STATEMENT OF WORK FOR
REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES
UPPER COLUMBIA RIVER SITE

INTRODUCTION

The Purpose of this Remedial Investigation/Feasibility Study (RI/FS) is to investigate the nature and extent of contamination at the Upper Columbia River site, provide information for EPA to perform the baseline risk assessment for human health and the environment and develop and evaluate potential remedial alternatives. The RI and FS are interactive and may be conducted concurrently so that the data collected in the RI influences the development of remedial alternatives in the FS, which in turn affects the data needs and the scope of treatability studies.

The respondent will conduct this RI/FS except for the baseline risk assessment component and will produce a draft RI and FS report that are in accordance with this statement of work, the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (U.S. EPA, Office of Emergency and Remedial Response, October 1988), and any other guidance that EPA uses in conducting an RI/FS (a list of the primary guidance is attached), as well as any additional requirements in the administrative order. The RI/FS Guidance describes the report format and the required report content. The respondent will furnish all necessary personnel, materials, and services needed, or incidental to, performing the RI/FS, except as otherwise specified in the administrative order.

At the completion of the RI/FS, EPA will be responsible for the selection of a site remedy and will document this selection in a Record of Decision (ROD). The remedial action alternative selected by EPA will meet the cleanup standards specified in Section 121 of CERCLA. That is, the selected remedial action will be protective of human health and the environment, will be in compliance with, or include a waiver of, applicable or relevant and appropriate requirements of other laws, will be cost-effective, will utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable, and will address the statutory preference for treatment as a principal element. The final RI/FS report, as adopted by EPA, and EPA's baseline risk assessment will, with the administrative record, form the basis for the selection of the site's remedy and will provide the information necessary to support the development of the ROD.

As specified in Section 104(a)(1) of CERCLA, as amended by SARA, EPA will provide oversight of the respondent's activities throughout the RI/FS. The respondent will support EPA's initiation and conduct of activities related to the implementation of oversight activities.

TASK 1 - SCOPING

Scoping is the initial planning process of the RI/FS and is initiated by EPA prior to issuing special notice. During this time, the site-specific objectives of the RI/FS, including the preliminary remediation goals (PRGs), are determined by EPA. Scoping is therefore initiated prior to negotiations between the PRPs and EPA, and is continued, repeated as necessary, and refined throughout the RI/FS process. In addition to developing the site-specific objectives of the RI/FS, EPA will determine a general management approach for the site. Consistent with the general management approach, the specific project scope will be planned by the respondent and EPA. The respondent will document the specific project scope in a work plan. Because the work required to perform an RI/FS is not fully known at the onset, and is phased in accordance with a site's complexity and the amount of available information, it may be necessary to modify the work plan during the RI/FS to satisfy the objectives of the study.

When scoping the specific aspects of a project, the respondent must meet with EPA to discuss all project planning decisions and special concerns associated with the site. The following activities shall be performed by the respondent as a function of the project planning process.

a. Site Background

The respondent will gather and analyze the existing site background information and will conduct a site visit to assist in planning the scope of the RI/FS.

Collect and analyze existing data and document the need for additional data

Before planning RI/FS activities, all existing site data will be thoroughly compiled and reviewed by the respondent. Specifically, this will include presently available data relating to the varieties and quantities of hazardous substances at the site, and past disposal practices. This will also include results from any previous sampling events that may have been conducted. The respondent will refer to Table 2-1 of the RI/FS Guidance for a comprehensive list of data collection information sources. This information will be utilized in determining additional data needed to characterize the site, better define potential applicable or relevant and appropriate requirements (ARARs), and develop a range of preliminarily identified remedial alternatives. Data Quality Objectives (DQOs) will be established subject to EPA approval which specify the usefulness of existing data. Decisions on the necessary data and DQOs will be made by EPA.

Conduct Site Visit

The respondent will conduct a site visit during the project scoping phase to assist in developing a conceptual understanding of sources and areas of contamination as well as potential exposure pathways and receptors at the site. During the site visit the respondent should observe the sit's physiography, hydrology, geology, and demographics, as well as

natural resource, ecological, and cultural features. This information will be utilized to better scope the project and to determine the extent of additional data necessary to characterize the site, better define potential ARARs, and narrow the range of preliminarily identified remedial alternatives.

b. Project Planning

Once the respondent has collected and analyzed existing data and conducted a site visit, the specific project scope will be planned. Project planning activities include those tasks described below, as well as identifying data needs, developing a work plan, designing a data collection program, and identifying health and safety protocols. The respondent will meet with EPA regarding the following activities and before the drafting of the scoping deliverables below. These tasks are described in Section c of this task since they result in the development of specific required deliverables.

Refine and document preliminary remedial action objectives and alternatives

Once existing site information has been analyzed and an understanding of the potential site risks has been determined by EPA, the respondent will review and, if necessary, refine the remedial action objectives that have been identified by EPA for each actually or potentially contaminated medium. The revised remedial action objectives will be documented in a technical memorandum and subject to EPA approval. The respondent will then identify a preliminary range of broadly defined potential remedial action alternatives and associated technologies. The range of potential alternatives should encompass, where appropriate, alternatives in which treatment significantly reduces the toxicity, mobility, or volume of the waste; alternatives that involve containment with little or no treatment; and a no-action alternative.

Document the need for treatability studies

If remedial actions involving treatment have been identified by the respondent or EPA, treatability studies will be required, except where the respondent can demonstrate to EPA's satisfaction that they are not needed. Where treatability studies are needed, initial treatability testing activities (such as research and study design) will be planned to occur concurrently with site characterization activities (see Tasks 3 and 5).

Begin preliminary identification of potential ARARs

The respondent will conduct a preliminary identification of potential state and federal ARARs (chemical-specific, location-specific, and action specific) to assist in the refinement of remedial action objectives, and the initial identification of remedial alternatives and ARARs associated with particular actions. ARAR identification will continue as site conditions, contaminants, and remedial action alternatives are better defined.

c. Scoping Deliverables

At the conclusion of the project planning phase, the respondent will submit an RI/FS work plan, a sampling and analysis plan, and a site health and safety plan. The RI/FS work plan and sampling and analysis plan must be reviewed and approved by EPA prior to the initiation of field activities.

RI/FS Work Plan

A work plan documenting the decisions and evaluations completed during the scoping process will be submitted to EPA for review and approval. The work plan should be developed in conjunction with the sampling and analysis plan and the site health and safety plan, although each plan may be delivered under separate cover. The work plan will include a comprehensive description of the work to be performed, including the methodologies to be utilized, as well as a corresponding schedule for completion. in addition, the work plan must include the rationale for performing the required activities. Specifically, the work plan will present a statement of the problem(s) and potential problem(s) posed by the site and the objectives of the RI/FS. Furthermore, the plan will include a site background summary setting forth the site description including the geographic location of the site, and to the extent possible, a description of the site's physiography, hydrology, geology, demographics, ecological, cultural, and natural resource features; a synopsis of the site history and a description of previous responses that have been conducted at the site by local, state, federal, or private parties; a summary of the existing data in terms of physical and chemical characteristics of the contaminants identified, and their distribution among the environmental media at the site. The plan will recognize EPA's preparation of the baseline risk assessment. In addition, the plan will include a description of the site management strategy developed by EPA during scoping; a preliminary identification of remedial alternatives and data needs for evaluation of remedial alternatives. The plan will reflect coordination with treatability study requirements (see Tasks 1 and 4). It will include a process for and manner of identifying federal and state ARARs (chemical-specific, location-specific, and action-specific).

Finally, the major part of the work plan is a detailed description of the tasks to be performed, information needed for each task and for EPA's baseline risk assessment, information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to EPA. This includes the deliverables set forth in the remainder of this statement of work; a schedule for each of the required activities which is consistent with the RI/FS guidance; and a project management plan, including a data management plan (e.g., requirements for project management systems and software, minimum data requirements, data format and backup data management), monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the RI/FS. The respondent will refer to Appendix B of the RI/FS Guidance for a comprehensive description of the contents of the required work plan. Because of the

unknown nature of the site and iterative nature of the RI/FS, additional data requirements and analyses may be identified throughout the process. The respondent will submit a technical memorandum documenting the need for additional data, and identifying the DQOs whenever such requirements are identified. In any event, the respondent is responsible for fulfilling additional data and analysis needs identified by EPA consistent with the general scope and objectives of this RI/FS.

Sampling and Analysis Plan

The respondent will prepare a sampling and analysis plan (SAP) to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data meet DQOs. The SAP provides a mechanism for planning field activities and consists of a field sampling plan (FSP) and a quality assurance project plan (QAPP).

The FSP will define in detail the sampling and data-gathering methods that will be used on the project. It will include sampling objectives, sample location and frequency, sampling equipment and procedures, and sample handling and analysis. The QAPP will describe the project objectives and organization, functional activities, and quality assurance and quality control (QA/QC) protocols that will be used to achieve the desired DQOs. The DQOs will, at a minimum, reflect use of analytic methods to identify contamination and remediate contamination consistent with the levels for remedial action objectives identified in the proposed National Oil and Hazardous Substances Pollution Contingency Plan (NCP), pages 51425-26 and 51433 (December 21, 1988). In addition, the QAPP will address sampling procedures, sample custody, analytical procedures, and data reduction, validation, reporting, and personnel qualifications. Field personnel should be available for EPA QA/QC training and orientation where applicable. The respondent will demonstrate, in advance and to EPA's satisfaction, that each laboratory it may use is qualified to conduct the proposed work. This includes use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved in the QAPP for the site by EPA. The laboratory must have and follow an approve QA program. If a laboratory not in the Contract Laboratory Program (CLP) is selected, methods consistent with CLP methods that would be used at this site for the purposes proposed and QA/QC procedures approved by EPA will be used. If the laboratory is not in the CLP program, a laboratory QA program must be submitted for EPA review and approval. EPA may require that the respondent submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment, and material specifications. The respondent will provide assurances that EPA has access to laboratory personnel, equipment, and records for sample, collection, transportation, and analysis.

Site Health and Safety Plan

A health and safety plan will be prepared in conformance with the respondent's health and safety program, and in compliance with OSHA regulations and protocols. The health and safety plan will include the eleven (11) elements described in the RI/FS Guidance, such as a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. It should be noted that EPA does not "approve" the respondent's health and safety plan, but rather EPA reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

TASK 2 - COMMUNITY RELATIONS

The development and implementation of community relations activities are the responsibility of EPA. The critical community relations planning steps performed by EPA include conducting community interviews and developing a community relations plan. Although implementation of the community relations plan is the responsibility of EPA, the respondent may assist by providing information regarding the site's history, participating in public meetings, or by preparing fact sheets for distribution to the general public. Two or more baseline risk assessment memoranda will be prepared by EPA which will summarize the toxicity assessment and exposure assessment components of the baseline risk assessment. EPA will make these memoranda available to all interested parties for comment and place them in the Administrative Record. (EPA is not required, however, to formally respond to significant comments except during the formal public comment period on the proposed plan.) In addition, the respondent may establish a community information repository, at or near the site, to house one copy of the administrative record. The extent of PRP involvement in community relations activities is left to the discretion of EPA. The respondents' community relations responsibilities, if any, are specified in the community relations plan. All PRP-conducted community relations activities will be subject to oversight by EPA.

TASK 3 - SITE CHARACTERIZATION

As part of the RI, the respondent will perform the activities described in this task, including the preparation of a site characterization summary and a RI report. The overall objective of site characterization is to describe areas of a site that may pose a threat to human health or the environment. This is accomplished by first determining a site's physiography, geology, and hydrology. Surface and subsurface pathways of migration will be defined. The respondent will identify the sources of contamination and define the nature, extent, and volume of the sources of contamination, including their physical and chemical constituents as well as their concentrations at incremental locations to background in the affected media. The respondent will also investigate the extent of migration of this contamination as well as its volume and any changes in its physical or chemical characteristics, to provide for a

comprehensive understanding of the nature and extent of contamination at the site. Using this information, contaminant fate and transport is then determined and projected.

During this phase of the RI/FS, the work plan, SAP, and health and safety plan are implemented. Field data are collected and analyzed to provide the information required to accomplish the objectives of the study. The respondent will notify EPA at least two weeks in advance of the field work regarding the planned dates for field activities, including ecological field surveys, field layout of the sampling grid, excavation, installation of wells, initiating sampling, installation, and calibration of equipment, pump tests, and initiation of analysis and other field investigation activities. The respondent will demonstrate that the laboratory and type of laboratory analyses that will be utilized during site characterization meets the specific QA/QC requirements and the DQOs of the site investigation as specified in the SAP. In view of the unknown site conditions, activities are often iterative, and to satisfy the objectives of the RI/FS it may be necessary for the respondent to supplement the work specified in the initial work plan. In addition to the deliverables below, the respondent will provide a monthly progress report and participate in meetings at major points in the RI/FS.

a. Field Investigation

The field investigation includes the gathering of data to define site physical and biological characteristics, sources of contamination, and the nature and extent of contamination at the site. These activities will be performed by the respondent in accordance with the work plan and SAP. At a minimum, this shall address the following:

Implement and document field support activities

The respondent will initiate field support activities following approval of the work plan and SAP. Field support activities may include obtaining access to the site, scheduling, and procuring equipment, office space, laboratory services, and/or contractors. The respondent will notify EPA at least two weeks prior to initiating field support activities so that EPA may adequately schedule oversight tasks. The respondent will also notify EPA, in writing, upon completion of field support activities.

Investigate and define site physical and biological characteristics

The respondent will collect data on the physical and biological characteristics of the site and its surrounding areas, including the physiography, geology, and hydrology, and specific physical characteristics identified in the work plan. This information will be ascertained through a combination of physical measurements, observations, and sampling efforts, and will be utilized to define potential transport pathways and human and ecological receptor populations. In defining the site's physical characteristics the respondent will also obtain sufficient engineering data (such as river/reservoir characteristics) for the projection of contaminant fate and transport, and development and

screening of remedial action alternatives, including information to assess treatment technologies.

Define sources of contamination

The respondent will locate each source of contamination. For each location, the areal extent and depth of contamination will be determined by sampling at incremental depths on a sampling grid. The physical characteristics and chemical constituents and their concentrations will be determined for all known and discovered sources of contamination. The respondent shall conduct sufficient sampling to define the boundaries of the contaminant sources to the level established in the QA/QC plan and DQOs.

Defining the source of contamination will include analyzing the potential for contaminant release (e.g., long term leaching from soil), contaminant mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess treatment technologies.

Describe the nature and extent of contamination

The respondent will gather information to describe the nature and extent of contamination as a final step during the field investigation. To describe the nature and extent of contamination, the respondent will utilize the information and site physical and biological characteristics and sources of contamination to give a preliminary estimate of the contaminants that may have migrated. The respondent will then implement an iterative monitoring program and any study program identified in the work plan or SAP such that by using analytical techniques sufficient to detect and quantify the concentration of contaminants, the migration of contaminants through the various media at the site can be determined. In addition, the respondent will gather data for calculations of contaminant fate and transport. This process is continued until the area and depth of contamination are known to the level of contamination established in the QA/QC plan and DQOs. EPA will use the information on the nature and extent of contamination to determine the level of risk presented by the site. Respondent will use this information to help to determine aspects of the appropriate remedial action alternatives to be evaluated.

b. Data Analyses

Evaluate site characteristics

The respondent will analyze and evaluate the data to describe: (1) site physical and biological characteristics; (2) contaminant source characteristics; (3) nature and extent of contamination; and (4) contaminant fate and transport. Results of the site physical characteristics, source characteristics, and extent of contamination analyses are utilized in the analysis of contaminant fate and transport. The evaluation will include the actual and

potential magnitude of releases from the sources, and horizontal and vertical spread of contamination as well as mobility and persistence of contaminants. Where modeling is appropriate, such models shall be identified to EPA in a technical memorandum prior to their use. All data and programming, including any proprietary programs, shall be made available to EPA together with a sensitivity analysis. The RI data shall be presented in a format (i.e., computer disc or equivalent) to facilitate EPA's preparation of the baseline risk assessment. The Respondent shall agree to discuss and then collect any data gaps identified by EPA that is needed to complete the baseline risk assessment. (See "Guidance for Data Usability in Risk Assessment - OSWER Directive # 9285.7-05 - October 1990.) Also, this evaluation shall provide any information relevant to site characteristics necessary for evaluation of the need for remedial action in the baseline risk assessment and for the development and evaluation of remedial alternatives. Analyses of data collected for site characterization will meet the DQOs developed in the QA/QC plan stated in the SAP (or revised during the RI).

c. Data Management Procedures

The respondent will consistently document the quality and validity of field and laboratory data compiled during the RI.

Document field activities

Information gathered during site characterization will be consistently documented and adequately recorded by the respondent in well-maintained field logs and laboratory reports. The method(s) of documentation must be specified in the work plan and/or the SAP. Field logs must be utilized to document observations, measurements, and significant events that have occurred during field activities. Laboratory reports must document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

Maintain sample management and tracking

The respondent will maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated analytical data are reported and utilized in the development and evaluation of remedial alternatives. Analytical results developed under the work plan will not be included in any site characterization reports unless accompanied by or cross-referenced to a corresponding QA/QC report. In addition, the respondent will establish a data security system to safeguard chain-of-custody forms and other project records to prevent loss, damage, or alteration of project documentation.

d. Site Characterization Deliverables

The respondent will prepare the preliminary site characterization summary and once the baseline risk assessment (Task 4) is complete, the remedial investigation report.

Preliminary Site Characterization Summary

After completing field sampling and analysis, the respondent will prepare a concise site characterization summary. This summary will review the investigative activities that have taken place, and describe and display site data documenting the location and characteristics of surface and subsurface features and contamination at the site, including the affected medium, location, types, physical state, concentration of contaminants and quantity. In addition, the location, dimensions, physical condition and varying concentrations of each contaminant throughout each source, and the extent of contaminant migration through each of the affected media will be documented. The site characterization summary will provide EPA with a preliminary reference for developing the risk assessment, and evaluating the development and screening of remedial alternatives, and the refinement and identification of ARARs.

Remedial Investigation (RI) Report

The respondent will prepare and submit a draft RI report to EPA for review and approval. after completion of the baseline risk assessment (see Task 4). This report shall summarize results of field activities to characterize the site, sources of contamination, nature and extent of contamination, and the fate and transport of contaminants. The respondent will refer to the RI/FS Guidance for an outline of the report format and contents. Following comment by EPA, the respondent will prepare a final RI report which satisfactorily addresses EPA's comments.

TASK 4 - TREATABILITY STUDIES

Treatability testing will be performed by the respondent to assist in the detailed analysis of alternatives. In addition, if applicable, testing results and operating conditions will be used in the detailed design of the selected remedial technology. The following activities will be performed by the respondent.

a. Determination of Candidate Technologies and of the Need for Testing

The respondent will identify in a technical memorandum, subject to EPA review and approval, candidate technologies for a treatability studies program during project planning (Task 1). The listing of candidate technologies will cover the range of technologies required for alternatives analysis (Task 6.a.) The specific data requirements for the testing program will be determined and refined during site characterization and the development and screening of remedial alternatives (Tasks 2 and 6, respectively).

Conduct literature survey and determine the need for treatability testing

The respondent will conduct a literature survey to gather information of performance, relative costs, applicability, removal efficiencies, operation and maintenance (O&M) requirements, and implementability of candidate technologies. If practical candidate technologies have not been sufficiently demonstrated, or cannot be adequately evaluated for this site on the basis of available information, treatability testing will be conducted. Where it is determined by EPA that treatability testing is required, and unless the respondent can demonstrate to EPA's satisfaction that they are not needed, the respondent will submit a statement of work to EPA outlining the steps and data necessary to evaluate and initiate the treatability testing program.

Evaluation treatability studies

Once a decision has been made to perform treatability studies, the respondent and EPA will decide on the type of treatability testing to use (e.g., bench versus pilot). Because of the time required to design, fabricate, and install pilot scale equipment as well as perform testing for various operating conditions, the decision to perform pilot testing should be made as early in the process as possible to minimize potential delays of the FS. To assure that a treatability testing program is completed on time, and with accurate results, the respondent will either submit a separate treatability testing work plan or an amendment to the original site work plan for EPA review and approval.

b. Treatability Testing and Deliverables

The deliverables that are required, in addition to the memorandum identifying candidate technologies, where treatability testing is conducted, include a work plan, a sampling and analysis plan, and a final treatability evaluation report. EPA may also require a treatability study health and safety plan, where appropriate.

Treatability testing work plan

The respondent will prepare a treatability testing work plan or amendment to the original site work plan for EPA review and approval describing the site background, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for treatability testing should be documented as well. If pilot scale treatability testing is to be performed, the pilot scale work plan will describe pilot plant installation and start-up, pilot plant operation and maintenance procedures, operating conditions to be tested, a

sampling plan to determine pilot plant performance, and a detailed health and safety plan. If testing is to be performed off-site, permitting requirements will be addressed.

Treatability study SAP

If the original QAPP or FSP is not adequate for defining the activities to be performed during the treatability tests, a separate treatability study SAP or amendment to the original site SAP will be prepared by the respondent for EPA review and approval. Task 1, Item c. of this statement of work provides additional information on the requirements of the SAP.

Treatability study health and safety plan

If the original health and safety plan is not adequate for defining the activities to be performed during the treatment tests, a separate or amended health and safety plan will be developed by the respondent. Task 1, Item c, of this statement of work provides additional information on the requirements of the health and safety plan. EPA does not "approve" the treatability study health and safety plan.

Treatability study evaluation report

Following completion of treatability testing, the respondent will analyze and interpret the testing results in a technical report to EPA. Depending on the sequence of activities, this report may be a part of the RI/FS report or a separate deliverable. The report will evaluate each technology's effectiveness, implementability, cost, and actual results as compared with predicted results. The report will also evaluate full scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

TASK 5 - DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

The development and screening of remedial alternatives is performed to develop an appropriate range of waste management options that will be evaluated. This range of alternatives should include, as appropriate, options in which treatment is used to reduce the toxicity, mobility, or volume of wastes, but varying in the types of treatment, the amount treated, and the manner in which long-term residuals or untreated wastes are managed; options involving containment with little or no treatment; options involving both treatment and containment; and a no-action alternative. The following activities will be performed by the respondent as a function of the development and screening of remedial alternatives.

a. Development and Screening of Remedial Alternatives

The respondent will begin to develop and evaluate a range of appropriate waste management options that, at a minimum, ensure protection of human health and the environment, concurrent with the RI site characterization task.

Refine and document remedial action objectives

Based on EPA's baseline risk assessment, the respondent will review and, if necessary, modify the site-specific remedial action objectives, specifically the PRG. The revised PRGs will be documented in a technical memorandum that will be reviewed and approved by EPA. These modified PRGs will specify the contaminants and media of interest, exposure pathways and receptors, and an acceptable contaminant level or range of levels (at particular locations for each exposure route).

Develop general response actions

The respondent will develop general response actions for each medium of interest defining containment, treatment, excavation, pumping, or other actions, singly or in combination, to satisfy the remedial action objectives.

Identify areas or volumes of media

The respondent will identify areas or volumes of media to which general response actions may apply, taking into account requirements for protectiveness as identified in the remedial action objectives. The chemical and physical characterization of the site will also be taken into account.

Identify, screen, and document remedial technologies

The respondent will identify and evaluate technologies applicable to each general response action to eliminate those that cannot be implemented at the site. General response actions will be refined to specify remedial technology types. Technology process options for each of the technology types will be identified either concurrent with the identification of technology types, or following the screening of the considered technology types. Process options will be evaluated on the basis of effectiveness, implementability, and cost factors to select and retain one or, if necessary, more representative processes for each technology type. The technology types and process options will be summarized for inclusion in a technical memorandum. The reasons for eliminating alternatives must be specified.

Assemble and document alternatives

The respondent will assemble selected representative technologies into alternatives for each affected medium or operable unit. Together, all of the alternatives will represent a range of treatment and containment combinations that will address either the site or the

operable unit as a whole. A summary of the assembled alternatives and their related action-specific ARARs will be prepared by the respondent for inclusion in a technical memorandum. The reasons for eliminating alternatives during the preliminary screening process must be specified.

Refine alternatives

The respondent will refine the remedial alternatives to identify contaminant volume addressed by the proposed process and sizing of critical unit operations as necessary. Sufficient information will be collected for an adequate comparison of alternatives. PRGs for each chemical in each medium will also be modified as necessary to incorporate any new risk assessment information presented in EPA's baseline risk assessment information presented in EPA's baseline risk assessment report. Additionally, action-specific ARARs will be updated as the remedial alternatives are refined.

Conduct and document screening evaluation of each alternative

The respondent may perform a final screening process based on short- and long-term aspects of effectiveness, implementability, and relative cost. Generally, this screening process is only necessary when there are many feasible alternatives available for detailed analysis. If necessary, the screening of alternatives will be conducted to assure that only the alternatives with the most favorable composite evaluation of all factors are retained for further analysis. As appropriate, the screening will preserve the range of treatment and containment alternatives that was initially developed. The range of remaining alternatives will include options that use treatment technologies and permanent solutions to the maximum extent practicable. The respondent will prepare a technical memorandum summarizing the results and reasoning employed in screening, arraying alternatives that remain after screening, and identifying the action-specific ARARs for the alternatives that remain after screening.

b. Alternatives Development and Screening Deliverables

The respondent will prepare a technical memorandum summarizing the work performed in and the results of each task above, including an alternatives array summary. These will be modified by the respondent if required by EPA's comments to assure identification of a complete and appropriate range of viable alternatives to be considered in the detailed analysis. This deliverable will document the methods, rationale, and results of the alternatives screening process.

TASK 6 - DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

The detailed analysis will be conducted by the respondent to provide EPA with the information needed to allow for the selection of a site remedy. This analysis is the final task to be performed by the respondent during the FS.

a. Detailed Analysis of Alternatives

The respondent will conduct a detailed analysis of alternatives which will consist of an analysis of each option against a set of nine evaluation criteria and a comparative analysis of all options using the same evaluation criteria as a basis for comparison.

Apply nine criteria and document analysis

The respondent will apply nine evaluation criteria to the assembled remedial alternatives to ensure that the selected remedial alternative will be protective of human health and the environment; will be in compliance with, or include a waiver of, ARARs; will be cost-effective; will utilize permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable; and will address the statutory preference for treatment as a principal element. The evaluation criteria include: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume; (5) short-term effectiveness; (6) implementability; (7) costs; (8) state (or support agency) acceptance; and (9) community acceptance. (Note: Criteria 8 and 9 are considered after the RI/FS report has been released to the general public.) For each alternative, the respondent should provide: (1) a description of the alternative that outlines the waste management strategy involved and identifies the key ARARs associated with each alternative; and (2) a discussion of the individual criterion assessment. If the respondent does not have direct input on Criteria 8 state (or support agency) acceptance and (9) community acceptance, these will be addressed by EPA.

Compare alternatives against each other and document the comparison of alternatives

The respondent will perform a comparative analysis between the remedial alternatives. That is, each alternative will be compared against the others using the evaluation criteria as a basis of comparison. Identification and selection of the preferred alternative are reserved by EPA. The respondent will prepare a technical memorandum summarizing the results of the comparative analysis.

b. Detailed Analysis Deliverables

In addition to the technical memorandum summarizing the results of the comparative analysis, the respondent will submit a draft FS report to EPA for review and approval. Once

EPA's comments have been addressed by the respondent to EPA's satisfaction, the final FS report may be bound with the final RI report.

Feasibility study report

The respondent will prepare a draft FS report for EPA review and comment. This report, as ultimately adopted or amended by EPA, provides a basis for remedy selection by EPA and documents the development and analysis of remedial alternatives. The respondent will refer to the RI/FS Guidance for an outline of the report format and the required report content. The respondent will prepare a final FS report which satisfactorily addresses EPA's comments.

REFERENCES FOR CITATION

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RI/FS process:

The (revised) National Oil and Hazardous Substance Pollution Contingency Plan (NCP).

"Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01.

"Interim Guidance on Potentially Responsible Party Participation in Remedial investigation and Feasibility Studies", U.S. EPA, Office of Waste Programs Enforcement, Appendix A to OSWER Directive No. 9355.3-01.

"Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies", U.S. EPA, Office of Waste Programs Enforcement, OSWER Directive No. 9835.3.

"A Compendium of Superfund Field Operations Methods", Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.

"EPA NEIC Policies and Procedures Manual", May 1978, revised November 1984, EPA-330/9-78-991-R.

"Data Quality Objectives for Remedial Response Activities", U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987, OSWER Directive No. 9335.0-7B.

"Guidelines and Specifications for Preparing Quality Assurance Project Plans", U.S. EPA, Office of Research and Development,, Cincinnati, Ohio, QAMS-004/80, December 29, 1980.

"Interim Guidelines and Specifications for preparing Quality Assurance Project Plans", U.S. EPA, Office of Emergency and Remedial Response, QAMS-005/80, December 1980.

"Users Guide to the EPA Contract Laboratory Program:, U.S. EPA, Sample Management Office, August 1982.

"Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements", U.S. EPA, Office of Emergency and Remedial Response, July 9, 1987, OSWER Directive No. 9234.0-05.

"CERCLA Compliance with Other Laws Manual", Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, August 1988 (draft), OSWER Directive No. 9234.1-01 and -02.

"Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites", U.S. EPA, Office of Emergency and Remedial Response, (draft), OSWER Directive No. 9283.1-2.

"Draft Guidance on Preparing Superfund Decision Documents", U.S. EPA, Office of Emergency and Remedial Response, March 1988, OSWER Directive No. 9355.3-02.

"Risk Assessment Guidance for Superfund--Volume I, Human Health Evaluation Manual (Part A)", December 1989, EPA/540/1-89/002.

"Risk Assessment Guidance for Superfund--Volume II Environmental Evaluation Manual", March 1989, EPA/540/1-89/001.

"Guidance for Data Usability in Risk Assessment", October 1990, EPA/540/G-90/008.

"Performance of Risk Assessments in Remedial Investigation/ Feasibility Studies (RI/FSs) Conducted by Potentially Responsible Parties (PRPs)", August 28, 1990, OSWER Directive No. 9835.15.

"Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions", April 22, 1991, OSWER Directive No. 9355.0-30.

"Health and Safety Requirements of Employees Employed in Field Activities", U.S. EPA, Office of Emergency and Remedial Response, July 12, 1981, EPA Order No. 1440.2.

OSHA Regulations in 29 CFR 1910.120 (Federal Register 45654, December 19, 1986).

"Interim guidance on Administrative Records for Selection of CERCLA Response Actions", U.S. EPA, Office of Waste Programs Enforcement, March 1, 19889, OSWER Directive No. 9833.3A.

"Community Relations in Superfund: A Handbook", U.S. EPA, Office of Emergency and Remedial Response, June 1988, OSWER Directive No. 9320.0-03B.

"Community Relations During Enforcement Activities and Development of the Administrative Record", U.S. EPA, Office of Waste Programs Enforcement, November 1988, OSWER Directive No. 9836.0-1A.

STATEMENT OF WORK FOR
REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES
UPPER COLUMBIA RIVER SITE
Deliverables List

Site Characterization

Existing Site Information (and Data Quality review) and Potential Site Risks*

Data Gap Analysis, to include a preliminary Conceptual Site Model, and preliminary Data Quality Objectives ***

Preliminary Remedial Action Objectives and Applicable and/or Relevant and Appropriate Requirements

Proposed Modeling Approach

Preliminary Treatability Study Determination

Remedial Investigation and Feasibility Study (RI/FS) Planning*

RI/FS Work Plan

Sampling and Analysis Plan (including a Field Sampling Plan and Quality Assurance Project Plan)

Health and Safety Plan

Data Management Plan

Site Characterization

Evaluation of Site Characteristics*

Contaminant Source Evaluation

Site Characterization Report (including revised Conceptual Model)

Remedial Investigation Report*

Treatability Studies

Determination of Candidate Technologies and of the Need for Testing

Treatability Testing Work Plan
Treatability Testing Sampling and Analysis Plan

Treatability Evaluation Report*

Development and Screening of Remedial Alternatives

Refine Remedial Action Objectives*

Develop General Response Actions

Identify Areas and/or Volumes*

Identify, Screen, and Document Remedial Technologies

Assemble Alternatives

Refine Alternatives

Conduct Screening Evaluation of Each Alternative*

Alternatives Array Summary

Detailed Analysis of Remedial Alternatives

Comparative Analysis

Feasibility Study Report*

***** These deliverables require both a draft (for agency comment) and final document

******* The Conceptual Site Model must address, but not limited to both geochemical processes and contaminant fate and transport