

## ATTACHMENT C

### REMEDIAL INVESTIGATION/FEASIBILITY STUDY SCOPE OF WORK

#### I. SCHEDULE

Metro shall submit for DEQ review and approval Remedial Investigation (RI), Risk Assessment (RA) and Feasibility Study (FS) work plans and reports which address all elements of this Scope of Work (SOW). Elements of the SOW may be addressed by alternative means or by using existing data or information to the extent that the data are applicable, meet the objectives of the RI/FS, and are of acceptable quality.

All work completed under this order shall proceed in general accordance with the schedule below. However, upon DEQ's and Metro's mutual agreement, the schedule may be modified as needed to allow for public meetings and implementation of other public outreach activities.

<b>Draft RI Proposal</b>	To DEQ within <b>120</b> days of issuance of this order.
<b>Metro/DEQ Meeting</b>	Within <b>15</b> days of receipt of Draft RI Proposal.
<b>DEQ Review and comment</b>	Within <b>30</b> days of receipt of the Draft RI proposal.
<b>Final RI Proposal</b>	Within <b>15</b> days of Metro's receipt of DEQ review and comments.
<b>Draft RI Work Plan</b>	To DEQ within <b>60</b> days of receipt of the final RI Proposal.
<b>Metro/DEQ Meeting</b>	Within <b>15</b> days of receipt of the draft RI Work Plan DEQ will meet with Metro to discuss RI Work plan content and scope.
<b>DEQ Review and Comment</b>	Within <b>30</b> days of receipt of draft work plan DEQ will provide review comments.
<b>Final RI Work Plan</b>	To DEQ within <b>30</b> days of Metro's receipt of DEQ's review comments.
<b>Initiation of RI</b>	To be specified in Project Management section of RI Work Plan.
<b>Completion of RI/FS</b>	The RI/FS must be completed within <b>4</b> years of issuance of this Consent Order

As indicated in the table above, DEQ will review and comment within 30 days of receipt of the draft RI proposal, the draft RI work plan and any associated work products. The schedule for additional deliverables specified in this SOW (e.g. Risk Assessment work plan, Feasibility Study work plan, Remedial Investigation report, Risk

Assessment report and Feasibility Study report) should be specified in the Project Management Plan section of the RI work plan.

All work plans may be amended by Metro as necessary to reflect or incorporate newly discovered information and/or environmental conditions. Additional work plans and work plan amendments are subject to DEQ review and approval and shall be processed according to schedules negotiated between the parties at the time of each phase change or task addition. Metro shall initiate and complete work according to the schedule specified in the applicable approved work plan or amendment.

## **II. OBJECTIVES**

- A. Work performed under this Consent Order shall complement and incorporate existing site information. The overall objectives shall be as follows:
  - 1. Identify the hazardous substances which have been released to the environment.
  - 2. Determine the nature, extent and distribution of hazardous substances in affected media on- and off-site.
  - 3. Determine the direction and rate of migration of hazardous substances.
  - 4. Identify migration pathways and receptors.
  - 5. Determine the risk to human health and/or the environment.
  - 6. Identify hot spots of contamination.
  - 7. Develop the information necessary to evaluate remedial action alternatives and select a remedial action.
  - 8. Generate or use data of sufficient quality for site characterization, risk assessment, and the subsequent analysis, and selection of remedial alternatives.
- B. Additional specific RI objectives will be developed in the RI Proposal based on review and analysis of existing and available information.

## **III. RI PROPOSAL**

The RI Proposal shall discuss Metro's proposed approach to the RI, addressing soil, groundwater, surface water, sediments, and air. The proposal will provide the framework for the RI Work Plan and will include at a minimum, a summary of data collected to date, a conceptual site model (including a conceptual site hydrogeologic model), and a description of proposed investigation tasks, phases, and schedule necessary to satisfy the objectives of this SOW.

The proposal shall address landfill features and site hydrogeologic characteristics, including but not limited to the following:

1. Heterogeneity and anisotropy of the overbank silt deposits (OBS), including hydraulic properties of sand lenses present within the OBS.
2. Leachate distribution within the landfill, including hydraulic head relationships and vertical hydraulic gradients at and below the landfill's base.
3. Vertical hydraulic gradients in the Pleistocene Gravel (PG) aquifer, in the Columbia River sand (CRS), and in the OBS near the PSU-Groundwater-Model predicted leachate impacted area.
4. Seasonal groundwater flow maps for the OBS and PG units (including CRS where present), and cross-sectional flow nets for the OBS from actual water level measurements to verify computer model predictions and help assess potential off-site sources of contamination.
5. Installation of monitoring wells necessary to determine groundwater chemistry in the model-predicated area of leachate impact in the PG aquifer, beneath the landfill footprint in the upper layers of the OBS, and west of the landfill near monitoring well G-6 in the upper, middle and lower portions of the OBS.
6. Installation of additional monitoring wells in the PG aquifer as needed to characterize contamination of the aquifer on a site-wide scale.
7. The current physical condition and performance of the final cover system.

In addition, the development of RI objectives shall address the landfill's potential impacts to surface water and sediment including: analysis of existing surface water and sediment data; further sampling and analysis of sediments and surface water as needed to characterize landfill impacts; analysis of contaminants in groundwater wells adjacent to surface water; and, where feasible, direct analysis of contaminants in groundwater seepage within the zone of interaction between groundwater and surface water. The surface water and sediment impacts analysis shall assess the changes to landfill-impacted media due to the existing water control structure's replacement. Specifically, this analysis shall evaluate the following:

- The effects of changes in tidal fluctuations and lake levels on groundwater flow, and on the quality of landfill-impacted groundwater, surface water, and sediments.
- The characteristics, fate, and environmental impact of any landfill-impacted sediments (near-surface or subsurface) that may be disturbed or moved by operation of the planned water-control structure, or by natural processes.

#### **IV. REMEDIAL INVESTIGATION WORK PLAN**

The work plan shall be developed in accordance with applicable Oregon Administrative Rules (OAR 340-122-010 through -115), DEQ guidance and the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, OSWER Directive 9355.3-01, 1988, as appropriate. Existing data may be used if it meets data quality objectives for the RI/FS. The submitted work plan shall include, but not be limited to the following items:

##### **A. PROJECT MANAGEMENT PLAN**

The RI Work Plan shall include a proposed schedule for submittals and implementation of all proposed activities and phases pertaining to this scope of work (this schedule will include target dates for the submittal of a Risk Assessment work plan, Feasibility Study work plan, and submittal of draft and final Remedial Investigation, Risk Assessment and Feasibility Study reports); a description of the personnel (including subcontractors, if known) involved in the project, and their respective roles in the project; and a discussion of how variations from the approved work plan will be managed.

## **B. SITE DESCRIPTION**

The RI work plan shall include a discussion of the current understanding of the physical setting of the site and surrounding area; the site history; hazardous substance and waste management history; and current site conditions.

## **C. SITE CHARACTERIZATION PLAN**

The Site Characterization plan shall be consistent with DEQ guidance and the requirements specified in OAR 340-122-080. The site characterization plan shall include, but not be limited to, characterization of the hazardous substances, characterization of the facility, identification of potential receptors and the collection and evaluation of information relevant to the identification of hot spots of contamination, and shall address the following:

### **1. Soils**

Objective: To identify and characterize releases of hazardous substances from the facility to soils.

Scope: The plan shall supplement previous soil sampling at the facility. The plan shall address all areas which could potentially have received spills, leaks from tanks or piping, been used for waste treatment or disposal, or have been affected by contaminated surface water or storm water runoff, and all other areas where soil contamination is known or suspected.

Procedures: The plan shall be designed and conducted to determine the vertical and lateral extent of soil contamination, characterize the site geology, determine the physical and chemical soil characteristics relevant to the RI, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing soil.

### **2. Groundwater**

Objective: To identify and characterize releases of hazardous substances and other non-hazardous substances that might affect the beneficial water uses within the locality of the facility, or otherwise characterize the geochemical characteristics of groundwater within the locality of the facility.

Scope: The plan shall supplement previous investigations at the facility and shall identify and characterize all past, current and potential releases of hazardous substances to groundwater.

Procedures: The plan shall be designed and conducted to determine the vertical and lateral extent of groundwater contamination, both on and, if applicable, off-site; characterize the site hydrogeology, determine the physical and chemical water bearing zone characteristics relevant to the RI; evaluate the potential for contaminant migration through groundwater; and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing groundwater. Alternative methods for characterizing groundwater should be considered to accelerate the RI. Monitoring wells and other holes must be drilled, constructed and decommissioned in accordance with OAR Chapter 690, Division 240 and DEQ “Ground Water Monitoring Well, Drilling, Construction and Decommissioning” guidelines (DEQ 1992). Continuous core samples shall be obtained from test borings and monitoring well borings.

### 3. **Surface Water and Sediments**

Objective: To identify and characterize releases of hazardous substances from the facility to surface water and sediments.

Scope: The plan shall supplement previous investigations at the facility and shall identify and characterize all past, current, and potential impacts to surface waters and sediments.

Procedures: At a minimum, the plan shall delineate past and present surface drainage patterns at the site and evaluate whether surface water and sediments may have been impacted by the facility. Unless this evaluation is sufficient to demonstrate that surface water or sediment quality has not been impacted, an appropriate surface water and sediment characterization plan shall be prepared. The plan shall be designed to delineate the nature and extent of contamination, characterize the site hydrology, determine the physical and chemical surface water and sediment characteristics relevant to the RI, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing surface water and sediments.

### 4. **Air**

Objective: To identify and characterize the release of hazardous substances to the air, from soil, surface water, or groundwater contamination at the facility.

Scope: The plan shall supplement previous investigations at the facility and shall identify and characterize all past, current and potential releases (e.g. contaminated soil or groundwater) of hazardous substances to air.

Procedures: The plan shall include the proposed methodology for evaluating air emissions using appropriate emission calculations and/or a field sampling program. The plan shall be designed to delineate the nature and extent of contamination, characterize the site climatology, determine the physical and chemical air characteristics relevant to the RI, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination.

### 5. **Identification of Current and Reasonably Likely Future Land and Water Use**

Objective: To identify current and reasonably likely future land and water uses in the locality of the facility.

Scope: The plan shall be designed to identify current and reasonably likely future land and water uses for the purposes of identifying hot spots of contamination and conducting the baseline human health and ecological risk assessments based on OAR 340-122-080 and DEQ Guidance.

Procedures: The plan shall include the proposed methodology for identifying current and reasonably likely future land and water uses in the locality of the facility.

#### **D. SAMPLING AND ANALYSIS PLAN (SAP)**

Objective: To adequately document all supplemental (RI/FS) sampling and analysis procedures not already addressed in the DEQ approved Environmental Monitoring Plan (EMP).

Scope: In preparation of the SAP, the following guidance documents shall be utilized: Data Quality Objectives for Remedial Response Activities, EPA/540/G-87/004 (OSWER Directive 9355.0-7B), March, 1987; Test Methods for Evaluating Solid Waste, SW-846; and A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001 (OSWER Directive 9355.0-14), December 1987. The SAP shall address all topics listed in Environmental Cleanup Division Policy #760.000, Quality Assurance Policy.

Procedures: The work plan shall include a sampling and analysis plan (SAP). The SAP shall include quality assurance and quality control (QA/QC) procedures for both field and lab procedures. The SAP shall be sufficiently detailed to function as a manual for field staff.

#### **E. HEALTH AND SAFETY PLAN (HASP)**

Objective: To establish policies and procedures to protect workers and the public from the potential hazards posed by a hazardous materials site.

Scope: The HASP portion of the work plan shall comply with 29 CFR 1910.120 and OAR Chapter 437, Division 2.

Procedures: The HASP shall include a description of risks related to RI activities, protective clothing and equipment, training, monitoring procedures, decontamination procedures and emergency response actions.

#### **F. MAPS**

The work plan shall include a map or maps of the facility which clearly shows site topography, on-site structures, waste disposal areas, surface water, and proposed sampling locations.

### **V. RISK ASSESSMENT WORK PLAN**

#### **A. HUMAN HEALTH RISK ASSESSMENT PLAN**

Objective: To evaluate the collective demographic, geographic, physical, chemical, and biological factors at the site, for the purposes of characterizing current or reasonably likely future risks to human health as a result of a threatened or actual release(s) of a hazardous substance; documenting the magnitude of the potential risk at a site; supporting risk management decisions; and establishing remedial action goals if necessary.

Scope: The human health risk assessment shall evaluate risk in the context of current and reasonably likely future land and water uses and in the absence of any actions to control or mitigate these risks (i.e., under an assumption of no action). The human health risk assessment portion of the work plan shall be developed based on the requirements specified in OAR 340-122-084, DEQ guidance, the Risk Assessment Guidance for Superfund - Human Health Evaluation Manual Part A, United States Environmental Protection Agency (EPA), Interim Final, July 1989, (RAGS-HHEM); Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors", EPA, March 1991, (HHE-SG); and the Exposure Factors Handbook, EPA, 1996. A suggested outline for the human health evaluation is given in Exhibit 9-1 of the RAGS-HHEM. The work plan should use this outline as a framework for discussing the methodologies and assumptions to be used in assessing the potential human health risks at the site.

Procedure: The plan shall describe the different tasks involved in preparing the human health risk assessment. The human health risk assessment can be completed using either deterministic or probabilistic methodologies. If probabilistic methodologies are to be used, then Metro shall discuss risk protocol with DEQ before the commencement of a probabilistic risk assessment. If deterministic methodologies are to be used, then the human health risk assessment shall include an estimate of both the central tendency exposure (CTE) and the reasonable maximum exposure (RME) expected to occur under both current and future land use conditions. In general, RME exposures should be based on the 90th percentile exposure case. Additional guidance on quantifying the RME is given in Chapter 6 of the RAGS-HHEM, SRAGS, and HHE-SG. Quantifying the potential risks associated with the RME shall be the overall goal of the risk assessment.

## **B. ECOLOGICAL RISK ASSESSMENT PLAN**

Objective: To evaluate the collective demographic, geographic, physical, chemical, and biological factors at the site, for the purposes of characterizing current or reasonably likely future risks to the environment as a result of a threatened or actual release(s) of a hazardous substance; documenting the magnitude of the potential risk at a site; supporting risk management decisions; and establishing remedial action goals if necessary.

Scope: The ecological risk assessment shall evaluate risk in the context of current and reasonably likely future land and water uses and in the absence of any actions to control or mitigate these risks (i.e., under an assumption of no action). The ecological risk assessment will use a tiered approach (with four levels) to produce a focused and cost-effective assessment of risk. The ecological risk assessment work plan shall be developed based on the requirements specified in OAR 340-122-084; DEQ guidance; Proposed Guidelines for Ecological Risk Assessment, EPA, September 1996; Framework for Ecological Risk Assessment, EPA, February 1992; and Risk Assessment Guidance for Superfund, Volume II, Environmental Evaluation Manual, Interim Final, EPA, March 1989 (RAGS-EEM). The ecological risk assessment plan shall consider but not be limited to the following list of fish and wildlife species:

- a. benthic macroinvertebrates

- b. mussels
- c. crayfish
- d. juvenile salmonids
- e. amphibians
- f. western painted turtle
- g. great blue heron
- h. osprey
- i. savannah sparrow
- i. river otter

Procedure: The plan shall describe the different tasks involved in preparing the ecological risk assessment. Ecological risk assessments may include a level I scoping plan; a level II screening plan; and a level III baseline plan or level IV field baseline plan. The level III and level IV baseline plans shall include an exposure analysis, an ecological response analysis, a risk characterization and an uncertainty analysis as required by OAR 340-122-084(3). The ecological risk assessment can be completed using either deterministic or probabilistic methodologies. If probabilistic methodologies are to be used, then Respondent shall discuss risk protocol with DEQ before the commencement of a probabilistic risk assessment. If deterministic methodologies are to be used, then the ecological risk assessment shall include an estimate of both the central tendency exposure (CTE) and the reasonable maximum exposure (RME) expected to occur. Estimating the potential risks associated with the RME shall be the overall goal of the risk assessment.

## **VI. FEASIBILITY STUDY WORK PLAN**

Objective: To develop the information required to identify and evaluate remedial action alternatives and select or approve a remedial action to be taken at the facility.

Scope: The Feasibility Study (FS) shall be developed in accordance with the requirements specified in OAR 340-122-085 and 090, DEQ guidance, and Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01, 1988. The FS shall develop and evaluate an appropriate range of alternatives. The FS may be developed in parallel with Remedial Investigation (RI) activities or may be developed and submitted separately after commencement of RI activities.

Procedures: A work plan shall be submitted which will include, but not be limited to, the following:

### **A. PRELIMINARY EVALUATION OF REMEDIAL INVESTIGATION DATA**

The FS work plan shall include a preliminary evaluation of data collected during the RI. The evaluation should be used to identify preliminary remedial alternatives and additional data needs.

### **B. DESCRIPTION OF FS EVALUATION PROCESS**

The FS work plan shall include a description of how remedial alternatives will be developed, screened, and evaluated in detail, including identification of hot spots of contamination and completion of a residual risk assessment.

## VII. REPORTS

### A. QUARTERLY REPORTS

Three copies of the quarterly reports shall be submitted to DEQ by the 10th day of the month following the reporting period. The quarterly reports shall summarize activities performed, data results collected or received and problems encountered or resolved during the past quarter and activities planned for the upcoming quarter.

### B. REMEDIAL INVESTIGATION REPORT

The Remedial Investigation report shall follow the outline in Table 3-13 (page 3-30 - 3-31) in the CERCLA RI/FS guidance, as applicable, and address the items listed below:

1. **Executive Summary.**
2. **Introduction.**
3. **Site Background.** A discussion and supporting maps of facility operations, site description, site setting, and current and reasonably likely future land and water uses.
4. **Study Area Investigation.** A discussion of the investigative procedures and results for soil, groundwater, surface water, sediments and air.
5. **Summary and Conclusions.** A discussion of the nature, extent, distribution and environmental fate and transport of contaminants in soil, groundwater, surface water, sediments and air.
6. **Appendices.** Detailed information supporting the results of the Remedial Investigation shall be submitted in the Appendices of the report.

### C. RISK ASSESSMENT REPORT

#### 1. **Human Health Risk Assessment Report**

The results of the human health risk assessment should follow the outline suggested by the RAGS-HHEM (see Exhibit 9-1 of the RAGS-HHEM). Justification for not following the outline should be explained.

The main sections of the human health risk assessment report should include the following:

- i. Introduction.
- ii. Chemicals of Concern.
- iii. Exposure Assessment.

- iv. Toxicity Assessment.
- v. Risk Characterization.
- vi. Uncertainty analysis.

2. **Ecological Risk Assessment Report**

The main sections of the ecological risk assessment report should include the following:

- i. Problem Formulation.
- ii. Exposure analysis.
- iii. Ecological response analysis.
- iv. Risk characterization.
- v. Uncertainty analysis.

**D. FEASIBILITY STUDY REPORT**

The results of the Feasibility Study (FS) shall be submitted to DEQ in a report which, at a minimum, includes a full evaluation of remedial action alternatives. The FS shall provide a workable number of options, acceptable to DEQ, which achieve the remedial action objectives and are protective of public health, safety and welfare, and the environment.

The results of the FS should comply with OAR Chapter 340, Division 122, DEQ Guidance, and, as appropriate, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA OSWER Directive 9355.3-01, 1988. The results of the feasibility study should follow the outline suggested in Table 6-5 (Page 6-15) of the CERCLA RI/FS guidance.

The main sections of the FS report should include the following:

- 1. **Introduction**
- 2. **Identification of Hot Spots of Contamination.**
- 3. **Identification of Areas or Volumes of Media which Require Remedial Action.** Identify areas or volumes of media which exceed the acceptable risk level and areas or volumes of media which have been identified as hot spots of contamination.
- 4. **Development of Remedial Action Objectives.** Develop and discuss the remedial action objectives (RAOs) that meet the standards in OAR 340-122-040.

5. **Identification and Screening of Remedial Technologies.** Identify potential containment, treatment, and removal technologies and eliminate (screen) those technologies that cannot be implemented at the site.
6. **Development and Screening of Preliminary Remedial Action Alternatives.** Develop a range of preliminary remedial action alternatives acceptable to DEQ.
7. **Detailed Analysis of Remedial Action Alternatives.** Analyze remedial action alternatives in detail according to the requirements set forth in OAR 340-122-085 and 090.
8. **Comparative Analysis of Remedial Action Alternatives.**
9. **Recommended Remedial Action Alternative.** Recommend a remedial action alternative based on the comparative analysis of remedial action alternatives. Perform a residual risk assessment on the recommended alternative as specified in OAR 340-122-084(4).

**E. REPORT DISTRIBUTION.**

1. Three bound and one unbound copy of all reports should be submitted to DEQ.
2. DEQ requests that all copies be duplex printed on recycled paper.