personnel may be exposed to during the field investigation. These include brambles, uneven terrain, falling objects, slippery surfaces, marshy ground, ditches, holes, sharp objects, tools, and heavy machinery/equipment.

Weather conditions may expose personnel to cold temperatures. The principal hazards of cold stress are frostbite and hypothermia and impaired ability to work. Wind will lower the effective temperature. Low illumination levels may exist inside the building and produce a vision hazard.

The use of power tools and equipment often creates excessive noise. Chronic over exposure can lead to loss of hearing. At the least, excessive noise can annoy or distract workers and increase the risk of other accidents due to interference with communication.

5.3 Hazard Control

Engineering controls are the preferred method to control health and safety hazards whenever such controls are available and practical. The use of dust suppression techniques, equipment guards, and work procedures that minimize worker exposure to hazardous substances or situations are examples of engineering controls.

Only equipment that is used for its intended task and that is in safe operating condition will be used. Personnel will be familiar with the hazards associated with the use of the tools and equipment and methods to mitigate the hazards.

Personal protective equipment will be utilized when engineering and administrative controls are not feasible or practical. Personal protective equipment may consist of boots, clothing, gloves, head, eye, and hearing protection. Respirators may be utilized if concentrations of airborne contaminants warrant. All respirators will be NIOSH/MSHA approved.

6.0 WORK ZONES AND MONITORING

6.1 Work Zones

At those sites where there is a potential for the accidental spread of hazardous substances from contaminated or potentially contaminated sites to clean areas, work zones will be established where different types of operations will occur, and the flow of personnel and equipment will be controlled. The establishment of work zones will help ensure that personnel are properly protected against hazards present where they are working, that work activities and contamination are confined to the appropriate areas, and that personnel can be located and evacuated in an emergency.

Prior to the commencement of field activities within areas of concern, work zones will be established as needed to meet operational and safety objectives.

Exclusion (Control) Zone

The exclusion zone is the area where contamination does or could occur. Entry into this area is limited to those personnel wearing the specified personal protective equipment who have completed the required health and safety training, and who are participating in the medical surveillance program. The boundary of the exclusion zone will be determined for each site individually and may change depending on site activities and conditions. The exclusion zone will be clearly delineated through the use of signs, barricade tape, and/or fences. Access control points will be established to regulate the flow of personnel and equipment into and out of the zone and to help verify that proper procedures for entering and exiting are followed. The required level of personal protective equipment in the exclusion zone depends upon the job assignment, and detailed information known regarding types, quantities and extent of hazardous substances.

Contamination Reduction Zone

The contamination reduction zone is the transition area between the exclusion zone and the clean zone. This zone is designed to reduce the probability that the support (clean) zone will become contaminated or affected by other site hazards. Decontamination of personnel and equipment will occur in the contamination reduction zone. Personnel and equipment will not be allowed to leave the contamination reduction and exclusion zones without being properly decontaminated except in emergency situations.

Support (Clean) Zone

The support zone is all areas outside the exclusion and contamination reduction zones. An access control log will be maintained at the access control point into the exclusion and contamination reduction zones. The access control log will record the names of personnel entering/exiting the exclusion zone and the time.

7.0 MONITORING

Monitoring will be performed to assess the potential exposure to hazardous substances and to ensure that the proper level of personal protective equipment has been selected. It will also be performed to delineate areas where protection is needed and to assist in determining specific medical monitoring requirements (if necessary).

Air monitoring/sampling will be performed using two approaches, as necessary; the use of direct-reading real-time instruments and the collection of air samples in a suitable collection media and subsequent laboratory analysis.

Direct-reading instruments will be calibrated daily before use according to the manufacturer's instructions. Air samples will be collected and analyzed according to the NIOSH Manual of Analytical Methods, Third Edition (as applicable). Air sampling pumps will be calibrated before and after sample collection.

Direct reading instrumentation will be used for monitoring the following air contaminants and conditions, as necessary: organic vapors, combustible gases and oxygen-deficient atmospheres.

8.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

This section describes the personal protective equipment program for the project. The level of PPE required will be dependent upon the work task, site hazards, and current level of hazard assessment within the area. Modifications (i.e. upgrading/downgrading) of the specified level of PPE may be made at the discretion of the Site Safety Officer as more information regarding site hazards becomes known. Engineering controls and work practices will be the primary methods of protecting site workers. Only when such controls and practices are not feasible will PPE be utilized.

Based upon information obtained from the Ecology and Environment, Inc. site assessment report, the site visit and walk-through and the absence of air sampling data currently available at the time of this writing, Level C PPE will be implemented during initial phases of the RI.

Level C

Level C to be selected when the concentration and type of air contaminants is known and the criteria for selection of air-purifying respirators are met.

Level C equipment; (used as appropriate)

- Full-face respirator with appropriate cartridges/canisters
- Chemical-resistant coveralls (polyethylene coated Tyvek, or equivalent)
- Gloves, outer, chemical-resistant (nitrile, or equivalent)
- Gloves, inner, chemical-resistant (vinyl, or equivalent)
- Boots, chemical-resistant, steel toe (PVC, or equivalent)
- Cotton coveralls
- Safety glasses with side shields

Following an assessment of air toxins through a background air sampling scheme, the Site Safety Officer may elect to downgrade to a Modified Level C (full-face air-purifying respirators with combination dust/organic vapor cartridges, not necessarily worn, but readily available).

9.0 DECONTAMINATION

All personnel, clothing, equipment, and samples leaving a control zone (contaminated or potentially contaminated area) shall be decontaminated to remove any harmful substances that may have adhered to them. Some equipment/clothing may be disposed of rather than decontaminated. This section gives guidelines regarding the decontamination procedures to be implemented at the site.

9.1 Personnel Decontamination

A decontamination (decon) station will be established in the contamination reduction zone. The decon station will consist of the following, as appropriate:

- Equipment drop
- Boot wash station; a tub of water and detergent with brushes for cleaning and another tub of water for rinsing
- Glove wash station (similar to boot wash station)
- Disposable clothing barrel; all contaminated or potentially contaminated disposable clothing shall be placed into barrels (or equivalent) for disposal as contaminated waste.

9.2 Equipment Decontamination

All equipment/tools used in the control zone will be inspected for contamination prior to removal from the site. Any equipment/tools with visible contamination will be required to be cleaned. A water and detergent solution will be used as necessary for highly contaminated equipment. All water used during decontamination will be containerized for proper disposal. If necessary, cleaning solvents may be used on a case-by-case basis.

10.0 GENERAL PROJECT SAFETY REQUIREMENTS

The project operations shall be conducted with the following minimum safety requirements employed:

- Eating, drinking, and smoking will be restricted to a designated area.
- All personnel shall be required to wash hands and face before eating, drinking, or smoking.
- Gross decontamination and removal of all personal protective equipment shall be performed prior to exiting the facility. Contaminated clothing will be removed and collected for disposal.
- Shaking or blowing of potentially contaminated clothing or equipment to remove dust or other materials is not permitted.
- The Project Manager and Site Safety Officer will be responsible to take necessary steps to ensure that employees are protected from physical hazards, which would include:
- Falling objects such as tools or equipment
- Falls from elevations
- Tripping over hoses, pipes, tools, or equipment
- Slipping on wet or oily surfaces
- Insufficient or faulty protective equipment

- Insufficient or faulty operation, equipment or tools
- Field operations personnel shall be cautioned to inform each other of non-visual effect of the presence of toxics, such as:
- Headaches
- Dizziness
- Nausea
- Blurred Vision
- Cramps
- Irritation of eyes, skin, or respiratory tract
- Changes in complexion or skin discoloration
- Changes in apparent motor coordination
- Changes in personality or demeanor
- Excessive salivation or changes in papillary response
- Changes in speech ability or pattern

11.0 EMERGENCY RESPONSE PROCEDURES

In the event of an accident resulting in physical injury, First Aid will be administered and the Project Manager and the Site Safety Officer will be notified. The injured worker will be transported to Valley Medical Center for emergency treatment. A physician's attention is required regardless of the severity of the injury.

In the event of fire, explosion, or property damage, the local emergency response agencies will be immediately notified.

Emergency Telephone Numbers:

- Fire, Police, Ambulance. 911

- Hospital (Valley Medical Center)
  400 S. 43rd, Renton
  Emergency. 251-5185
- Directions from Kent - take I-5-N to 405N. Exit on SW 43rd Street going south. Hospital will be off to the left.

- Additional Contingency Telephone Numbers
  MK-Environmental Services, Bellevue, WA. 453-1110
  Washington Dept. of Ecology
  Redmond, WA. 867-7200
  Olympia, WA. 459-6418

APPENDIX

ATTACHMENT 2

SAMPLING PROTOCOL, QUALITY CONTROL AND SAMPLE ANALYSIS PLAN

ATTACHMENT 2
SAMPLING PROTOCOL
QUALITY CONTROL AND SAMPLE ANALYSIS PLAN

1.0 SOIL CORE SAMPLING

Soil core samples will be collected using either standard hollow stem drilling techniques or a hand held sampling device. If power drilling equipment is used, samples may be collected using a split spoon, modified California sampler, or shelby tubes. If shelby tubes are used, the sample should be extruded in the field and the sample length composited so that a representative split of the sample obtained is collected into the sample jar for analysis. If a California-type sampler is used, the sampler sleeve should be stainless steel, and the end caps should be PVC or other material which is not likely to leach organic constituents into the sample. The step-by-step procedures for collecting soil samples are described in the following paragraphs.

1.1 Sample Collection

Random surface and shallow soil samples will be collected at depths specified in the work plan. Soil samples from different holes will not be composited for analysis.

Prior to sampling, all sampling equipment will be decontaminated as described in Section 1.2.

All sample containers will be supplied pre-cleaned from the analytical laboratory.

Fill sample containers to the top, with no head space and seal the container immediately. Place all filled sampled containers on ice.

- Collect the surface soil at 0 to 6 inches using the hand sampling device or power corer.

- Clean loose soil and waste from the area to prevent downhole contamination.

- Collect samples according to depth. Sample collection includes describing and trimming cores and placing samples in labeled containers.

- Duplicate (split) samples are required for Quality Control. To split the sample, first scrape (trim) the core of any material form the sampling device. Collect samples for volatile analyses, then place the entire remaining sample in a stainless steel bowl and mix with a stainless steel spoon until visually homogenized. Fill two jars from the material in the bowl, alternately placing material first in one jar then the other jar.

- After all samples have been collected, backfill the hole with a bentonite slurry to minimize the chances for downhole contamination.

1.2 Decontamination

The following decontamination procedures will be followed for collection of soil samples.

1. All down-hole sampling equipment including hand auger bit, auger flights and split spoons will be steam cleaned prior to collecting the first sample and between each sample hole.

2. All equipment that comes in contact with samples will be washed with an "Alconox" and water wash and triple rinsed with distilled water between sample depths and between sample locations. This includes washing split spoons between sample depths (they are still steam cleaned between different borings), and washing stainless steel bowls, spoons, and knives between each sample.

3. Clean plastic tarp or garbage bags will be spread out for a work area during sample collection. Cleaned sampling equipment will be placed on the plastic, <u>not</u> on the ground.

4. Clean latex or PVC gloves will be worn by the sampling personnel and will be changed between each sample depth. If additional protection is needed for health and safety, the protective gloves will be worn beneath the disposable latex or PVC gloves.

1.3 Sample Documentation

The field logbook maintained during sampling will include the following information:

- Sample collector's name(s)
- Date and time of sample collection
- Method of sample collection
  (including name of drilling company and driller's name if appropriate)
- Physical soil characteristics
- Presence or absence of oil or staining
- Sample identification (boring number and depth)
- Number and types of containers and sample identification number (includes preservatives used)
- Analyses requested
- Field observations during sampling
- Description of decontamination procedures
- Weather conditions, estimated air temperature

1.5 Sample Preservation and Shipping

Each sample container will be labeled with indelible ink. The following information will be included on the label:

- Sample identification number, including depth interval
- Date and time and sample collection
- Sample collector's name
- Analyses requested
- Preservative used

All sample numbers for each soil core sampling event will include the boring number and the depth of the sample.

All containers will be supplied pre-cleaned from the analytical laboratory. Any preservatives will be added by the laboratory prior to shipping the containers.

2.0 GROUNDWATER SAMPLING PROTOCOL

Prior to beginning field activities, sample collection equipment, sample containers and documents (forms to be completed in the field) associated with sampling will be prepared. The types of equipment used to purge the wells and collect ground water samples as well as the step-by-step process are listed below.

Sample Equipment

1. Depth to water meter
2. Several gallons of distilled water and wash bottles
3. Clean paper towels and disposable latex gloves
4. Dedicated, bottom entry PVC bailers and 1,000 feet polypro cord. The cord is tied to the bailers to purge and sample the wells and is then discarded.
5. Graduated buckets to recorded amount of water purged from wells
6. Labeled sample bottles containing appropriate preservatives (supplied by contract lab)
7. Electrical conductivity and pH meter with temperature probe and necessary standards
8. Field log book, standardized forms for field use, clip board, pencils and pens, and waterproof markers
9. Ice chests, wet ice, and waterproof bags for the chain-of-custody forms

2.1 Sample Collection Procedures

1. Inspect wells and record ambient conditions that may affect the sampling effort. Decontaminate (distilled water rinse) the depth to water probe and measure the depth to water from the top of the PVC well casing. Determine the height of the water column in the well and calculate the bore volume of the well using the following equations:

$$V = (\pi r^2)\ (12h)\ (0.00433)$$
or
$$= 0.163\ h \text{ (for 2 inch diameter monitoring well)}$$

Where V = bore volume of the well (gallons)
r = inside radius of the well (inches)
h = height of water column in well (feet)
0.00433 = convert cubic inches to gallons

Maintain all records concerning sample collection in a field book. Some data will be listed on forms specifically designed to aid in data collection.

2. Thoroughly rinse the dedicated PVC well bailers with distilled water and proceed to purge the well, recording the volume of water removed. A minimum of 3 bore volumes will be purged unless the well reaches dryness before 3 bore volumes are removed. Water purged from each well

will be examined for the presence of immiscible liquids. If any are present, record it in the field log book or on the well inspection report.

3. Allow wells to recharge until the water level is 90% recovered or for a period of time which will not exceed 24 hours. During this period the bailers will be suspended in the wells.

4. Collect samples using the dedicated PVC bailers and place samples into containers which were segregated, labeled, and treated with the proper preservatives prior to entering the field. Each set of sample containers is to be identified with a field ID number (not the well number). The first samples collected are for metals and field measurement for one rep of pH, EC, and temperature. The sample for metals analysis is collected first to reduce the likelihood of obtaining a turbid sample. All samples collected for metals analysis are filtered in the field using disposable 0.45 micron filter paper. Next, two vial samples are collected for volatiles analysis. The remainder of the sample containers are filled at random. In the case of collecting replicate samples, no two sample containers will be filled from the same bailer volume. All sample containers are filled so that there is <u>no</u> headspace in the bottle and then are placed on ice in the field.

5. Specific steps used to retrieve a ground water sample from a monitoring well using a dedicated bailer are:

    a. Lower bailer slowly until it contacts water surface.

    b. Allow bailer to sink and fill with a minimum of surface disturbance.

    c. Steadily raise bailer to surface, do not allow bailer or line to contact ground or other objects.

    d. Open bottom check valve to allow slow discharge to flow gently down the side of the given sample bottle with minimum entry turbulence, using a precleaned funnel if necessary to facilitate the transfer. Latex gloves are worn during sampling and changed between wells, thereby preventing contact with the ground water and eliminating possible contamination between wells.

    e. Repeat steps a. through d. as needed to acquire sufficient volume.

6. Following sample collection, cap and lock the wells and rinse the bailers with distilled water before storing them individually in doubled plastic bags.

7. As the wells are sampled and complete sets of containers are obtained, store the ice chests holding the samples temporarily while the remainder of the wells are sampled. When sampling is completed, the chain-of-custody form which has been maintained in the field will be signed and placed in a waterproof plastic bag and enclosed in an ice chest which is clearly marked CHAIN-OF-CUSTODY ENCLOSED. All of the ice chests will be packed with ice in the field (to maintain the samples at or near 4°C) and sealed prior to being shipped by same-day or overnight carrier to the analytical laboratory.

2.2 Shipment

Samples transported off-site will be packaged for shipment in compliance with current Department of Transportation (DOT) and commercial carrier regulations. Before the ice chests leave the facility, they will be packed with ice and sealed by the personnel who performed the sampling. Once sealed, the ice chests will be delivered to the laboratory either by field personnel or by same-day or overnight carrier. The completed chain-of-custody records, laboratory analysis request forms (if needed), and any other shipping or sample documentation accompanying the shipment will be enclosed in a waterproof plastic bag and taped to the underside of the cooler lid. The laboratory receiving the samples will be notified when and where the samples are arriving.

Detailed shipping instructions are given in Section 3.0.

2.3 Field Assurance

In an effort to eliminate sample contamination and to identify the source of contamination (or rule out avenues of contamination) in the event data results are suspect, the following field quality control procedures will be employed:

- Use only dedicated bailers to eliminate cross contamination and contamination which could occur during intensive cleanings and excessive handling.

- Bail all wells to dryness or remove a minimum of three bore volumes and sample within 24 hours of purging.

- Prepare all sampling equipment and sample containers prior to entering the field.

- Store all properly preserved samples on ice.

- Thoroughly rinse all equipment with distilled water and change gloves between wells to prevent cross contamination.

- Collect one duplicate sample set from a downgradient well.
- Submit for analysis a sample containing the distilled water used to decontaminate sampling equipment (reagent blank) for each group of parameters to be tested.

- Submit a field blank which consists of two volatile vials which are filled with distilled water and left open at a sampling locations and allowed to "breathe" while samples are collected.

2.4 Sample Labels

A legible label providing the specific sample identification code will be affixed to each sample container. The labels will be sufficiently durable to remain legible even when wet and will define which type of preservative is contained in the bottle. Analyses requested for each container will be defined by the identification code, which will be cross referenced on a separate sheet.

2.5 Field Records

Information associated with sampling will be recorded in a field log book. This log book serves as a record of field activities associated with sample collection and handling. The field log book will contain all additional information and observations not included on either the standardized forms or the chain-of-custody document. This information will describe factors or conditions which might affect sampling procedures (e.g., prevailing weather). All routine measurements and observations will be recorded in the field log book and on prepared forms including sampling blanks, static water depths, borehole volumes, soil core descriptions, and pertinent colors or odors.

Information to be Recorded in the Field Log Book

- Monitoring well number
- Date and time of collection
- Weather conditions
- Depth to water
- Analytical parameters
- Volume of water purged
- Number observations
- Field observations
- Field measurements pH, SC
- Description of sampling methods
- Deviations from standard procedures
- Sample preservations procedures
- Sample collector's name

Chain-of-Custody:

Chain-of-custody procedures are described in Section 3 of this attachment.

3.0 CHAIN-OF-CUSTODY PROCEDURES

A Chain-of-Custody form must accompany all samples that are shipped or delivered to laboratories for analysis, or whenever the samples leave the custody of the person collecting the samples. An internal chain-of-custody (sample tracking sheet) will be maintained for the duplicate samples which are kept in the freezer on site. A regular chain-of-custody from for these samples will be completed when/if the samples are sent off-site for analysis. Copies of the internal sample tracking sheets will be maintained in the Environmental Engineer's office.
The following chain-of-custody procedures apply to all samples.

1. Remove all samples from the field coolers, and sort into sample types.

2. Check the labels on all samples for completeness. If incomplete, fill in necessary information, referencing the field logbook.

3. Wipe the jars. Check to be sure that the lids are on securely.

4. Fill out the Chain-of-Custody (as described below) as the samples are placed into the shipping cooler.

5. Pack the jars carefully. Wrap each jar in bubble wrap or the styrofoam bag supplied by the laboratory. Leave enough room for blue ice (or ice) on the top layer. Pack the interstices with vermiculite or polystyrene popcorn.

6. In the top layer, include at least two blocks of frozen blue ice or two quart-size zip-lock bags of wet ice. Double seal the wet ice, if used. Include a note to the lab to return the blue ice with the coolers.

7. At the time of shipping, double check to insure the Chain-of-Custody is enclosed, the air bill vendor name and number is on the chain-of-custody, and tape the cooler securely.

8. Double check that the shipping form clearly shows the destination address and indicates who the samples are going to. Insure samples for the amount specified in the sampling SOP, or for $1,000 if no specifications were made.

9. If delivering the samples to the laboratory, have the laboratory receiving personnel sign the chain-of-custody. Retain a signed copy for the operating record.

3.1 Chain-of-Custody Instructions

Described below are step-by-step procedures for completing chain-of-custody forms. Please refer to the example for clarification.

1. Fill out client name and project number, including task number.

2. All sample collector's names should be in the Sampler(s) Signature box, including person filling out Chain-of-Custody record. The person completing the Chain-of-Custody record should circle his/her name.

3. For each sample, record the sample ID, date and time the sample was collected, whether it is a composite or individual grab sample, and how many containers contain that sample. In the Sample Type column note the sample matrix (water, soil, etc).

4. The series of columns following Sample Type is for Requested Analyses. Fill in the requested analytical parameters along the diagonal line and put an "x" in the box for each sample to be analyzed for this parameter.
5. There is ample room from comments. For example if the samples contain preservatives, or any special instructions are necessary, this should be noted under "comments" for that (those) sample(s).

6. When a cooler has been filled, complete the area above the Comments column. Note the page number (eg., 1 of 1, 1 of 2, 2 of 2), and the cooler number. If any page has lines remaining, cross them out in such a way that nothing else can be added to that page.

7. Under Shipping Notes, fill in the shipper (e.g., Federal Express or UPS), and the air bill number. Also note on the first page the total number of containers in the cooler.

8. When the form has been completed, sign and note the date and time under "Relinquished By". This section is to be signed immediately prior to delivery of samples to the shipper or to the laboratory. Double seal the white copy of the Chain-of-Custody form(s) inside two zip-lock type bags and tape them inside of the cooler lid.

9. Keep the pink and yellow copies in the project file.

10. Deliver samples to shipper or directly to laboratory.

4.0 QUALITY CONTROL/SAMPLE ANALYSIS PLAN

This analytical plan has been prepared for the sampling program to be initiated on the MARALCO Aluminum site by MK-Environmental Services. The samples will be analyzed at the Department of Ecology laboratory at the request of the Department of Ecology.

A standard turnaround of 15 - 20 working days is sufficient for the initial phase of this project. In order to be assured that maximum holding times are not exceeded, all final lab reports will contain the dates of sample extraction and analysis. All the results will be reported in the order in which they were extracted and analyzed by the lab.

The sampling program to be initiated will result in the collection and analysis of ground water, surface water, stream sediments, and various soil borings from the MARALCO site. The guidance provided herein is intended to lead to the production of data that are technically defensible for all legal and regulatory purposes and that are of known quality. The sampling and analysis plan is described in Section 4 of the work plan. The Stage I analysis plan is shown in Tables 4-2 and 4-3 of the work plan. Table SAP 4-1 of this attachment lists the required containers and preservatives for the various analytical parameters.

4.1 Data Quality Objectives

The objectives of quality assurance (QA) efforts for laboratory analysis are twofold. First, they provide the mechanism for ongoing control and evaluation of data quality on a routine basis. Second, quality control data can ultimately be used to define data quality for the various measurement parameters in terms of precision and accuracy.

Data representativeness is a function of sampling strategy. Data comparability will be achieved by following approved, standard analytical procedures, without significant modifications, and by reporting results in standard units of measure, suggested by the American Chemical Society's publication "Principles of Environmental Analysis," Anal. Chem. 1983, 55. 2210-2218.

For the organic analyses the lab will provide CLP-QC following SW-846 methodology. The inorganic metals will also be analyzed using SW-846 methodology and CLP-QC. Deliverables are not required but if requested they will follow CLP/SOW-787. The miscellaneous inorganics will be analyzed using methods and QC prescribed in "Standard Methods for Chemical Analysis of Water and Wastewater," EPA-600/4-79-020. Detection limits accuracy, precision, and recovery limits are shown in Appendix SAP - A.

The laboratory will provide a system of internal analytical and statistical QC checks designed to establish technically sound criteria for evaluating analytical data. Criteria for data acceptance shall address the following items:

1. Accuracy of analytical methods used.
2. Sensitivity of analytical methods.
3. Precision of analytical methods.
4. Data comparability.
5. Data completeness.

The system of Quality Control will include:

1. Field duplicate samples. MK will collect duplicate samples at a frequency of one per the total number of samples analyzed or 5 percent, whichever is greater.

2. Equipment blanks. One distilled water equipment blank per day per piece of equipment used will be submitted.

3. Trip blanks. These will be collected whenever volatile organics are being collected and shipped.

4. Laboratory reagent blanks. At least one laboratory reagent blank shall be prepared and analyzed for each day samples are analyzed per matrix per method.

5. Laboratory duplicates. At least one laboratory duplicate shall be prepared and analyzed for each group of samples received by the laboratory per matrix per method. The lab duplicates shall be carried through the entire analytical process from extraction to final analysis.

6. Matrix spikes. At least one matrix spike shall be prepared and analyzed for every twenty samples received by the laboratory per matrix as appropriate. Matrix spikes will not be used for conventional parameters. The matrix spike shall be carried through the entire analytical process.

7. Surrogate spike analysis. Each sample, matrix spike, laboratory duplicate and blank shall be spiked with surrogate compounds prior to purging or extraction, as appropriate.

4.2 Sample Preservation

Some form of preservation is usually required for all samples. The type of sample preservation required will vary depending on the sample type and the analytes to be measured. Because of this, more than one container of the same waste may be required, if the waste is to be analyzed for more than one parameter.

Table SAP 4-1 lists the analytes of interest on this project and the required sample amount, container, and preservation method. The maximum allowable holding time is also stated for each parameter.

4.3 Sample Custody and Sample Tracking

Sample custody procedures for this program are based on USEPA recommended protocols, which emphasize careful documentation of sample collection and transfer data. To ensure that all important information pertaining to each sample is recorded, the following documentation procedures should be used.

- Samples labels
- Chain-of-Custody Record--EPA format
- Tamper indication seals
- Sample ID numbers
- Sample control logbook
- Laboratory logbook

4.4 Analytical Parameters

Table 4-2 and 4-3 of the work plan lists the analytical parameters and methods for the types samples will be collected at MARALCO Aluminum. The analytical parameters listed are at the recommendation of WDOE. All the methods listed are reference methods published by the EPA in: (1) "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, and (2) "Methods for Chemical Analysis of Water and Wastes." EPA-600/4-79-020.

Samples must be analyzed within 14 days of collection for Method 8240, 7 days until extraction for Method 8270 and within 48 hours for nitrate. All other samples have a maximum holding time of 28 days with the exception of dissolved oxygen which must be analyzed within 22 days of collection.

TABLE SAP-2
ENVIRONMENTAL SAMPLING GUIDE
MARALCO SITE

Parameter	EPA Method No.	Matrix Analysis/ Prep	Sample Amount Required	Container	Preservation	Maximum Holding Time
INORGANIC TESTS:						
Ammonia (NH_3-N)	350.2		500 ml	P, G	H_2SO_4 to pH<2, Cool 4°C	28
Chloride (halide differences)	325.3		100 ml	P, G	None Required	28
Cyanide, total	335.2		1000 ml	P, G	NaOH to pH<2, Cool 4°C	14
Fluoride	340.2		300 ml	P	None Required	28
Nitrogen	351.0		500 ml	P, G	H_2SO_4 to pH<2, Cool 4°C	28
Nitrate	352.1		100 ml	P, G	$H2SO_4$ to pH<2, Cool 4°C	48
Phosphorus, total	365.4		100 ml	P, G	$H2SO_4$ to pH<2, Cool 4°C	28
Sulfate	375.4	water	200 ml	P, G	Cool 4°C	28
Metals	6000		200 ml	P, G	HNO_3 to pH<2	28
ORGANIC TESTS:						
VOAs	8240/624		40 ml/100g	G, Teflon	Cool 4°C, Zero Head Space	14
BNAs	8270/625		1 L	G, Teflon	Cool 4°C,	7
Dissolved	360.1/360.2		1 L	G	H_2SO_4 to pH 1.5	22
Oxygen						

Key: P - Polyethylene; G = Glass

Note: Chemical preservatives apply only to water samples

APPENDIX SAP - A

LABORATORY RESULTS

Detection Limits mg/L

Analyte	Soil	Water
Cyanide	1.0	0.01
Chloride	50	5
Fluoride	1	0.1
Nitrate	5	0.5
Sulfate	50	5
Phosphate	10	1
Carbonate	50	5
Bicarbonate	50	5

EP TOX - Detection Limit: order of magnitude < the MCL

Precision and Accuracy limits as defined by SW-846 CLP SOW 7-87

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ATI I.D. # -

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY CONTINUED

COMPOUND	RESULT
4-NITROPHENOL	<50
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<50
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3-DICHLOROBENZIDINE	<20
BENZO(a)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(b)FLUORANTHENE	<10
BENZO(k)FLUORANTHENE	<10
BENZO(a)PYRENE	<10
INDENO(1,2,3-cd)PYRENE	<10
DIBENZ(a,h,)ANTHRACENE	<10
BENZO(g,h,i)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-d5
2-FLUOROBIPHENYL
TERPHENYL-d14
PHENOL-d6
2-FLUOROPHENOL
2,4,6-TRIBROMOPHENOL

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ATI I.D. # -

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT :
PROJECT # :
PROJECT NAME :
CLIENT I.D. :
SAMPLE MATRIX : SOIL
EPA METHOD : 8270
RESULTS BASED ON DRY WEIGHT

DATE SAMPLED :
DATE RECEIVED :
DATE EXTRACTED :
DATE ANALYZED :
UNITS : mg/Kg
DILUTION FACTOR : 1

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

CONTINUED NEXT PAGE

Analytical Technologies, Inc.

ATI I.D. # -

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT :
PROJECT # :
PROJECT NAME :
CLIENT I.D. :
SAMPLE MATRIX : SOIL
EPA METHOD : 8240
RESULTS BASED ON DRY WEIGHT

DATE SAMPLED :
DATE RECEIVED :
DATE EXTRACTED :
DATE ANALYZED :
UNITS : mg/Kg
DILUTION FACTOR : 1

COMPOUND	RESULT
ACETONE	<1.0
BENZENE	<0.050
BROMODICHLOROMETHANE	<0.050
BROMOFORM	<0.25
BROMOMETHANE	<0.50
2-BUTANONE (MEK)	<0.50
CARBON DISULFIDE	<0.050
CARBON TETRACHLORIDE	<0.050
CHLOROBENZENE	<0.050
CHLOROETHANE	<0.050
CHLOROFORM	<0.050
CHLOROMETHANE	<0.50
DIBROMOCHLOROMETHANE	<0.050
1,1-DICHLOROETHANE	<0.050
1,2-DICHLOROETHANE	<0.050
1,1-DICHLOROETHENE	<0.050
1,2-DICHLOROETHENE (TOTAL)	<0.050
1,2-DICHLOROPROPANE	<0.050
CIS-1,3-DICHLOROPROPENE	<0.050
TRANS-1,3-DICHLOROPROPENE	<0.050
ETHYLBENZENE	<0.050
2-HEXANONE (MBK)	<0.50
4-METHYL-2-PENTANONE (MIBK)	<0.50
METHYLENE CHLORIDE	<0.25
STYRENE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.050
TETRACHLOROETHENE	<0.050
TOLUENE	<0.050
1,1,1-TRICHLOROETHANE	<0.050
1,1,2-TRICHLOROETHANE	<0.050
TRICHLOROETHENE	<0.050
VINYL ACETATE	<0.50
VINYL CHLORIDE	<0.050
TOTAL XYLENES	<0.050

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-d4
TOLUENE-d8
BROMOFLUOROBENZENE

AnalyticalTechnologies, inc.

ATI I.D. # -

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT :
PROJECT # :
PROJECT NAME :
CLIENT I.D. :
SAMPLE MATRIX : WATER
EPA METHOD : 8240

DATE SAMPLED :
DATE RECEIVED :
DATE EXTRACTED : N/A
DATE ANALYZED :
UNITS : ug/L
DILUTION FACTOR : 1

COMPOUND	RESULT
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-d4
TOLUENE-d8
BROMOFLUOROBENZENE

APPENDIX

ATTACHMENT 3

RESUMES OF PROJECT PERSONNEL

NAME: **ALAN M. PARKER**

EDUCATION: BS, Mining Engineering
University of Idaho (1974)

REGISTRATIONS: Professional Engineer, British Columbia

PATENTS: Tar Sands Treatment/Enhanced Oil Recovery
Patent of Canada Number: 1,234,351

YEARS OF EXPERIENCE: 14

CAREER SUMMARY:

More than 14 years of experience in project management, engineering, design, cost estimating, financial analysis and construction. Representative project work includes: current assignment as Project Manager for Mobil Oil Corporation's 10,000 bbl per day oil mining project in Louisiana; Project Manager for a RI/FS at a 2,500 acre NPL site in Lead, North Dakota; engineer for ARCO's $235 million, Carr Fork Project, a 10,000 tpd copper mine near Tooele, Utah; management of a complete uranium mine and mill property evaluation in New Mexico; design and cost analysis for the Department of Energy's proposed 70,000 tonne, $1.5 billion high-level nuclear waste storage facility in Texas.

WORK EXPERIENCE:

M-K ENVIRONMENTAL SERVICES Inc., Boise, Idaho

1987 - Present **PROJECT MANAGER** - Manages and directs technical and administrative personnel during the execution of engineering, environmental, and hazardous waste studies. Responsible for developing overall project direction, plans, strategies, reviewing and approving technical work, and achieving project schedules and budgets. Representative projects include:

Perth Amboy Refinery Project, Massachusetts Currently managing a lump sum design/construct bid in support of an Site Closure Plan for a petroleum refinery site located near Waltham, Massachusetts. M-K's involvement includes determining the extent of the contamination on the site; gathering information and data to the extent needed to perform the activities in the work plan; and evaluation and costing of the remedial options applicable to the contamination.

Caddo Pine Island Project, Mobil Oil Corporation. Managed an evaluation of a 10,000 bbl per day enhanced oil recovery facility in Louisiana. The project is situated in an environmentally sensitive area and involves a resource evaluation, EOR system and material handling design, environmental planning, cost, and economic analysis.

Whitewood Creek Remediation Project, Homestake Mining Company. Managed the FS portion of a waste remediation design at an NPL site (Number 20) in Lead, North Dakota. The FS work was completed under regulatory authority instituted under CERCLA. The site extends over 2,000 acres and contains an estimated 15 million tons of waste. The FS activities involved evaluation of RI data, screening and selection of remedial actions, process design for recovery of saleable by products, and siting and designing an offsite disposal facility. Four different remedial actions were designed for site clean-up and a detailed cost estimate was prepared for each design.

St. Helen's Refinery, Bogle and Gates, Inc. Supported an environmental assessment of a secondary recycling facility. Work involved analyzing historical production records, plant operations and developing marketing and cost data. Also performed a series of financial analysis for the operation.

Dalton Pass Uranium Project, U.S. Department of Justice. Managed the evaluation and preparation of a comprehensive feasibility study for a 1 million pound per year uranium mine and mill facility. The project involved a complete resource, mine, mill, environmental, marketing, and economic analysis.

Beaumont Remediation Project, Dupont, Inc. Performed a market study in support of a waste water treatment process that allows for the recovery several types of vanadium by product. Prior to the market study the vanadium was being discharged as a waste product. Contacted domestic and international buyers to assess interest, availability of long term contracts, and to determine the optimum vanadium product versus price.

1985 - 1986 **STAFF DESIGN ENGINEER** - Responsible for developing technical design input, calculations, and estimates for mining projects. Duties included mine site analysis and selection, mine access analysis and selection, and mine design. Also participated in equipment evaluation and selection, and development of capital and operating cost estimates. Representative projects include:

Conceptual Design of a High-Level Nuclear Waste Repository in Salt, U.S. Department of Energy. Developed engineering and cost estimating input for the design of the U.S. Department of Energy's proposed 70,000 tonne, $1.5 billion high-level nuclear waste storage facility in Texas. Also assigned on a temporary basis to the Basalt Waste Isolation Project in Richland, Washington. Prepared design and cost estimates related to the construction and operation of a high level nuclear waste test facility. Both facilities were designed under RCRA and CERCLA authority.

NORTHERN CONSTRUCTION COMPANY LTD., Vancouver, B.C.
(A wholly-owned subsidiary of Morrison-Knudsen Corporation)

1982 - 1985 **MANAGER - PROJECT DEVELOPMENT** - Responsible for mining related business development in Canada, and assisted in the preparation of engineering studies, bid calculations and cost estimates. Representative projects include:

Tar Island Facility, Suncor, Inc. Assisted in the preparation of quantity take-offs, estimation of overburden volumes, the evaluation and selection of mining equipment, and in the preparation of capital and operating costs as part of a proposed 2-year overburden and tar sand stripping contract.

Internal Acquisition Audit and Evaluation of 14 mines and related material handling and surface facilities for A.T. Massey Coal holdings in West Virginia.

MORRISON-KNUDSEN COMPANY Inc., Boise, Idaho

1979 - 1981 **SENIOR MINING ENGINEER** - Responsible for developing technical design input, calculations, and estimates for mining projects. Duties included mine site analysis and selection, mine access analysis and selection, shaft and drift design, and mine ventilation studies. Also participated in equipment evaluation and selection, and development of preliminary capital and operating cost estimates.

EXXON MINERALS, U.S.A., Crandon, Wisconsin

1978 - 1979 **PROJECT AND SUBCONTRACTS ENGINEER** - Responsible for engineering activities relating to the initial surface and underground work at the Crandon Project, a proposed 10,000 tpd underground copper, lead, and zinc mine and mill complex. Duties involved review, selection, and supervision of engineering contractors, underground design, and preparation of cost estimates.

ANACONDA COPPER COMPANY, Tooele, Utah

1977 - 1978 — **CONSTRUCTION ENGINEER** - Responsible for contract administration and supervision of shaft and tunnel development contractors at Anaconda's $235 million, 10,000 tpd copper mine. Also directed a series of prototype equipment evaluation studies.

MORRISON-KNUDSEN COMPANY Inc., Boise, Idaho

1975 - 1976 — **MINING ENGINEER** - Participated in the preparation of major feasibility studies relating to Colorado oil shale deposits and New Mexico uranium deposits. These studies covered shaft and slope access and design, underground mine layout, equipment evaluation and selection, and rapid excavation design and scheduling.

NAME: BARBARA A. TRENARY

EDUCATION: BS, Industrial Hygiene/Chemistry
Colorado State University (1979)
Practices and Procedures for Asbestos Control
University of Kansas
Certificate/Hazardous Waste Site Investigations
IT Corporation
OSHA 29 CFR 1910.120 Hazardous Waste Training

ASSOCIATIONS: American Industrial Hygiene Association (Full Member)
American Society of Safety Engineers (Full Member)

REGISTRATION: Certified Industrial Hygienist (Comprehensive Practice), American Board of Industrial Hygiene - Certificate No. 3678

YEARS OF EXPERIENCE: 11

CAREER SUMMARY:

Extensive experience in the practice of Industrial Hygiene and Safety Engineering, as well as in management of project IH/SE programs, staff and outside consultants. Currently Manager of Environmental Health Services group, chartered to provide all health, safety, QA/QC and risk assessment support to division projects in addition to managing its own projects. Assigned as project health and safety officer for multi-site hazardous waste program management services for a major transportation services company in the State of Washington. Served as project manager for several asbestos management contracts, including survey and assessment and abatement. Specializes in development of Health and Safety plans for a wide range of hazardous waste projects and is responsible for chemical control on several projects. Ensures compliance with all regulatory authority impacting the discipline for which she is responsible (OSHA, CERCLA/SARA, RCRA, TSCA, state and local regulations, etc.)

WORK EXPERIENCE:

MK-ENVIRONMENTAL SERVICES, Bellevue, Washington.

1989 - Present AREA MANAGER - Overall technical and administrative responsibility for development and execution of area projects. Directs project planning, scheduling, budgeting and staffing and is responsible for technical performance and completion of work according to the contracted scope. As management sponsor of area projects, advises and supports other project managers and interfaces with clients and regulatory agencies, as required. Also provides services as a Certified Industrial Hygienist, as required.

Boise, Idaho.

1987 - 1989 MANAGER, ENVIRONMENTAL HEALTH SERVICES - Responsible for staffing and implementation of MK-Environmental Services' Industrial Hygiene (health and safety) program and for the coordination and support of health and safety requirements for all projects and proposals. Provides management review and implementation of health and safety programs related to hazardous waste projects. Acts as project manager for hazardous waste projects as assigned. Instructs the 40-hour Hazardous Waste Site Investigation course for MKE employees, subcontractors, and outside entities.

MORRISON-KNUDSEN ENGINEERS, INC., Boise, Idaho.

1985 - 1986 SENIOR ENVIRONMENTAL SPECIALIST-CHEMICAL - Responsible for project-specific Health and Safety plans including risk assessment and specification of cost-effective personal protective equipment, qualitative and quantitative analyses of industrial and waste chemicals and radioactive sources, specification of decontamination procedures. Responsible for on-site supervision of project activities and emergency response. Specified medical surveillance criteria and coordinated with occupational medicine clinics. Trained division staff in toxicology and industrial hygiene. Acted as expert witness on industrial hygiene issues. Trained project employees on chemical handling, respiratory care and use, and proper decontamination. Performed surveys with wide range of field instrumentation. Responsible for all area, personal and perimeter air monitoring, and interpreted and communicated results. Also implemented corrective measures as necessary. Project assignments included:

- Building Decontamination and Demolition, Adolph Coors Company. Health and Safety Manager for complete building and equipment decontamination and demolition of an industrial facility in which a hazardous substance had been used as a raw manufacturing material. Beryllium oxide (BeO) dusts had become airborne, and static, contaminated dust was found to most surfaces within the building. Also, the presence of friable asbestos on equipment and refractory wiring being demolished created control problems. Dilution ventilation was used via a large baghouse which was tapped to provide negative ventilation to the asbestos abatement enclosure. Personal and area samples were taken with Gillian Hi-Flow pumps equipped with appropriate filters. Level C personal protective equipment included Racal positive air purifying respirators, 10-oz. cotton drill coveralls laundered on site, steel-toed boots and hard hats.

- <u>Roper Yard, Denver and Rio Grande Western Railroad</u>. Health and Safety Manager for a drilling/trenching project for an underground fuel oil spill. Soils at the site also consisted of fill from uranium mill tailings piles near the rail yard, and low levels of radioactivity were detected at numerous investigatory borings around the 200-acre site. Minor amounts of lead and PCBs were also suspected, and all materials were handled as were mixed waste. The rail yard was in full operation during remedial activities. Level C personal protective equipment consisted of poly-coated Tyvek, nitrile gloves, air purifying respirators with combination cartridges, steel-toed boots, safety glasses, and hard hats. Air monitoring instrumentation consisted of a flame ionization detector (Foxboro Century 128), a combustible gas/oxygen meter (MSA 261), and scintillometer (Ludlum), and personal sampling pumps with charcoal tubes and filter media per NIOSH third edition methodologies.

- <u>Woods Chemical Company Site, Glacier Park Company</u>. Health and Safety Manager for a pesticides formulation facility decontamination including soils, impoundments and ground- water. Health and safety procedures dictated the use of Level B personal protective equipment (some Level C) Poly-Tyvek, supplied air, nitrile gloves, hard hats, and steel-toed boots. Personnel and environmental air sampling was conducted for various pesticides and other semi-volatiles. Personal sampling pumps, high-volume pumps, and appropriate filters were used to assess airborne contaminants per NIOSH/EPA methods. Flame and photoionization detectors and combustible gas meters were used to assess field conditions, allowing proper selection of levels of protection.

- <u>Hillyard Train Yard, Glacier Park Company</u>. Health and Safety Manager for a site contaminated with PCBs, asbestos, and petroleum-based materials as a result of previous demolition and salvage activities at this inactive site. Contaminants were widely dispersed over the 25-acre site, and materials were encountered in unpredictable concentrations and locations. Level C personal protective equipment was used in anticipation of modeled worst-case exposures (Tyvek, half- and full-face air purifying respirators, nitrile gloves, hard hats, steel-toed impervious boots). Sampled air for airborne asbestos with Gillian personal and Micro-Max high-volume pumps, the latter run by a generator. Barrier tape, warning signs, and security personnel kept unauthorized visitors from the site.

- Asbestos Abatement Program, LDS Church. Project Manager for several projects entailing survey and assessment, preparation of technical specifications and management of abatement contracts.

HEWLETT-PACKARD CORP., Boise Idaho

1981 - 1984 HEALTH AND SAFETY MANAGER - Supervised a staff of five industrial hygienists, safety engineers and environmental engineers. Minimized department expenses, recruited and developed staff. Created technical manuals. Represented Hewlett-Packard to government authority, the media and the public on health and safety issues.

1979 - 1981 INDUSTRIAL HYGIENIST - Developed first industrial hygiene program for site of 3,000 employees. Performed quantitative analysis for airborne contaminants. Developed site chemical control procedures. Characterized noise environment of site. Designed ventilation systems for contaminant control.

IBM, Boulder, Colorado.

1978 - 1979 INDUSTRIAL HYGIENIST TECHNICIAN - Extensive experience in noise characterization. Developed site library on radiological health. Lead, respirable dust and trichloroethylene surveys.

(0689)

NAME: C. SUSAN EVANS

EDUCATION: MS, Geology, Emphasis on Geochemistry
Portland State University (1986)

BS, Geology
Portland State University (1983)

ASSOCIATIONS: National Water Well Association
Geological Society of America

YEARS OF EXPERIENCE: 7

CAREER SUMMARY:

Over 7 years of experience in design and implementation of geological, geochemical and environmental studies. Environmental experience includes ground water contamination assessment projects, RCRA closures, Part B permitting, and environmental liability audits. Project areas include review and evaluation of EPA proposed RI's and remediation plans for CERCLA sites, geological reports and groundwater monitoring design reports for RCRA Part B permits for several sites, including refineries, chemical plants, and steel mills. Involved in agency negotiations with the Texas Water Commission (TWC), Washington Department of Ecology (WDOE) and EPA Region X. Project oriented supervisory experience, including budgeting, scheduling and managing project staff performing multiple tasks on different sites.

Other geologic work includes design of a geochemical sampling program, geochemical sampling and data analysis for an area covering 640 square miles in southwest Oregon to evaluate precious metal potential. Geologic and geochemical mapping, sampling and evaluation of Red Butte, Oregon (MS thesis project).

Prior to entering the field of geology, Susan worked in retail camera sales for several years where she managed a department of 7 to 14 people for a department with over $200,000 in sales per year. She was responsible for all ordering, marketing, and scheduling.

WORK EXPERIENCE:

MK-ENVIRONMENTAL SERVICES, INC., Bellevue, Washington.

1989 - Present HYDROGEOLOGIST

Project manager and hydrogeologist for RCRA and CERCLA projects. Develops RI/FS and RA Work Plans, authors RCRA permits, performs regulatory analyses, evaluates cleanup goals, is responsible for data analysis, and prepares final reports. Directs and manages field work and subcontractors, evaluates RIs and negotiates with regulatory agencies.

ENTRIX, INC., Seattle, Washington and Walnut Creek, California.

1987 - 1989 HYDROGEOLOGIST

- Project manager and geologist for oversight of RCRA basin closure at refinery in the Pacific Northwest, including removal of structures and underlying affected soils, and closure report. Designed verification sampling protocol, supervised excavation and conducted verification sampling. The basin was successfully removed from the RCRA Part B permit.

- Project manager for all RCRA - related sampling for the above refinery under interim status and under final permit. Assisted in negotiations with EPA and WDOE for final permit conditions.

- Conducted environmental liability assessments at several food processing plants and large agricultural facilities in California for multi-million dollar land transfer. Evaluated the potential dollar liability related to environmental issues for each site investigated. A broad range of environmental issues were encountered, from pesticide residues in soils to underground storage tanks and on-site drum storage areas.

- Reviewed EPA proposed Expedited Remedial Action for an EPA Region X CERCLA site at a wood treating plant on Puget Sound. Evaluated proposed groundwater and soils remediations and participated in agency negotiations for a more effective ERA. Collected data on the influence of tidal fluctuations on water levels in on-site wells used in design of the final ERA.

- Reviewed chemical and hydrological data for a Gulf Coast refinery requesting an Alternate Concentration Limit (ACL) Petition. Evaluation of barium solubility under existing ground water conditions and review of past practices showed that the refinery was in compliance and that the monitoring wells had been improperly sampled. A full ACL was not necessary.

- Performed review of RI and Endangerment Assessment (EA) of a Region VI CERCLA site in Houston.

- EPA oversight of groundwater assessment of PCB-contaminated site in heavily karsted area in New Mexico.

- Performed extensive sediment sampling from boats to evaluate the extent and impact of the April 23, 1988 Shell oil spill into the lower Sacramento Delta waters.

ERM - SOUTHWEST, INC., Houston, Texas.

1985 - 1987 HYDROGEOLOGIST

- Project manager for ground water assessment project including extensive review of previous work, redesign of ground water onitoring system and revision of the ground water monitoring design section of RCRA Part B permit application for a major Pacific Northwest refinery.

- Prepared geology and ground water monitoring design reports for everal RCRA Part B permit applications including steel mills, refineries and petrochemical plants. Responsible for the design, installation and sampling of several RCRA groundwater monitoring systems. Performed geologic mapping, field permeability falling head and draw-down tests and developed contaminant transport dispersion models as part of RCRA Part B applications.

- Conducted remedial field investigations (including waste, soil and ground water sampling) contamination transport modeling, and literature search to identify potential contaminant migration, and exposure and risk assessment studies for a pesticide formulation plant.

- Evaluated an EPA proposed Work Plan for RI/FS for an EPA Region VI CERCLA site. Suggested changes appropriate to site and contributed to QAPP for modified work plan. Evaluated the effect of dilute solutions of various organic chemicals on the permeability of clay liners as supplement to design of a RCRA vault on site.

- Conducted soil and groundwater sampling and supervised drilling and tank removal for LUST projects involved in property transfers.

- Designed a standard protocol used to evaluate environmental liabilities for services stations in several states for a major petroleum marketing firm.

- Evaluated toxicity data, chemical properties and biodegradation rates of organic and inorganic contaminants as part of exposure risk assessments for Alternate Concentration Limits Petition for a Gulf Coast refinery and to determine appropriate monitoring parameters for various sites.

- Performed confidential evaluation of EPA - proposed remediation for arsenic contaminated soil and groundwater at a Region VI CERCLA site, including groundwater contaminant transport modeling and computer simulated well field design for recovery well and slurry cut-off wall system.

Selected Publications

Evans, C. Susan, and Cummings, M.L., 1985, Geology and Geochemistry of Red Butte, Oregon - a precious metal bearing hot spring system, G.S.A. Abstracts with Programs, Vol. 17, No. 4, p. 236.

Evans, C. Susan, and Cummings, M.L., 1985, Trace element and REE geochemistry of Red Butte, Oregon, a gold bearing hot spring system, G.S.A. Abstracts with Programs, Vol 17, No. 7, p. 576.

Selected Publications (con't)

Evans, C. Susan, and Cummings, M.L., 1986, Trace element geochemistry anomalies and guides to mineralization: Red Butte, Owyhee Uplands, Oregon; geoexpo/86, Exploration in the North American Cordillera, A.E.G. Programs and Abstracts, p. 39.

Evans, C. Susan, Fuller, R.H., and Diehl, D.S., 1985, Section V Ground Water Monitoring Design Report, Part B Permit application, Union Oil company of California, Beaumont Refinery, Nederland, Texas (ERM 35-07).

Evans, C. Susan et al., 1986, Revised Ground Water Monitoring Report, Union Oil Company of California, Beaumont Refinery, Nederland, Texas (ERM 35-09).

Evans, C. Susan and McGaughey, L.M., 1987, Phase I ground Water Investigation Report, Union Oil company of California, Beaumont Refinery, Nederland, Texas (ERM 35-14).

Evans, C. Susan, et al., 1985, Geology Report, Part B Permit Application (for) Structural Metals, Inc., Seguin, Texas (ERM 36-06).

Evans, C. Susan , et al, 1986, Sampling and Analysis Plan to Document Closure of the North Ditch Holding Pond, (for) Sterling Chemicals, Inc., Texas City Plant (ERM 09-53)

Evans, C. Susan and Bost, R.C., 1987, Ground Water Assessment Report for Steps 1 and 2, (RCRA) Ground Water Quality Assessment Report, ARCO Cherry Point Refinery, Ferndale, Washington (ERM 15-17)

Evans, C. Susan, and Bost, R.C., 1987, RCRA Part B Application Volume 3 Section E, Ground Water Monitoring, ARCO Cherry Point Refinery, Ferndale, Washington.

Evans, C. Susan and Johnson, P.J., 1989, Comments on: Draft Dangerous Waste Permit Jointly Issued by US E.P.A. and Washington D.O.E. Feb. 16, 1989, (for) ARCO Products Company, Cherry Point Refinery, Ferndale, Washington (ENTRIX 894010).

Evans, C. Susan, 1988, Soil Sampling and Analyses Related to the 23 July 1988 Pipeline Leak near Martinez, California (for) Pacific Gas and Electric Company (ENTRIX 8840687).

NAME: **SCOTT BENDER**

EDUCATION: MS, Geology with special emphasis in Hydrogeology
University of Idaho (Fall, 1989)

BS, Geology
University of Washington (June, 1987)

CAREER SUMMARY:

Hydrologic and Hydrogeologic applications from the installation of monitor wells and stream gage networks to the analysis of pump test and water supply data. PC and mainframe applications including model simulations, data base management, and ARC/INFO Geographic Information System. Performs sampling of ground and surface waters and soils and coordinates analyses of sediments and water sampling.

YEARS OF EXPERIENCE: 5

WORK EXPERIENCE:

MK-ENVIRONMENTAL SERVICES, INC. Bellevue, Washington

1988 - Present HYDROGEOLOGIST - Critiqued earlier studies and analyzed hydrologic data for litigation support for confidential clients concerning hazardous waste investigations. On the basis of reviewing one of these studies, performed a water quality and hydrogeologic investigation of the site and made recommendations for the installation of additional monitoring wells. Developed graphs and presentation material for the litigation support.

OTT WATER ENGINEERS INC. Bellevue, Washington

1987 HYDROGEOLOGIST - Performed runoff and combined sewer overflow computer modeling for the city of Everett, WA. Tasks included simulation and data base management as well as on site investigation and flow monitoring. Hydrogeologic investigations, Baker River Spawning Project. Evaluated, monitored, and stressed spring discharge for hatchery water supply. Participated in the design and layout of site facility.

U.S. GEOLOGICAL SURVEY, WRD. Tacoma, Washington

1984 - 1987 HYDROLOGIC TECHNICIAN -

- Implementation of ground-water recharge model in the Lower Puyallup River Basin. Tasks included data acquisition and evaluation for streamflow, land use, soil type, vegetation, aspect, and weather as well as conversion of the model from an arid to temperate climate based evapotranspiration subroutines. A technical report was produced on model application and results.

- Responsible for ground and surface-water relationship set-up and data collection for the Cowlitz River Project investigating the rise of ground and surface water levels in relation to mudflow deposits on the river bed as a result of the 1980 eruption of Mt. St. Helens. Tasks included drilling of monitor wells, installation of surface water sites, supervision of survey crews, statistical analysis of data, and seismic survey of the river bed. Co-author of the final report.

- Data collection and management, Ground-Water Pumpage, Columbia Plateau 1984, and a second report covering period from 1945 - 1983. Tasks included data acquisition both in the field and from LANDSAT imagery and management and presentation of the data using ARC/INFO software.

- Collected stream and precipitation data, rainfall/runoff project, King and Snohomish Counties, WA.

- Performed stream gaging in western Washington as well as participated in the construction and maintenance of stream gage stations.

PUBLICATIONS:

Bender, S.F., "Investigation of the Extent and Chemical Distribution of Mining Wastes in the Lower Couer d' Alene River Valley, Killarney Lake, Northern Idaho", in progress.

Packard, F.A. and Bender, S.F. "Influence of Sediment from the 1980 Mt. St. Helens Mudflows on the Lower Cowlitz River Valley Ground Water System". U.S. Geological Survey, report in final review.

NAME: **ERIK M. CREAGH**

EDUCATION:

MS, Environmental Biology
The Ohio State University (March, 1988)

MS, Environmental and Industrial Hygiene
University of Cincinnati (June, 1985)

BS, Biological Sciences
University of Cincinnati (December, 1981)

TRAINING:

AHERA Practices and Procedures in Asbestos Abatement for Contractors, Supervisors, Project Designers and Workers. University of Utah, (1988)

Health and Safety Training for Hazardous Waste Operations
(40 hour OSHA 29CRF1910.120)
Lake Washington VocTech (1989)

Academic and practical training in the fields of Industrial Hygiene and Environmental Science.

ASSOCIATIONS: American Industrial Hygiene Association (AIHA)

YEARS OF EXPERIENCE: 3

CAREER SUMMARY:

Dual academic training in Industrial Hygiene and Environmental Science has provided abilities to solve a wide range of environmental problems in both the industrial and ecosystem setting. Major projects have included:

- MS thesis: "A Characterization of Aflatoxin Emissions from Contaminated Corn."
- Industrial hygiene walk-throughs at various Ohio corporations (foundry, paint manufacturing, electronic, papermill, etc.) for purposes of identifying potential or existing health hazards to workers, and compliance with OSHA General Industry Standards 29.CFR 1910. Subsequent survey reports were prepared for company use.
- Field experience in the collection and interpretation of data from aquatic and terrestrial ecosystems in performance of environmental impact surveys within Lake Erie regions. Such surveys include: analysis of plant and animal communities in lotic and lentic waters undergoing cultural eutrophication, farmland reclamation studies, and deforestation effects from acid rain.
- On-site industrial hygienist for asbestos abatement projects within the Puget Sound area. Responsibilities included air monitoring, worker compliance with safety and health regulations, record keeping, report writing, and liaison between owner and abatement contractor.
- Technical analyst for environmental components of industrial bankruptcy litigation involving a lead smelter. Reviewed and summarized environmental permitting and monitoring documentation for legal counsel, and associated with supporting analyses.

- Radiation survey specialist at a major Department of Energy facility cleanup. Responsibilities included equipment and area surveys, subcontract administration, field documentation, and data base entry.

- Site Health and Safety Officer for a Hydrological/Lithological Verification Investigation conducted at an Amco Oil Refinery Tank Farm. Responsibilities included day-to-day implementation and compliance verification of the Master Health and Safety Plan and Site/Activity Specific Health and Safety Plans.

WORK EXPERIENCE:

July 1988 - present

MK-Environmental Services, Bellevue, Washington

Industrial Hygienist - Currently administrating second field season support as Industrial Hygienist for asbestos abatement projects within the Puget Sound area. Previously provided on-site industrial hygiene assistance as site health and safety officer at an Amoco Refinery Tank Farm verification investigation; radiation survey specialist at a DOE facility cleanup, and technical analyst for environmental components of industrial bankruptcy litigation.

I A I KEY PERSONNEL

PHIL STANSFELD
7819 South 202 Street
Kent, WA
(206) 872-5296

SUMMARY OF QUALIFICATIONS:

Education:

UNIVERSITY OF BRITISH COLUMBIA
Vancouver, British Columbia, Canada
Degree: Bachelor of Applied Science
In: Metallurgical Engineering

NORTH SEATTLE COMMUNITY COLLEGE
Seattle, WA
Major: Music
Duration: 1973 to present

NORTH VANCOUVER HIGH SCHOOL
Graduated in 1962

VARIOUS COURSE WORK

Wooden boat building, musical, engineering

Experience:

Over 22 years in the Aluminum manufacturing industry. Worked in such diverse fields as cost accounting, Quality Control, lab (set up state of the art spectrographic lab in 1980), sales, customer field work, plan design and engineering.

International Aluminum Incorporated
November 1986 to present:

President and founder: Formed and lead the beginning of a Washington State Profit Corporation; leaders in recycling of wastes from aluminum production facilities.

P. K. Metallurgical Services
November 1986 to present:

Sole proprietor: Consulting service for the Pacific Northwest aluminum foundry industry. References here abound.

Maralco Aluminum/Materials Reclamation Company;
March 1973 to November 1986:

All things technical in nature; reported directly to the owners of the largest family owned secondary aluminum smelter in the world. Responsibilities included customer liaison, product development, process development, alloy development, and supervision of the technical/QC effort within the structure of a small ($1,000,000 per month sales) operation. During the 1973 through 1980 period, before the move from West Marginal to Kent, Washington, held the position of plant manager with 60 people in the workforce.

Noranda Metal Industries, Bellingham, WA:

March 1972 to March 1973: Evaluated cost and manufacturing capabilities of a new copper water tube plant. Ran plant as plant manager during the evaluations and reported directly to the West Coast Manager in New Westminster, British Columbia.

Kaiser Aluminum Trentwood Works, Spokane, WA:

July 1967 through February 1972: Metallurgist Finish Mill Area. Responsibilities included QC and process procedure mainly in the heat treating and final manufacture of aluminum alloy sheet and plate. Interesting products included most of the plate used in the structural building of the Saturn 5 rocket as well as the Phantom jet. Was responsible for the certification of these products to the military and worked daily with the military inspector.

<u>Public Speaking:</u> Was always encouraged by Grandfather Jim: "Aluminum and Its Alloys" for the Spokane Chapter of the American Society of Metals. Was guest speaker for various chapters of the American Society for Metals and the American Foundrymen's Society. Subjects were: "The Aluminum Recycling Industry", "The Production of Aluminum Memory Discs for Computers" and "Grain Refinement and Modification of Aluminum Casting Alloys Using Sodium and Strontium".

<u>Patent:</u> Co-author of U.S. Patent No. 4,822,412 dated 04/18/89 "Method of Removing Lithium from Aluminum-Lithium Alloys".

<u>Copyrights:</u> Two musical arrangements of Scot Joplin works were transcribed for brass quintet and have sold over 600 copies throughout the world. These arrangements were copyrighted under Stansfeld Music Company in 1978.

<u>Accomplishments:</u> In 1973, the invention of 343.1 alloy, an aluminum alloy used for production of high strength corrosion resistant die castings. This alloy is still being used extensively in the industry in the manufacture of marine and structural components.

<u>Musical:</u> The musical resume will not appear here except to describe administrative experience gained in the music profession: 1. Leader and manager of PRECINCT, a four-piece classical jazz group which has played extensively in the local area for noon hour concerts (MICROSOFT, PHYSIO CONTROLS, RUTH DYKMAN BOY'S HOME) and a world premier movie reception. 2. Founding father and lead trombonist with the JAZZ POLICE, a 20-piece contemporary jazz ensemble whose accomplishments are many, including live performances at the Bellevue and Gig Harbor jazz festivals and the production of a compact disk recording with world distribution. Act as business consultant for the Jazz Police and was instrumental in the current success of this fine Pacific Northwest group.

<u>Metallurgical Processes:</u>

Too numerous to include here, the metallurgical processes can be included on a separate addendum on request.

<u>References:</u> Available on request.

APPENDIX

ATTACHMENT 4

PILOT PLANT PROPOSAL

INTERNATIONAL ALUMINUM INC.
FIVE MONTH PHASED PILOT PROJECT February 28,1990

MONTH NUMBER		ONE	TWO	THREE	FOUR	FIVE
Mode of operations:						
Construction		ALL	PART	PART	PART	NONE
Production level		0%	25%	50%	75%	100%
Number of mixers		0	1	1	2	3
Number of production shifts		0	1	2	2	2
Operating expenses:						
Project manager, with fringe	Phil Stansfeld	6,000	6,000	6,000	6,000	6,000
Auto Expenses	Corporate vehicle	500	500	500	500	500
Contract Labor	Equipment fabrication	5,800	800	800	800	800
Office person	Next Phase	0	0	0	0	0
Equipment Leases	Note (1)	6,765	8,793	12,209	11,437	11,993
Insurance	Umbrella policy	1,000	1,000	1,000	1,000	1,000
License & Fees	Kent HW fee	12,000	0	0	0	0
Office equipment lease	FAX, copy, CPTR	300	300	300	300	300
Office Supplies	Stationery, ribbons, etc.	100	100	100	100	100
Postage, UPS, Federal XP	Sample shipping + postage	250	250	250	250	250
Training	Health and safety	4,000	4,000	0	0	0
Legal fees and acct.	Robert Kovacevich	1,500	1,500	1,500	1,500	1,500
Third party lab	Metro verification	600	600	600	600	600
Repairs & Maintenance	Lube, screens, gen'l eqpt	806	1,921	2,000	2,000	2,000
Wages + 40% fring.	Hourly operators	7,750	10,156	17,922	17,922	17,922
Taxes	State B and O tax	250	250	250	250	250
Telephone Expenses	Comm. with M-K, Lafarge	230	230	230	230	230
Travel expense	Kamloops trips	0	500	500	500	500
Puget Power	Electricity	350	450	600	1,000	1,100
Fuel	Loader forklift	1,000	1,000	1,000	1,000	1,000
Water, sewer/METRO	Utilities	350	1,284	2,258	4,206	6,154
Total Operating Expenses (TOE)		50,051	39,634	48,019	49,595	5[illegible],199
Contingencies (CONT)		16,684	13,211	16,006	16,532	1[illegible],400
TOE + CONT		66,735	52,845	64,025	66,127	69,599
Before tax profit (BTP)		16,684	13,211	16,006	16,532	17,400
TOE+CONT+BTP		83,418	66,057	80,032	82,658	86,998
Kent projects (Storm drain & wtr vlv, mo. 1, road,mo. 4)		5,000			12,000	
Total Monthly Expenses		88,418	66,057	80,032	94,658	86,998
Pilot project 5-month total		399,163				
Kent projects 5-month total		17,000				
Grand Total		416,163				
Black dross processed (tons)		0	204	408	816	1,223
Washed oxide produced (tons)		0	143	285	571	856
Cost per ton of black dross removed (last month only).						71
Cost per ton of oxide washed (last month only).						102

Note (1) - Mixers, conveyors, screens, front end loader, forklift, on site lab equipment, repair and mtc. tool crib, other items as necessary.

Product drying not included