

ATTACHMENT B

**SCOPE OF WORK FOR
SOURCE CONTROL and FEASIBILITY STUDY**

I. SCHEDULE

Respondent shall submit for DEQ review and approval a River Bank Source Control Evaluation (SCE) and, if necessary, an evaluation of alternatives for River Bank Source Control Measures (SCM) (i.e., alternatives analysis). Respondent shall also submit for DEQ review and approval plans for design and implementation of groundwater and stormwater SCMs and, if necessary, plans for the design and implementation of a River Bank SCM. DEQ has received Focused Feasibility Studies (FFS) on groundwater and stormwater from Respondent pursuant to DEQ Voluntary Agreement No. ECVC-WMCVC-NWR-97-14. The plans for design and implementation of the groundwater and stormwater SCMs shall be pursuant to the FFS submittals as ultimately approved by DEQ. In addition, Respondent shall submit for DEQ review and approval 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 source control program and FS, and are of acceptable QA/QC.

All work completed under this Consent Order shall proceed in accordance with the schedule below:

Project Management Plan	Project Management Plan for, SCE, SCMs and the FS shall be submitted to DEQ within 45 days of issuance of this Consent Order.
River Bank Erodible Soil Source Control Screening Evaluation	River Bank Erodible Soil Source Control Screening Evaluation shall be submitted within 45 days of issuance of this Consent Order.
Hot Spot Evaluation Update	Updated Hot Spot Evaluation shall be submitted to DEQ within 45 days of DEQ approval of the HHRA and Ecological Risk Assessments.
Alternatives Analysis of River Bank Source Control Measures	If necessary, Draft Alternatives Analysis of Erodible Soil SCMs shall be submitted to DEQ within

45 days of DEQ approval of the Erodible Soil Source Control Screening Evaluation and Hot Spot Evaluation. This evaluation will also evaluate the feasibility of treating, removing or containing any hot spots of contamination present in the river bank.

Design and Implementation Work Plans for Groundwater and Stormwater SCMs and, if necessary, a River Bank SCM.

Draft Work Plans to design the Groundwater, Stormwater and River Bank SCMs shall be submitted to DEQ within 30 days of DEQ approval of the respective alternative evaluations.

Feasibility Study Data Gaps

Draft FS Data Gaps Work Plan shall be submitted to DEQ within 30 days of a scoping meeting between DEQ and Respondent.

Draft FS Work Plan

Draft FS Work Plan shall be submitted to DEQ as Specified in the Project Management Plan.

Draft FS Report

To be specified in Project Management Plan.

Final FS Report

To be specified in Project Management Plan.

The schedule for additional deliverables necessary to implement this SOW should be specified in the Project Management Plan and shall be updated as necessary as the project evolves.

All work plans may be amended by Respondent 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 and documented in writing between Respondent and DEQ at the time of each phase change or task addition. Respondent shall initiate and complete work according to the schedule specified in the applicable approved work plan or amendment. Future schedules or deadlines for all submittals, work plans or other requirements shall be adjusted accordingly for the time necessary for preparation, approval and implementation of additional work plans, investigations and/or reports not contemplated in the original schedule, and shall be approved by DEQ in writing.

II. OBJECTIVES

For purposes of this Scope of Work, the "facility" shall exclude that portion of the facility that is below the mean high-water mark of the Willamette River, except as necessary to assess the need for source control, implement source control, and evaluate the effectiveness of source control. A separate Portland Harbor Sediment RI/FS is being developed with respect to the portion of the Willamette River below the mean high-water mark, and it is not the purpose of this Scope of Work to duplicate any of that work.

Work performed under this Consent Order shall complement and incorporate existing facility information with the following specific objectives:

- A. Identify hot spots of contamination at the Arkema facility.
- B. Evaluate erodible soil data along the river bank per the December 2005 DEQ and EPA Portland Harbor Joint Source Control Strategy.
- C. Prepare an alternatives analysis of river bank source control measures for erodible soil which also evaluates the feasibility of treating, removing or containing hot spots of contamination present in the river bank.
- D. Design and implement necessary source control measures for groundwater, stormwater, and river bank soil.
- E. Implement necessary removal measures identified by either Arkema or DEQ, not addressed by the source control program, to address contaminant releases from the Arkema facility.
- F. Develop the information necessary to evaluate remedial action alternatives and select a final remedial action for the upland site, including an adaptive management alternative as appropriate.
- G. Generate or use data of sufficient quality for analysis and selection of remedial alternatives.

III. PROJECT MANAGEMENT PLAN

The Project Management Plan shall include a proposed schedule for submittals and implementation of all proposed activities and phases pertaining to this scope of work (i.e., RI Addendums, Source Control Measures, other removal actions and Feasibility Study); 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.

The Project Management Plan should reference all appropriate DEQ approved project reports and workplans, and anticipated workplan addendums.

IV. EVALUATION AND IMPLEMENTATION OF RIVER BANK SOURCE CONTROL MEASURES

Objective: To evaluate and implement, if necessary, SCMs to address hot spots of contamination present in the river bank and contaminant migration via erodible soil from along the river bank to the Willamette River.

Scope: Evaluate existing site characterization data to determine the need for SCMs. If needed, evaluate removal options to control sources determined by DEQ to require SCMs, and design, implement and evaluate the effectiveness of SCMs required by DEQ.

Procedures: Evaluate erodible soil data along the river bank per the December 2005 DEQ and EPA Portland Harbor Joint Source Control Strategy and the results of the hot spot evaluation, and prepare a work plan which identifies the site specific source control objectives.

V. REMOVAL ACTIONS (IF NECESSARY)

Objective: To develop the information required to evaluate the feasibility of removal actions at the facility and to design and implement removal actions.

Scope: The Removal Action Work Plan, if necessary, shall identify and evaluate feasible removal actions (e.g., fencing, and other measures to restrict access; soil remedial alternatives; capping; and other risk reduction measures) not addressed by the SCMs that could mitigate immediate threats to human health and safety or the environment and prevent or reduce further contaminant migration.

Procedure: A Removal Action Work Plan shall be submitted which will include, but not be limited to, the following:

A. PRELIMINARY EVALUATION OF REMEDIAL INVESTIGATION DATA FOR REMOVAL ACTIONS

The Removal Action work plan shall include a preliminary evaluation of data collected during and subsequent to the RI. The evaluation should be used to identify potential removal actions and additional data needs. The preliminary evaluation of the RI data shall include, but not be limited to, the following:

1. Proposed contaminant concentration levels that meet relevant and appropriate upland risk based remedial goals and a preliminary estimate of the volume exceeding those concentrations.

2. A preliminary identification of hot spots that meet the definition in OAR 340-122-0115(31), including a preliminary estimate of hot spot volumes.
3. Description of any additional investigative work that needs to be conducted to complete evaluation and implementation of removal actions.

B. DESCRIPTION OF REMOVAL ACTION PROCESS

The removal action work plan shall include a description of how potential removal actions will be identified, screened, and evaluated in detail, including discussions of the feasibility and costs of each potential removal action identified, and a schedule for implementation.

VI. FEASIBILITY STUDY

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

Scope: The Feasibility Study (FS) shall be developed in accordance with the requirements specified in OAR 340-122-0085 and 0090, DEQ guidance, and, as appropriate, 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.

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

A. EVALUATION OF REMEDIAL INVESTIGATION DATA

The FS work plan shall include an evaluation of data collected during the RI, SCMs, and any other removal actions. The evaluation should be used to identify remedial alternatives and additional data needs, if any. The evaluation of the RI, SCM, and other data shall include, but not be limited to, the following:

1. A determination of the current and reasonably likely future beneficial uses of groundwater and surface water in the locality of the facility.
2. A determination of the current and reasonably likely future land uses in the locality of the facility.
3. Identification of complete or potentially complete

contaminant transport pathways from the upland site to the Willamette River requiring remedial action.

4. An identification of hot spots that meet the definition in OAR 340-122-0115(31), including an estimate of hot spot volumes.
5. An identification of relevant and appropriate federal, state, and local laws and regulations.
6. Proposed contaminant concentration levels that meet remedial goals and a preliminary estimate of the volume exceeding those concentrations, for each affected environmental medium.
7. Description of any additional investigative work that needs to be conducted to complete the removal actions assessment and FS.

B. DESCRIPTION OF FS EVALUATION PROCESS

The FS Work Plan shall include a description of how remedial action technologies will be identified and screened and how remedial action alternatives will be developed, screened, and evaluated in detail. The plan shall include but not be limited to the following:

1. Identify how the areas or volumes of media which require remedial actions will be determined. Describe selection criteria for identification of areas needing remedial action.
2. Describe development of remedial action objectives (RAOs) that meet the standards in OAR 340-122-0040. RAOs should specify the contaminants and media of interest, exposure pathways, and preliminary remediation goals that permit a range of treatment, engineering and institutional controls, and remedial alternatives to be developed. RAOs should be consistent with requirements developed for in-water remedial objectives established by the Environmental Protection Agency under the Portland Harbor CERCLA RI/FS (to the extent they are known or can be reasonably and practicably determined based on progress/status of the RI/FS) for any contaminants transported to the Willamette River.
3. Describe source control measures and removal activities which have been implemented to date or are planned, and the relationship of the source control measures and removals to the preliminary RAOs.
4. Describe how general remedial actions will be identified. General remedial actions should describe areas or volumes of media to which containment, treatment or remedial actions may be applied that may satisfy the RAOs for the site.

5. Describe how potential remedial action technologies applicable to each general remedial action will be identified and evaluated (screened), based on effectiveness, implementability and cost.
6. Describe how technology process options will be identified and evaluated to select a representative process for each technology type retained for consideration.
7. Describe how the selected representative technologies and process options will be assembled into a range of media-specific or site-wide preliminary remedial action alternatives representing no action, treatment, engineering or institutional controls, excavation and off-site disposal or combinations thereof as specified in OAR 340-122-0085(2).
8. Describe how the preliminary remedial action alternatives will be developed and eliminated (screened), if necessary, based on effectiveness, implementability, and cost.
9. Describe how the detailed analysis of remedial action alternatives retained through the screening process will be completed including application of the higher threshold of cost for the treatment of hot spots. Detailed analysis of remedial action alternatives should be completed in compliance with OAR 340-122-0085 and 340-122-0090.
10. Describe how the remedial action alternatives retained through the screening process and detailed analysis will be compared to one another.
11. Describe how compliance with other applicable or relevant and appropriate laws and regulations will be achieved.
12. Describe how the residual risk assessment will be performed in accordance with OAR 340-122-0084(4).
13. Describe how concerns of the facility owner, neighboring owners and the community will be addressed.

VII. REPORTS

A. QUARTERLY REPORTS

Two (2) paper copies and one (1) electronic copy of the Quarterly Reports shall be submitted to DEQ by the 15th day following the end of the calendar quarter. . The quarterly reports shall summarize activities performed, data results collected or received and problems

encountered or resolved during the previous quarter and activities planned for the upcoming quarter.

B. SOURCE CONTROL MEASURES AND REMOVAL ACTION REPORTS

Post completion (construction completion) reports shall be submitted to DEQ for any SCMs and removal actions implemented.

C. 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, providing a workable number of alternatives, 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 shall comply with OAR 340-122, 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 as appropriate.

The main sections of the FS Report shall include the following:

1. **Introduction**

Provide site background information summarized from the Remedial Investigation (RI) Report. Background information should include summary of the site history; nature and extent of contamination, relevant contaminant fate and transport information, source control evaluations, baseline human health and ecological risk assessments and relevant and appropriate findings from the Portland Harbor CERCLA project. Describe the purpose and organization of the FS Report.

2. **Identification of Hot Spots of Contamination**

The FS Report shall identify hot spots of contamination for the purpose of evaluating remedial action alternatives. The identification of hot spots will be made in an addendum to the RI Report. Information obtained from the remedial investigation/site characterization report, human health risk assessment, and ecological risk assessment will be required to complete the identification of hot spots. The identification of hot spots of contamination shall include:

- a. Identification of significant adverse effects on current and reasonably likely future beneficial uses of groundwater and surface water to which the hazardous substances would be reasonably likely to migrate and for which treatment is reasonably likely to restore or protect such beneficial uses within a reasonable time, as determined in the FS. The identification of significant adverse effects on current or reasonably likely future beneficial uses of water shall be based on current or reasonably likely future exceedance of:
 - i. Applicable or relevant federal, state or local water quality standards, criteria, guidance or specifications;
 - ii. In the absence of applicable or relevant water quality standards, criteria, guidance or specifications, the acceptable risk based level, as defined by OAR 340-122-0115; or
 - iii. If i and ii do not apply, the concentration of the hazardous substance indicated by available published peer-reviewed scientific information to have a significant adverse effect on a current or reasonably likely future beneficial use of water.
- b. Identification of hot spots of contamination for media other than water (e.g., contaminated soil, debris, sediments and sludges; drummed wastes; "pools" of dense non-aqueous phase liquids submerged beneath groundwater or in fractured bedrock; and non-aqueous phase liquids floating on groundwater), if hazardous substances present a risk to human health or the environment exceeding the acceptable risk level. The identification of hot spots in other media shall be based on any one of the following:
 - i. Individual contaminants that are present in concentrations exceeding a risk-based concentration corresponding to:
 - (a) 100 times the acceptable risk level for human exposure to each individual carcinogen;
 - (b) 10 times the acceptable risk level for human exposure to each individual noncarcinogen; or
 - (c) 10 times the acceptable risk level for exposure of individual ecological receptors or populations

of ecological receptors to each individual hazardous substance.

- ii. Contaminants reasonably likely to migrate to such an extent that another hot spot of contamination would be created.
- iii. Contaminants not reliably containable, as determined in the FS.

3. **Identification of Contaminant Transport Pathways which Require Remedial Action**

The FS Report shall identify contaminant transport pathways that may require remedial action.

4. **Identification of Areas or Volumes of Media which Require Remedial Action**

The FS Report shall 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.

5. **Development of Remedial Action Objectives**

Develop and discuss remedial action objectives (RAOs) that meet the standards in OAR 340-122-0040, specifying the contaminants and each media of interest, exposure pathways, and preliminary remediation goals that permit a range of treatment, containment, and remedial alternatives to be developed. Develop and discuss general remedial actions for each medium of interest defining containment, treatment, and remedial actions singly or in combination, that may be taken to satisfy the RAOs for the site.

6. **Identification and Screening of Remedial Technologies**

Identify potential containment, treatment, and remedial technologies applicable to each general remedial action and eliminate (screen) those technologies that cannot be implemented technically at the site. Identify and evaluate technology process options to select a representative process for each technology type to be retained for consideration. Assemble the selected representative technologies into preliminary remedial action alternatives representing a range of containment, treatment and remedial combinations.

7. **Development and Screening of Preliminary Remedial Action Alternatives**

- a. Develop a range of preliminary remedial action alternatives acceptable to DEQ including any or all of the following:
 - i. No action;
 - ii. Remedial action utilizing engineering and/or institutional controls;
 - iii. Remedial action utilizing treatment;
 - iv. Remedial action utilizing excavation and off-site disposal; and
 - v. Any combination of the above, as appropriate.
- b. Each preliminary remedial action alternative developed must be demonstrated to be protective of human health and the environment based upon the standards set forth in OAR 340-122-0040.
- c. Preliminary remedial action alternatives may be screened, if appropriate, with only the alternatives judged as most promising, based on evaluation factors, retained for detailed analysis. Preliminary remedial action alternatives should be evaluated against the following criteria:
 - i. Effectiveness;
 - ii. Implementability; and
 - iii. Cost.

8. **Detailed Analysis of Remedial Action Alternatives**

Each preliminary remedial action alternatives retained through the screening process shall be analyzed in detail. The detailed analysis of each remedial action alternative shall include, but not be limited to the following:

- a. The feasibility of the remedial action alternative based upon a balancing of the remedy selection factors (OAR 340-122-0090). The remedy selection factors are:
 - i. Effectiveness;
 - ii. Long-term reliability;

- iii. Implementability;
 - iv. Implementation risk; and
 - v. Reasonableness of cost.
- b. For each remedial action alternative, the FS Report shall present the following information:
- i. Description and comparison of the remedial action alternatives, estimated present worth cost, and rationale for selection.
 - ii. Performance expectation (i.e., reductions in contaminant concentration levels), reliability, and ability to implement.
 - iii. Design criteria and rationale.
 - iv. General operation and maintenance requirements; necessary engineering or institutional controls.
 - v. Monitoring program to assure both short-term and long-term performance of the alternative.
 - vi. Estimated time for implementation.
 - vii. Evaluation of the short-term and long-term effectiveness and risks of the alternative.
 - viii. A schedule for implementation of the remedial action.
 - ix. Identification of necessary exemptions under ORS 465.315(3).
- c. To the extent which the remedial action treats hot spots of contamination, as follows:
- i. For hot spots of contamination in groundwater the FS shall evaluate treatment to concentrations that ensure significant adverse effects on current or reasonably likely future use of water will not occur. Specifically, the following shall be evaluated: whether treatment is reasonably likely to restore or protect a beneficial use within a reasonable time, and the extent to which treatment is feasible, considering the remedy selection factors (OAR 340-122-0090),

including application of the higher threshold for evaluating the reasonableness of the cost of treating hot spots of contamination.

- ii. For hot spots of contamination in groundwater where the treatment concentration identified for waters is not equivalent to an acceptable risk level, the FS shall evaluate the feasibility of treatment to the concentration, regardless of whether that level is more or less stringent than the acceptable risk level, applying the higher threshold for reasonableness of the cost of treatment. Where the acceptable risk level is more stringent than the treatment concentration identified for groundwater, the FS shall also evaluate the feasibility of treatment to the acceptable risk level, without application of the higher threshold for reasonableness of the cost of treatment. If treatment to a more stringent acceptable risk level is not feasible, the FS study shall evaluate other remedial measures providing protection while allowing beneficial use of the water.
- iii. For contamination of media other than groundwater, the FS shall evaluate the extent to which the hazardous substances cannot be reliably contained.
- iv. For hot spots of contamination in media other than groundwater, the FS shall evaluate the feasibility of treatment and of excavation and off-site disposal to a point where the concentration or condition making the hazardous substance a hot spot would no longer occur, based upon a balancing of the remedy selection factors and an application of the higher threshold for evaluating the reasonableness of the cost of treatment and of excavation and off-site disposal of hot spots of contamination.
- v. For hot spots of contamination in media other than groundwater, the FS shall evaluate the feasibility of treatment and of excavation and off-site disposal to the acceptable risk level through comparison to other remedial methods without application of the higher threshold for reasonableness of the cost of the treatment and of excavation and off-site disposal.

9. Comparative Analysis of Remedial Action Alternatives

Once the alternatives have been analyzed in detail, a comparative analysis shall be completed including a narrative discussion describing the strengths and weaknesses of the individual alternatives relative to one another. The discussion should include how reasonable variations of key uncertainties could change the expectations of their relative performance.

10. **Recommended Remedial Action Alternative**

The FS Report shall recommend a protective and feasible remedial action from the remedial action alternatives developed and evaluated in the FS. For any recommended remedial action the FS Report shall:

- a. Demonstrate the protectiveness of the recommended remedial action through presentation of the results of the residual risk assessment in accordance with OAR 340-122-0084(4).
- b. Identify the extent to which the remedial action alternative would be conducted onsite.
- c. Identify all state or local permits, licenses, or other authorizations or procedural requirements proposed to be exempted.
- d. Describe any consultation with affected state or local government bodies.
- e. Identify applicable substantive requirements of the affected state or local laws and how they would be addressed.

D. REPORT DISTRIBUTION.

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