

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

IN THE MATTER OF:

ASTORIA MARINE CONSTRUCTION CO.,

RESPONDENT

DEQ NO. [LQSR-NWR-12-10]

ORDER ON CONSENT
FOR REMEDIAL INVESTIGATION AND
FEASIBILITY STUDY

Pursuant to ORS 465.260(4), the Director, Oregon Department of Environmental Quality (“DEQ”), issues this Order on Consent (“Consent Order”) to Astoria Marine Construction Co. (“Astoria Marine” or “Respondent”). DEQ and Astoria Marine are referred to collectively as “Parties.” This Consent Order contains the following provisions:

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Exhibit A: Site Map
 Exhibit B: Scope of Work

1. Purpose

The mutual objective of DEQ and Respondent is to determine the nature and extent of releases of hazardous substances at Respondent’s facility, and to develop, evaluate, and select appropriate removal and/or remedial measures in a manner that complies with the applicable provisions of ORS 465.200 through 465.420 and regulations promulgated thereto.

2. Stipulations

Respondent consents and agrees:

- A. To issuance of this Consent Order;
- B. To perform and comply with all provisions of this Consent Order;
- C. In any proceeding brought by DEQ to enforce this Consent Order, to not challenge DEQ's jurisdiction to issue and enforce this Consent Order;
- D. To waive any right Respondent might have, before commencement of action by DEQ to enforce this Consent Order, to seek judicial review or review by the Environmental Quality Commission of this Consent Order;
- E. To not litigate, in any proceeding brought by DEQ to enforce this Consent Order or to assess penalties for noncompliance with this Consent Order, any issue other than Respondent’s compliance with this Consent Order;
- F. To not assert, in any proceeding brought by DEQ to enforce this Consent Order or to assess penalties for noncompliance with this Consent Order, that performance of any interim or removal measures or phase of work by Respondent discharges Respondent’s duty to fully perform all remaining provisions of this Consent Order; and
- G. To waive any right Respondent might have under ORS 465.260(7) to seek reimbursement from the Hazardous Substances Remedial Action Fund of costs incurred under this Consent Order.
- H. For purposes of this Consent Order, "day" means calendar day unless otherwise specified.

3. Findings of Fact

DEQ makes the following findings without admission of any such facts by Respondent:

- A. Astoria Marine Construction Co. is an Oregon corporation. Astoria Marine owns and operates a marine shipyard by the same name at 92134 Front Road, Astoria (the "Site").
- B. The general location of the Astoria Marine shipyard is shown on Exhibit A to this Consent Order. The shipyard is located at the confluence of the Lewis and Clark River (west of the shipyard) and Jeffers Slough (south).
- C. The shipyard has been active since 1924. The shipyard primarily built wooden boats and ships, including wooden minesweepers and tugs for the Navy and Army between 1941 and 1955. The shipyard also refurbished previously-mothballed warships between approximately 1956 and 1963. Until 1989, Astoria Marine used copper-based paints containing tributyltin. Until approximately 1997, repair and maintenance included sandblasting old paint off ships and boats; the paint might have contained tributyltin, lead, and a copper compound. Spent sandblast grit and paint chip residues were stored in uncovered and unlined pits. The pits were removed in 1997. A burn area in the northwest corner of the shipyard was used to burn materials including scrap wood and cardboard.
- D. The Astoria Marine shipyard is located on tidal flats. The Lewis and Clark River often floods portions of the Site. The site drains into either the river or Jeffers Slough.
- E. The U.S. Environmental Protection Agency ("EPA") conducted a site inspection at the shipyard in 2008 and 2009. Soils and groundwater were sampled at the Site, as well as sediments in adjacent surface water bodies. Soils were found to be contaminated with tributyltin and other organotins, several heavy metals, volatile organic compounds, and semi-volatile organic compounds. Shallow groundwater was found to be contaminated with tributyltin, several heavy metals, and volatile organic contaminants. Sediment sampling detected elevated concentrations of tributyltins, petroleum hydrocarbons, and several heavy metals.
- F. In March 2011, EPA proposed to place the shipyard on the National Priority List ("NPL") of sites warranting priority cleanup under the federal Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"). In April 2011, the Clatsop

County Board of Commissioners requested that EPA delay NPL listing. EPA, DEQ, and Astoria Marine subsequently explored deferral of NPL listing and federal cleanup to remedial investigation and cleanup under DEQ's oversight, pursuant to the state cleanup statute, ORS 465.200 *et seq.* The purpose of this Consent Order is to undertake and enforce a CERCLA-equivalent remedial investigation and feasibility study of hazardous substance releases at and from the Site under state authority, which, along with other undertakings by DEQ and Astoria Marine, will support cleanup of the shipyard and continued deferral of NPL listing.

4. Conclusions of Law and Determinations

Based on the above findings of fact and the administrative record, DEQ determines, without admission of any such determinations by Respondent, that:

- A. Astoria Marine Construction Co. is a "person" within the meaning of ORS 465.200(21).
- B. The contaminants described in Subsection 3.E. are "hazardous substances" within the meaning of ORS 465.200(16).
- C. The presence of hazardous substances in soils, groundwater, and sediments at or near the Astoria Marine shipyard constitutes a "release" or "threat of release" into the environment within the meaning of ORS 465.200(22).
- D. The Site and related off-property contamination constitute a "facility" within the meaning of ORS 465.200(13).
- E. The activities required by this Consent Order are necessary to protect public health, safety, and welfare and the environment.

Based upon the above Stipulations, Findings of Fact, Conclusions of Law and Determinations, DEQ ORDERS:

5. Work to be Performed

A. Remedial Investigation and Feasibility Study

Respondent will perform a remedial investigation and feasibility study ("RI/FS") satisfying OAR Chapter 340 Division 122, the terms and schedules set forth in the Scope of Work ("SOW") contained in Exhibit B to this Consent Order, and the terms and schedules set forth in any DEQ-approved work plan. Once approved by DEQ, a work

plan is deemed to be incorporated into and made a fully enforceable part of this Consent Order.

B. Additional Measures

- (1) Respondent may elect at any time during the term of this Consent Order to undertake measures, beyond those required under this Consent Order and the SOW, as necessary to ensure consistency with the National Contingency Plan, 40 CFR Part 300, or to address the release or threatened release of hazardous substances at the Site. Such additional measures (including but not limited to engineering or institutional controls and other removal or remedial measures) are subject to prior approval by DEQ. DEQ's approval will be granted if DEQ determines that the additional measures will not compromise the validity of the RI/FS or threaten human health or the environment, and will comply with applicable laws.
- (2) DEQ may determine that, in addition to work specified in the SOW or an approved work plan, additional work is necessary to complete the RI/FS in satisfaction of the SOW and OAR Chapter 340 Division 122, to address unanticipated threats to human health or the environment, or to ensure consistency with the National Contingency Plan. DEQ may require that such additional work be incorporated into the applicable work plan by modification and/or be performed in accordance with a DEQ-specified schedule. Respondent must modify the work plan and/or implement the additional work in accordance with DEQ's directions and schedule, or invoke dispute resolution under Subsection 7.L. within 14 days of receipt of DEQ's directions.
- (3) DEQ, in cooperation with Respondent, will develop a Community Involvement Plan that will allow community members and local organizations to receive updates regarding RI/FS work and provide input and comments on those efforts. DEQ may require Respondent to support community involvement efforts.
- (4) DEQ will develop and propose to enter into a Memorandum of Understanding ("MOU") with interested Tribal organizations to provide for Tribal input into the planning and implementation of the RI/FS. DEQ shall share the terms of the tribal MOUs with Respondent, and acknowledges that Respondent is supporting implementation of the tribal MOUs with annual funding provided through Funding

and Participation Agreements with the participating tribes.

6. Public Participation

Upon issuance of this Consent Order, DEQ will provide public notice of this Consent Order through issuance of a press release describing the measures required under this Consent Order. Copies of the Consent Order will be made available to the public. DEQ will provide Respondent a draft of such press release and consider any comments by Respondent on the draft press release, before publication.

7. General Provisions

A. Project Managers

- (1) To the extent possible, all reports, notices, and other communications required under or relating to this Consent Order must be directed to:

DEQ Project Manager:
Chuck Harman
Oregon Department of
Environmental Quality
Northwest Region
2020 SW 4th Avenue, Suite 400
Portland, OR 97201
Phone: 503-229-5125
harman.charles@deq.state.or.us

Respondent Project Manager
Kevin Parrett Ph.D.
Senior Environmental Specialist
GSI Water Solutions, Inc.
55 SW Yamhill St Ste 400
Portland OR 97204
Phone: (971) 200-8519
kparrett@gsiwatersolutions.com

- (2) The Project Managers or their respective designees must be available and have the authority to make day-to-day decisions necessary to implement a work plan. The Project Managers also may modify, by mutual agreement in writing, the SOW and work plans as necessary to complete the RI/FS in satisfaction of OAR Chapter 340 Division 122, to address unanticipated threats to human health or the environment, or to ensure consistency with the NCP.

B. Supervising Contractor

All aspects of the work to be performed by Respondent pursuant to this Consent Order must be performed under the direction and supervision of a qualified employee or contractor having experience in hazardous substance investigation or remediation and knowledge of applicable state and federal laws, regulations, and guidance. In accordance with this Subsection, Respondent has proposed, and DEQ approves as of the Effective

Date, GSI Water Solutions, Inc. as the supervising contractor for purposes of this Consent Order.

- (1) If, during the course of work required under this Consent Order, Respondent proposes to change its supervising contractor, Respondent will notify DEQ in writing of the name, title, and qualifications of any proposed supervising contractor. DEQ may for good cause disapprove the proposed contractor. In the event of such disapproval, DEQ will notify Respondent in writing of the reasons for its disapproval within 14 days of receipt of the initial notice from Respondent. Respondent, within 14 days of receiving DEQ's notice of disapproval, will notify DEQ of the name, title, and qualifications of an alternative supervising contractor, subject to DEQ's right to disapprove under the terms and schedule specified above. If DEQ subsequently disapproves the alternative supervising contractor, DEQ may terminate this Consent Order, and reserves its authority to perform the RI/FS work and seek reimbursement of costs from Respondent.

C. DEQ Approvals

- (1) Where DEQ review and approval is required for any plan or activity under this Consent Order, Respondent may not proceed to materially implement the plan or activity until DEQ approval is received. Any DEQ delay in granting or denying approval correspondingly extends the time for completion by Respondent. Prior approval is not required in emergencies; provided, Respondent will notify DEQ immediately after the emergency and evaluate the impact of its actions.
- (2) After review of any plan, report, or other item required to be submitted for DEQ approval under this Consent Order, DEQ will: (a) approve the submission in whole or in part; or (b) disapprove the submission in whole or in part and notify Respondent of its deficiencies and/or request modifications to cure the deficiencies.
- (3) DEQ approvals, rejections, modifications, or identification of deficiencies will be given as soon as practicable in writing and will state DEQ's reasons with reasonable specificity.
- (4) In the event of DEQ disapproval or request for modification of a submission, Respondent will, within 30 days of receipt of the DEQ notice or such longer time as may be specified in the notice, either correct the deficiencies and resubmit the

revised report or other item for approval, or invoke dispute resolution under Subsection 7.L.

- (5) In the event of two deficient submittals of the same deliverable that are deficient for the same reasons due to Respondent's failure to cure the original deficiency, DEQ may modify the submission to cure the deficiency.
- (6) In the event of approval or modification of a submission by DEQ, Respondent will implement the action required by the plan, report, or other item, as so approved or modified.

D. Access to Property

- (1) Respondent will allow DEQ to enter all portions of the Site owned by or under the control of Respondent at all reasonable times and upon reasonable notice for the purpose of overseeing Respondent's performance under this Consent Order, including but not limited to inspecting records relating to work under this Consent Order, observing Respondent's progress in implementing this Consent Order, conducting such tests and taking such samples as DEQ deems necessary, verifying data submitted to DEQ by Respondent, conducting periodic review, and using camera, sound recording, or other recording equipment. DEQ will make available to Respondent, upon Respondent's request, any photographs or recorded or videotaped material taken.
- (2) Respondent will also seek to obtain access to property not owned or controlled by Respondent as necessary to perform the work required in this Consent Order, including access by DEQ for purposes described in Paragraph 7.D.(1). DEQ may use its statutory authority to obtain access to property on behalf of Respondent if DEQ determines that access is necessary and that Respondent has exhausted all good faith efforts to obtain access.

E. Records

- (1) In addition to those reports and documents specifically required under this Consent Order, Respondent will provide to DEQ, within 10 days of DEQ's written request, copies of available QA/QC memoranda and audits, raw data, final plans, task memoranda, field notes (not made by or at the direction of Respondent's attorney),

and QA/QC laboratory analytical reports relating to the work to be performed under this Consent Order.

- (2) Respondent will preserve all records and documents in possession or control of Respondent or its employees, agents, or contractors that relate in any way to activities under this Consent Order for at least five years after termination under Section 8 of this Consent Order. Upon DEQ's request, Respondent will provide to DEQ, or make available for copying by DEQ, copies of non-privileged records. For a period of 10 years after termination, Respondent will provide DEQ 60 days notice before destruction or other disposal of such records or documents. Ten years after termination, Respondent has no further obligation to preserve documents or records.
- (3) Subject to Paragraph 7.E.(4), Respondent may assert a claim of confidentiality under the Oregon Public Records Law regarding any documents or records submitted to or copied by DEQ pursuant to this Consent Order. DEQ will treat documents and records for which a claim of confidentiality has been made in accordance with ORS 192.410 through 192.505. If Respondent does not make a claim of confidentiality at the time the documents or records are submitted to or copied by DEQ, the documents or records may be made available to the public without notice to Respondent.
- (4) Respondent will identify to DEQ (by addressor-addressee, date, general subject matter, and distribution) any document, record, or item withheld from DEQ on the basis of attorney-client or attorney work product privilege, except to the extent that such identifying information is itself subject to a privilege. Attorney-client and work product privileges may not be asserted with respect to any records required to be submitted under Paragraph 7.E.(1). DEQ reserves its rights under law to obtain documents DEQ asserts are improperly withheld by Respondent.

F. Notice and Samples

- (1) Respondent will make every reasonable effort to notify DEQ of any excavation, drilling, sampling, or other fieldwork to be conducted under this Consent Order at least five working days before such activity, but in no event less than 24 hours before such activity. Upon DEQ's verbal request, confirmed in writing within two business days, Respondent will make every reasonable effort to provide a split or

duplicate sample to DEQ or allow DEQ to take a split or duplicate of any sample taken by Respondent while performing work under this Consent Order. DEQ will provide Respondent with copies of all analytical data from such samples as soon as practicable.

- (2) If DEQ conducts any sampling or analysis in connection with this Consent Order, DEQ will, except in an emergency, make every reasonable effort to notify Respondent of any excavation, drilling, sampling, or other fieldwork, at least 72 hours before such activity. Upon Respondent's verbal request, confirmed in writing within two business days, DEQ will make every reasonable effort to provide a split or duplicate sample to Respondent or allow Respondent to take a split or duplicate of any sample taken by DEQ, and will provide Respondent with copies of all analytical data for such samples as soon as practicable. Respondent will provide DEQ with copies of all analytical data from such samples as soon as practicable.

G. Quality Assurance

- (1) Respondent will conduct all sampling, sample transport, and sample analysis in accordance with the Quality Assurance/ Quality Control ("QA/QC") provisions approved by DEQ as part of the work plan. All plans prepared and work conducted as part of this Consent Order must be consistent with DEQ's *Environmental Cleanup Quality Assurance Policy* (DEQ10-LQ-0063-QAG). Respondent will make every reasonable effort to ensure that each laboratory used by Respondent for analysis performs such analyses in accordance with such provisions.
- (2) If DEQ conducts sampling or analysis in connection with this Consent Order, DEQ will conduct sampling, sample transport, and sample analysis in accordance with the QA/QC provisions of the approved work plan. Upon written request, DEQ will provide Respondent with copies of DEQ's records regarding such sampling, transport, and analysis.

H. Progress Reports

During each quarter of this Consent Order, Respondent will deliver to DEQ, on or before the tenth day of each third month, a progress report containing:

- (1) Actions taken by Respondent under this Consent Order during the previous reporting period;

- (2) Actions scheduled to be taken by Respondent in the next three months;
- (3) A summary of sampling, test results, and any other data generated or received by Respondent during the previous reporting period; and
- (4) A description of any problems experienced during the previous reporting period and actions taken to resolve them.

DEQ may approve less or more frequent reporting by Respondent, if warranted. Progress reports may be submitted in electronic form. If submitted in hard-copy written form, two copies must be provided to DEQ.

I. Other Applicable Laws

- (1) Subject to ORS 465.315(3), all actions under this Consent Order must be performed in accordance with applicable federal, state, and local laws and regulations.
- (2) All activities under this Consent Order must be performed in accordance with any applicable federal, state, and local law related to archeological objects and sites and their protection. If archeological objects or human remains are discovered during any investigation, removal, or remedial activity at the Site, Respondent will, at a minimum: (a) stop work immediately in the vicinity of the find; (b) provide any notifications required by ORS 97.745 and ORS 358.920; (c) notify the DEQ Project Manager within 24 hours of the discovery; and (d) use best efforts to ensure that Respondent and its employees, contractors, counsel, and consultants keep the discovery confidential, including but not limited to refraining from contacting the media or any third party or otherwise sharing information regarding the discovery with any member of the public. Any project delay caused by the discovery of archeological object or human remains is a Force Majeure under Subsection 7.K.

J. Reimbursement of DEQ Costs

- (1) DEQ will submit to Respondent a monthly invoice of costs incurred by DEQ on or after the Effective Date for oversight of Respondent's implementation of this Consent Order and consultation with EPA, other federal and state agencies, and Tribes. Each invoice must include a summary of costs billed to date.
- (2) DEQ oversight costs payable by Respondent include direct and indirect costs. Direct costs include site-specific expenses, DEQ contractor costs, and DEQ legal costs actually and reasonably incurred by DEQ under ORS 465.200 et seq. DEQ's

direct cost summary must include a Land Quality Division (“LQD”) direct labor summary showing the persons charging time, the number of hours, and the nature of work performed. Indirect costs include those general management and support costs of DEQ and of the LQD allocable to DEQ oversight under this Consent Order and not charged as direct, site-specific costs. Indirect charges are based on actual costs and applied as a percentage of direct personal services costs. DEQ will maintain work logs, payroll records, receipts, and other documents to document work performed and expenses incurred under this Consent Order and, upon request, will provide copies of such records to Respondent.

- (3) Within 90 days of receipt of DEQ’s invoice, Respondent will pay, or cause to be paid, the amount of costs billed by check payable to the “State of Oregon, Hazardous Substance Remedial Action Fund,” or invoke dispute resolution under Subsection 7.L. After 90 days, any unpaid amounts that are not the subject of pending dispute resolution, or that have been determined owing after dispute resolution, become a liquidated debt collectible under ORS 293.250 or other applicable law.
- (4) Respondent will pay simple interest of 9% per annum on the unpaid balance of any DEQ oversight costs, which interest begins to accrue at the end of the 90-day payment period, unless dispute resolution has been invoked. Interest on any amount disputed under Subsection 7.L. begins to accrue 30 days from final resolution of any such dispute.

K. Force Majeure

- (1) If any event occurs that is beyond Respondent’s reasonable control and that causes or might cause a delay or deviation in performance of the requirements of this Consent Order despite Respondent’s reasonable efforts (“Force Majeure”), Respondent will promptly, upon learning of the event, notify DEQ’s Project Manager verbally of the cause of the delay or deviation, its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Respondent proposes to carry out such measures. Respondent will confirm in writing this information within five working days of the verbal notification. DEQ in its discretion may assert that Respondent’s

failure to comply with these notice requirements precludes Respondent from asserting Force Majeure for the event and for any additional delay caused by the event.

- (2) If Respondent demonstrates to DEQ's satisfaction that the delay or deviation has been or will be caused by Force Majeure, DEQ will extend times for performance of related activities under this Consent Order as appropriate. Circumstances or events constituting Force Majeure might include but are not limited to acts of God, unforeseen strikes or work stoppages, unanticipated site conditions, fire, explosion, riot, sabotage, war, and delays in receiving a governmental approval or permit. Normal inclement weather, increased cost of performance, or changed business or economic circumstances may not be considered Force Majeure.

L. Dispute Resolution

- (1) Except as provided in Paragraph 7.L.(4), if Respondent disagrees with DEQ regarding any matter during implementation of this Consent Order, Respondent will promptly notify DEQ in writing of its objection. DEQ and Respondent then will make a good-faith effort to resolve the disagreement within 14 days of Respondent's written objection. At the end of the 14-day period, DEQ will provide Respondent with a written statement of its position from DEQ's Northwest Region Cleanup Manager. If Respondent still disagrees with DEQ's position, then Respondent, within 14 days of receipt of DEQ's position from the Cleanup Manager, will provide Respondent's position and rationale in writing to DEQ's Northwest Region Administrator. The Region Administrator may discuss the disputed matter with Respondent and, in any event, will provide Respondent with DEQ's final position in writing as soon as practicable after receipt of Respondent's written position.
- (2) If Respondent refuses or fails to follow DEQ's final position pursuant to Paragraph 7.L.(1), and DEQ seeks to enforce its final position, the Parties, subject to Section 2, are entitled to such rights, remedies, and defenses as are provided by applicable law.
- (3) During the pendency of any dispute resolution under this subsection, the time for completion of work or obligations affected by such dispute is extended for a period

of time not to exceed the actual time taken to resolve the dispute. Elements of work or obligations not affected by the dispute must be completed in accordance with the applicable schedule.

- (4) Dispute resolution under this subsection does not apply to: (a) DEQ approval or modification of the RI/FS work plan required under the SOW (which approval or modification is nonetheless subject to Subsection 7.C.); or (b) DEQ assessment of stipulated penalties under Subsection 7.M. (after dispute resolution has been exhausted, before assessment of a penalty, regarding the alleged violation).

M. Stipulated Penalties

- (1) Subject to Subsections 7.C., 7.K., and 7.L., upon any violation by Respondent of any provision of this Consent Order, and upon Respondent's receipt from DEQ of written notice of violation, Respondent will pay the stipulated penalties set forth in the following schedule:
 - (a) \$5,000 for the first week of violation or delay and \$2,500 per day of violation or delay thereafter, for:
 - (i) Failure to allow DEQ access to the Site under the provisions of Subsection 7.D;
 - (ii) Failure to provide notice and samples under the provisions of Subsection 7.F; or
 - (iii) Failure to provide records under the provisions of Subsection 7.E.
 - (b) \$2,500 for the first week of violation or delay and \$1,000 per day of violation or delay thereafter, for:
 - (i) Failure to submit a final work plan in accordance with the SOW's schedule and terms;
 - (ii) Failure to perform work in accordance with an approved work plan's schedule and terms;
 - (iii) Failure to perform additional work required by DEQ under Subsection 5.B.; or
 - (iv) Failure to submit a final report in accordance with an approved work plan's schedule and terms.

- (c) \$500 for the first week of violation or delay and \$500 per day of violation or delay thereafter, for:
 - (i) Failure to submit a draft work plan in accordance with the SOW's schedule and terms;
 - (ii) Failure to submit progress reports in accordance with Subsection 7.H.;
or
 - (iii) Any other violation of the Consent Order, SOW, or an approved work plan.
- (2) Violations arising out of the same facts or circumstances or based on the same deadline are considered as one violation per day.
- (3) Stipulated penalties do not begin to accrue under this subsection until Respondent receives a notice of violation from DEQ describing the violation and what is necessary to correct it. If the violation was not intentional, is capable of cure, and Respondent corrects the violation within 30 days of receipt of such notice of violation or such other period as may be specified in the notice, DEQ in its sole discretion may waive in writing the stipulated penalties. This opportunity to cure does not apply to violations subject to Subparagraph 7.M.(1)(a).
- (4) Respondent will, within 30 days of receipt of the notice, pay the amount of such stipulated penalty not waived by DEQ in writing as provided in Paragraph 7.M.(3) by check made payable to the "State of Oregon, Hazardous Substance Remedial Action Fund," or request a contested case hearing in accordance with Paragraph 7.M.(5). Respondent will pay simple interest of 9% per annum on the unpaid balance of any stipulated penalties, which interest begins to accrue at the end of the 30-day payment period. Any unpaid amounts that are not the subject of a pending contested case, or that have been determined owing after a contested case, are a liquidated debt collectible under ORS 293.250 and other applicable law.
- (5) Respondent may request a contested case hearing regarding the penalty assessment in accordance with OAR Chapter 340, Division 11. The scope of any such hearing must be consistent with the stipulations set forth in Section 2, must be limited to the occurrence or non-occurrence of the alleged violation, and not review the amount of

penalty assessed. Further penalties regarding the alleged violation subject to the penalty assessment do not accrue from the date DEQ receives a request for a contested case, through disposition of that case.

- (6) If DEQ assesses stipulated penalties pursuant to this subsection for any failure of Respondent to comply with this Consent Order, DEQ may not seek civil penalties from Respondent for the same violation under ORS 465.900 or other applicable law.

N. Reservations

- (1) In lieu of stipulated penalties under Subsection 7.M., DEQ may assess civil penalties under ORS 465.900 for Respondent's failure to comply with this Consent Order. Penalties may not accrue pending any contested case regarding the alleged violation. In addition to penalties, DEQ may seek any other available remedy for failure by Respondent to comply with any requirement of this Consent Order, including but not limited to termination of this Consent Order or court enforcement of this Consent Order.
- (2) Subject to Section 2, Respondent does not admit any liability, violation of law, or factual or legal findings, conclusions, or determinations made by DEQ under this Consent Order.
- (3) Subject to Subsection 2.G., nothing in this Consent Order prevents DEQ, the State of Oregon, or Respondent from exercising any rights each might have against any person not a party to this Consent Order.

O. Indemnification

- (1) Respondent will indemnify and hold harmless the State of Oregon and its commissions, agencies, officers, employees, contractors, and agents from and against any and all claims arising from acts or omissions related to this Consent Order of Respondent or its officers, employees, contractors, agents, receivers, trustees, or assigns. DEQ may not be considered a party to any contract made by Respondent or its agents in carrying out activities under this Consent Order.
- (2) To the extent permitted by Article XI, Section 7, of the Oregon Constitution and by the Oregon Tort Claims Act, the State of Oregon will indemnify and hold harmless Respondent and its officers, employees, contractors, and agents from and against

any and all claims arising from acts or omissions related to this Consent Order of the State of Oregon or its commissions, agencies, officers, employees, contractors, or agents (except for acts approving or omissions constituting approval of any activity of Respondent under this Consent Order). Respondent may not be considered a party to any contract made by DEQ or its agents in carrying out activities under this Consent Order.

P. Parties Bound

This Consent Order is binding on the Parties and their respective successors and assigns. The undersigned representative of each Party certifies that he or she is fully authorized to execute and bind such party to this Consent Order. No change in ownership, corporate, or partnership status in any way alters Respondent's obligations under this Consent Order, unless otherwise approved in writing by DEQ. Respondent will notify and provide a copy of this Consent Order to any prospective successor, purchaser, lessee, assignee, or mortgagee of the Astoria Marine property during the term of this Consent Order.

Q. Modification

DEQ and Respondent may modify this Consent Order by mutual written agreement.

R. Effective Date

The effective date of this Consent Order ("Effective Date") is the date of signature by the DEQ's Northwest Region Administrator.

8. Duration


- A. Either DEQ or Respondent may terminate this Consent Order after 30 days written notice to the other if EPA lists the Site on the NPL.
- B. Unless earlier terminated in accordance with Subsection 8.A., this Consent Order is deemed satisfied upon completion of work required under this Consent Order and payment by Respondent of any outstanding oversight costs and penalties. DEQ will determine whether work under this Consent Order is satisfactorily completed and the Consent Order terminated, by letter issued within 60 days of receipt of the last deliverable required from Respondent under this Consent Order, or as soon thereafter as reasonably practicable.

9. Signatures

STIPULATED, AGREED, and APPROVED FOR ISSUANCE:

ASTORIA MARINE CONSTRUCTION CO.

Respondent

By:  Date: 9/4/12
Donald Fastabend
Owner, Astoria Marine Construction Company

STIPULATED, AGREED, and SO ORDERED:

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

By:  Date: 9/10/12
Nina DeConcini
Administrator, Northwest Region

EXHIBIT A

ASTORIA MARINE CONSTRUCTION COMPANY

SITE MAP



Astoria Marine Construction Company
 92134 Front Road
 Astoria, Oregon
SITE MAP

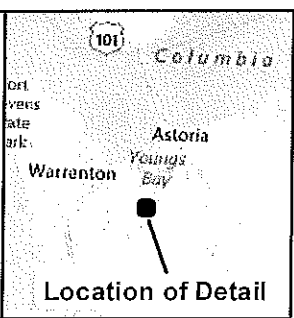


EXHIBIT B
ASTORIA MARINE CONSTRUCTION COMPANY (AMCCO)
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SCOPE OF WORK

I. SCHEDULE

AMCCO shall submit for DEQ review and approval Remedial Investigation (RI), Risk Assessment, Interim Removal Measure (IRM) Assessment 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 and quantity.

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

SUBMITTALS	SCHEDULE (days are calendar days)
RI Work Plan Scoping Meeting	Within 40 days of issuance of this Consent Order.
Draft RI Work Plan	To DEQ within 35 days after RI Work Plan Scoping Meeting.
DEQ Review and Comment	To AMCC within 20 days after public and Trustee comments received for draft RI Work Plan.
Final RI Work Plan	To DEQ within 20 days of receipt of DEQ's comments on draft RI Work Plan.
Initiation of RI	To be specified in Project Management section of RI Work Plan.

The schedule for additional deliverables specified in this SOW (e.g. Risk Assessment Work Plan, Interim Removal Measure Assessment Work Plan, Feasibility Study Work Plan, Remedial Investigation Report, Risk Assessment Report, Interim Removal Measure Assessment Report and Feasibility Study Report) should be specified in the Project Management Plan section of the RI Work Plan.

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

II. OBJECTIVES

Work performed shall complement and incorporate existing site information with the following overall objectives:

- A. Identify the hazardous substances which have been released to the environment.
- B. Determine the nature, extent and distribution of hazardous substances in affected media.
- C. Determine the direction and rate of migration of hazardous substances.
- D. Identify migration pathways and receptors.

- E. Determine the risk to human health and/or the environment.
- F. Identify hot spots of contamination.
- G. Develop the information necessary to identify and evaluate potential Interim Removal Measures.
- H. Develop the information necessary to evaluate remedial action alternatives and select a remedial action.
- I. Generate or use data of sufficient quality for site characterization, risk assessment, and the subsequent analysis and selection of remedial alternatives.

III. REMEDIAL INVESTIGATION SCOPING MEETING

AMCC shall present to DEQ in an RI Scoping Meeting the proposed approach to the RI, addressing soil, groundwater, surface water, sediments, and air, as appropriate. This meeting will provide the framework for the RI Work Plan and shall include the following:

- A. A summary of site-specific issues and a review of the results of previously completed work.
- B. A conceptual site model showing contaminant sources, release mechanisms, transport routes and media, potential human and ecological receptors, and relevant exposure scenarios based on current and reasonably likely future land and water use.
- C. A general description of each RI Work Plan item as specified in Section IV of this Scope of Work.
- D. The estimated schedule for implementation of the RI.

IV. REMEDIAL INVESTIGATION WORK PLAN

The work plan shall be developed in accordance with applicable Oregon Administrative Rules (OAR 340-122-0010 through -0115), DEQ guidance and, as appropriate, follow the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01, 1988. Existing data, reports or information, including data from any investigation activity conducted prior to the initiation of the RI may be used, if such data is consistent with the procedures and quality assurance/quality control criteria approved by DEQ. The submitted work plan shall include, but not be limited to the following items:

A. PROJECT MANAGEMENT PLAN

The Project Management Plan shall indicate the following:

- 1. A proposed schedule for submittals and implementation of all proposed activities and phases pertaining to this Scope of Work (SOW). This schedule shall specify submittal dates for the draft and final Risk Assessment, Interim Removal Measure Assessment and Feasibility Study work plans and the draft and final Remedial Investigation, Risk Assessment, Interim Removal Measure Assessment and Feasibility Study reports. These target dates may be revised by AMCC, in subsequent work plans or amendments, subject to DEQ approval.
- 2. A description of the personnel (including subcontractors if known) involved in the project and their respective roles in the project.

3. A discussion of how proposed variations from the approved work plan will be managed.

B. SITE DESCRIPTION

A description of facility operations shall include, but not be limited to the following:

1. A description of current and historical operating activities and practices, including approximate time periods and a list of chemical products used currently and historically.
2. The estimated volume of waste disposed of and/or discharged.
3. Time, volume and location of known spills.
4. A description of past and present waste treatment/disposal practices and areas.
5. The location of past and present raw material and finished product storage areas.
6. Any available aerial photographs that may provide information regarding disposal practices at the site.
7. Preliminary identification of current and reasonably likely future land and water use.

C. SITE CHARACTERIZATION PLAN

The Site Characterization Plan shall be consistent with DEQ guidance and the requirements specified in OAR 340-122-0080. 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 at or 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 implemented 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 and FS, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. At a minimum, the plan shall include, but not be limited to the following:

- a. For each sample:
 - i. Location.

- ii. Sampling interval or depth.
 - iii. Sampling procedures.
 - iv. Analytical parameters and methods.
 - v. Justification for all of the above.
- b. Provisions for describing soil samples, to include:
- i. The soil type according to the ASTM D 2487-93, Classification of Soils for Engineering Purposes (Unified Soil Classification System), and ASTM D 2488-93, Description and Identification of Soils (Visual-Manual Procedures), including soil color, structure, texture, mineral composition, moisture, and percent recovery.
 - ii. Other relevant characteristics such as visual identification of contamination, odor, and vapor monitoring using HNU, OVA or other equivalent type equipment as described by a qualified environmental professional shall be noted.
 - iii. Provisions to collect and describe formation materials during installation of soil borings. AMCC shall obtain continuous core samples or provide justification for why obtaining continuous cores is not appropriate. Borehole geophysics may be used to supplement coring.
- c. A method for determining background concentrations for potential contaminants of concern.

2. **Groundwater**

Objective: To identify and characterize releases of hazardous substances at or from the facility to groundwater.

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 implemented to determine the vertical and lateral extent of groundwater contamination, characterize the site hydrogeology, determine the physical and chemical water bearing zone characteristics relevant to the RI and FS, 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 (1992). The plan shall include, but not be limited to the following:

- a. Groundwater investigation plan to include:
 - i. Proposed sampling locations.

- ii. Proposed sampling depths.
 - iii. Proposed length and depth of screened intervals.
 - iv. Proposed drilling methods.
 - v. Proposed well construction materials and installation methods.
 - vi. Proposed well development and completion methods.
 - vii. Proposed methods to protect against cross contamination if drilling in contaminated soils or drilling through contaminated shallow aquifers or perched zones.
 - viii. The justification for all of the above.
- b. Groundwater quality monitoring plan, to include:
- i. Proposed monitoring locations.
 - ii. Sampling methods.
 - iii. A schedule and proposal for periodic sampling of monitoring wells.
 - iv. Analytical parameters and methods.
 - v. The justification for all of the above
- c. Hydrologic characterization proposal to include:
- i. Provisions to collect and describe formation materials during drilling. AMCC shall obtain continuous core samples or provide justification for why obtaining continuous cores is not appropriate. Borehole geophysics may be used to supplement coring.
 - ii. A means to characterize the hydrogeology including:
 - (a) stratigraphy
 - (b) structural geology
 - (c) depositional history
 - (d) regional groundwater flow patterns
 - iii. A means to characterize the hydrogeologic properties of all hydrogeologic units found at the site, including:
 - (a) hydraulic conductivity
 - (b) porosity
 - (c) lithology
 - (d) hydraulic interconnections between saturated zones
 - (e) test and analysis methods for the above
 - iv. Procedures to identify for each aquifer, the following:
 - (a) A description of groundwater flow direction.
 - (b) Identification of vertical and horizontal gradient(s).
 - (c) Interpretation of the flow system including the rate (horizontal and vertical) of groundwater flow, and including seasonal variations.
 - v. Procedures to identify hydraulic influences, including:
 - (a) Identification of pumping groundwater wells, past and present.
 - (b) Influences of rivers, streams, and ditches.
 - (c) Influences of ponds and lakes.
 - (d) Identification of areas of recharge/discharge.

- vi. Procedures to determine background groundwater concentrations for potential contaminants of concern.
- d. Well inventory to identify all active and inactive water wells within a radius of the facility acceptable to DEQ, to include:
 - i. Identification of all wells listed with the Oregon Water Resources Department,
 - ii. A field survey to identify wells for which no logs are on file, one-half mile downgradient if off-site contamination is present.
 - iii. For all located wells, to the extent practicable, identify:
 - (a) Owner
 - (b) Address
 - (c) Map location
 - (d) Driller
 - (e) Date drilled
 - (f) Depth
 - (g) Casing and screen material, depths and intervals
 - (h) Seal types, depths and intervals
 - (i) Static pumping levels
 - (j) Approximate land surface elevation
 - (k) Reported water quality and use of well
 - iv. A plan and schedule to sample those wells identified above, unless there is sufficient hydrogeological information available to demonstrate that sampling is not necessary.

3. Surface Water and Sediments

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

Scope: The plan shall supplement previous investigations at the facility and shall identify all past, existing, 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 and FS, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. The plan shall include, but not be limited to the following;

- a. Surface water characterization plan to include for each sample:
 - i. Location.
 - ii. Depth.
 - iii. Sampling procedures.

- iv. Analytical parameters and methods.
 - v. Justification for all of the above.
- b. Sediment characterization plan to include for each sample:
- i. Location.
 - ii. Depth.
 - iii. Sampling procedures.
 - iv. Analytical parameters and methods.
 - v. Justification for all of the above.
- c. A means to characterize surface water bodies to include:
- i. Flow characteristics
 - ii. Seasonal size and depth
 - iii. Chemical characteristics
 - iv. Channel characteristics
 - v. Flooding tendencies
 - vi. Tidal influences
- d. A method for determining background concentrations for potential contaminants of concern.

4. **Air**

Objective: To identify and characterize the release of hazardous substances to the air, from soil, surface water, or groundwater contamination at or from 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., from 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 and FS, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. At a minimum, the plan shall include, but not be limited to the following:

- a. Procedures for modeling air emissions including:
 - i. A description of proposed modeling methods.
 - ii. Identification of emission modeling data needs and a plan to obtain the necessary data.
- b. Procedures for the collection of air samples including:
 - i. Location.
 - ii. Height.
 - iii. Sampling methodology.

- iv. Sampling duration.
 - v. Analytical parameters and methods.
 - vi. Procedures for monitoring ambient air conditions (e.g. wind speed and direction).
- c. A method for determining background concentrations for potential contaminants of concern.

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, in accordance with OAR 340-122-0080 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. The plan shall include, but not be limited to the following:

- a. Identification of current and reasonably anticipated land uses in the locality of the facility considering:
 - i. Current land use zoning and other land use designations.
 - ii. Land use plans as established in local comprehensive plans and land use implementing regulations of any governmental body having land use designations.
 - iii. Concerns of the facility owner, neighboring property owners, and the community.
 - iv. Any other relevant information, such as developmental patterns and population projections.
- b. Identification of current and reasonably likely future beneficial uses of groundwater and surface water in the locality of the facility, considering:
 - i. Federal, state, and local regulations governing the appropriation and/or use of water.
 - ii. Nature and extent of current groundwater and surface water uses.
 - iii. Suitability of groundwater and surface water for beneficial uses.
 - iv. The contribution of water to the maintenance of aquatic or terrestrial habitat.
 - v. Any beneficial uses of water which the Water Resources Department or other federal, state or local program is managing in the locality of the facility.
 - vi. Reasonably likely future uses of groundwater and surface water, based on:
 - (a) Historical land and water uses.
 - (b) Anticipated future land and water uses.

- (c) Community and nearby property owners' concerns regarding future water use.
 - (d) Regional and local development patterns.
 - (e) Regional and local population projections.
 - (f) Availability of alternate water sources including, but not limited to public water supplies, groundwater sources, and surface water sources.
- vii. Potential for contaminant migration.

D. SAMPLING AND ANALYSIS PLAN (SAP)

Objective: To adequately document all sampling and analysis procedures.

Scope: In preparation of the SAP, the following guidance documents shall be utilized: Data Quality Objectives Process for Superfund, EPA 540-R-93-071, September, 1993; 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) for all sampling activities. The SAP shall be sufficiently detailed to function as a manual for field staff. The SAP shall include, at a minimum:

1. Proposed sampling parameters.
2. Sampling locations and frequency.
3. Description of sample collection techniques, sampling equipment, decontamination procedures, sample handling procedures, and management of investigation derived waste.
4. Quality assurance and quality control procedures for both field and lab procedures, and as described in EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, August, 1994.
5. Chain of custody procedures.
6. Analytical methods.

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, at a minimum, the following elements:

1. Name of key personnel and alternates responsible for site safety.
2. Description of the risks associated with each site task or operation found in the RI work plan.
3. Confirmation that personnel are adequately trained to perform their job responsibilities and to handle the specific hazardous situations they may encounter.

4. Description of protective clothing and equipment to be worn by personnel during various site operations.
5. Description of any site-specific medical surveillance requirements.
6. Description of the program for periodic air monitoring, personnel monitoring, and environmental sampling, if needed. Air monitoring should be conducted to determine possible hazardous conditions and to confirm the adequacy of personal protection equipment. The results of the air monitoring shall be used as the basis for specifying personal protective equipment and determining the need to upgrade protective measures.
7. Description of the actions to be taken to mitigate existing hazards (e.g., containment of contaminated materials) to make the work environment less hazardous.
8. Definition of the site access control measures including a site map. This part of the HASP should also describe measures to coordinate with the ongoing operations on the site so as not to interrupt those operations during site sampling activities.
9. Description of decontamination procedures for personnel and equipment.
10. An Emergency Response Plan or Contingency Plan for safe and effective responses to emergencies, including a spill containment program, the necessary personal protective equipment and other equipment.

F. MAPS

The work plan shall include a map or maps of the facility which clearly shows:

1. Site topography and surface drainage.
2. On-site structures, including tanks, sumps, catch basins, wells, pipelines and utilities.
3. The location of past spills, disposal areas, and all other waste and product management areas.
4. All pertinent structures adjacent to or nearby the site such as drainage ditches, pipelines, roadways, wells and utility corridors.
5. The location of all existing and proposed sampling locations, including background sampling points.
6. The locations of hydrogeologic cross-sections.
7. The drawing date, orientation, and scale.

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 and 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 340-122-0084; DEQ guidance; and, as appropriate, the Risk Assessment Guidance for Superfund - Human Health Evaluation Manual Part A, United States Environmental Protection Agency (EPA), Interim Final, July 1989, (RAGS-HHEM). 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 work 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 AMCC 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. Quantifying the potential risks associated with the RME shall be the overall goal of the risk assessment.

The Human Health Risk Assessment Work Plan should include, but not be limited to the following:

1. A conceptual site model for the site. This model should be an iterative flow chart based on available site information showing contaminant sources, release mechanisms, transport routes and media, potential receptors, and other important information as appropriate. Iterations of this model shall be carried through the work plan and the risk assessment as additional information is generated. Exhibit 4-1 of the RAGS-HHEM presents an example of a conceptual site model.
2. Data quality objectives based on the conceptual site model.
3. A plan for identifying contaminants of concern to focus subsequent efforts in the risk assessment process. The plan shall include a list of all chemicals identified at the site (by media), and rationale for selecting chemicals that will be carried through the human health risk assessment.
4. A plan for conducting an exposure assessment for the site identifying actual and potential exposure pathways, characterizing the potentially exposed populations, and determining the exposure risk from each pathway. Procedures for defining exposure units, performing a spatial analysis of the contaminant data and calculation of exposure point

concentrations should be provided. The exposure parameters shall be based on both current and reasonably anticipated future land and water use scenarios.

5. The analytical methods used during the site investigation, and the method detection limits that were used for all analytes. In addition, an explanation of how non-detect values and qualified data will be used to estimate exposure point concentrations shall be provided.
6. A discussion of how the fate and transport of site-related chemicals will be evaluated, including a description of the fate and transport model that will be used to estimate the potential movement of contaminants within and between environmental media.
7. A plan for conducting a toxicity assessment considering: 1) the types of adverse health effects associated with individual and multiple chemical exposures; 2) the relationship between magnitude of exposures and adverse effects; and 3) related uncertainties such as the weight of evidence for a chemical's potential carcinogenicity in humans. A summary table of the chemicals found, and their respective critical toxicity values (reference doses - RfDs), slope factors, and other relevant critical toxicity factors) and citations for these values; data on absorption factors that will be used (e.g., dermal absorption factors) should also be included.
8. A plan for conducting a risk characterization assessing the potential risks of adverse health effects for each of the exposure scenarios derived in the exposure assessment. The exposure points and exposure point concentrations to be used in the Human Health Risk Assessment (and/or how they will be estimated). A description of the model(s) that will be to estimate exposure point concentrations should be provided, if necessary.
9. A plan for conducting an uncertainty analysis identifying and discussing all appropriate uncertainties that could affect calculated risk. An explanation of how the uncertainty analysis will be conducted.

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 and 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 340-122-0084; DEQ guidance; and, as appropriate, Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, EPA, Interim Final, June 1997 (EPA/540/R-97/006).

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 340-122-0084(3). The Ecological Risk Assessment can be completed using either deterministic or probabilistic methodologies. If probabilistic methodologies are to be used, then AMCC 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.

The work plan should include, but not be limited to the following:

1. A Level I Scoping plan to conduct conservative, qualitative determination of whether there is any reason to believe that ecological receptors and/or complete exposure pathways are present or potentially present at or in the locality of the site.
2. A Level II Screening plan to include identification of contaminants of potential ecological concern, potential ecological effects, ecological receptors, exposure pathways, initial definition of assessment and measurement endpoints, all with respect to current and reasonably likely future land and water uses. The plan for the problem formulations should include a preliminary conceptual site model that integrates ecological receptors, contaminants of potential ecological concern, and exposure routes. Similar to the human health risk assessment, the conceptual site model for the ecological risk assessment should be an iterative flow chart based on available information. Iterations of this model shall be carried through the work plan and risk assessment as additional information is generated.
3. Data quality objectives based on the conceptual site model.
4. A Baseline Level III or Level IV plan for conducting an exposure analysis which would refine the preliminary conceptual site model and include the identification and selection of contaminants of ecological concern; definition of population based on habitat and spatial extent of the population; identification and selection of target ecological receptors; a spatial analysis of contaminant data; calculation of exposure point concentrations; an exposure pathway model relating target receptors, their exposure routes, and measurement endpoints; and a quantitative estimate of exposure for both current and reasonably likely future land and water use scenarios.
5. A Baseline Level III or Level IV plan for conducting an ecological response analysis to include a summary of current information regarding the toxicological effects, ecological effects, and bioaccumulation potential of the identified contaminants of potential ecological concern, as well as ecological benchmarks values.
6. A Baseline Level III or Level IV plan for conducting a risk characterization presenting the quantitative ecological risks potentially associated with the facility, a weight-of-evidence analysis of risk, a discussion of any available facility-specific ecological studies, and consideration of any other available published peer-reviewed scientific information on other sources of stress as appropriate.
7. A Baseline Level III or Level IV plan for conducting an uncertainty analysis identifying and discussing all appropriate uncertainties that could affect calculated risk.

VI. INTERIM REMOVAL MEASURE ASSESSMENT AND FEASIBILITY STUDY WORK PLANS

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

Scope: The Interim Removal Measure (IRM) Assessment Work Plan shall identify and evaluate potentially feasible IRMs (e.g., fencing, and other measures to restrict access; soil removal; capping; hydraulic containment; and other risk reduction measures) that could mitigate immediate threats to human health and safety or the environment and prevent or reduce further contaminant migration.

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. 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 work plans for the IRM Assessment and FS shall include a preliminary evaluation of data collected during the RI. The evaluation should be used to identify potential IRMs, preliminary remedial alternatives and additional data needs. The preliminary evaluation of the RI 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. A preliminary identification of hot spots that meet the definition in OAR 340-122-0115(31), including a preliminary estimate of hot spot volumes.
4. A preliminary identification of relevant federal, state, and local laws and regulations.
5. Proposed contaminant concentration levels that meet preliminary remedial goals and a preliminary estimate of the volume exceeding those concentrations, for each affected environmental medium.
6. Description of any additional investigative work that needs to be conducted to complete the IRM Assessment and FS.

B. DESCRIPTION OF IRM ASSESSMENT PROCESS

The IRM Assessment Work Plan shall include a description of how potential IRMs will be identified, screened, and evaluated in detail, including discussions of the feasibility and costs of each potential IRM identified, and a schedule for implementation.

C. 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 removal alternatives to be developed.
3. Describe interim removal or remediation activities which have been implemented to date or are planned, and the relationship of the interim activities to the preliminary RAOs.
4. Describe how general response actions will be identified. General response actions should describe areas or volumes of media to which containment, treatment or removal actions may be applied that may satisfy the RAOs for the site.
5. Describe how potential remedial action technologies applicable to each general response 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. PROGRESS REPORTS

Three copies of Progress Reports shall be submitted to DEQ by the 10th day of each third month. These reports shall include, but not limited to the following:

1. Actions taken during the previous reporting period;
2. Actions scheduled to be taken in the next three months.
3. A summary of sampling, test results, and any other data generated or received during the previous reporting period; and,
4. Description of any problems or difficulties experienced during the previous reporting period and actions to be taken or taken to resolve them.

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.**
 - a. Purpose.
 - b. Report organization.
3. **Site Background.** A description and supporting maps of facility operations, including, but not limited to, the following:
 - a. Site description.
 - i. Location.
 - ii. Physical features, such as buildings, roads, etc.
 - iii. Site history.
 - b. Facility operations.
 - i. Location, time and volume of known hazardous substance spills, including a map.
 - ii. Past and present waste treatment/disposal practices and areas.
 - iii. The approximate time periods for past operational, treatment, storage, disposal and/or discharge practices.

- iv. A map of all pertinent structures on, adjacent to or near the site, such as buildings, tanks, drainage ditches, pipelines, roadways, wells and utility corridors.
- c. Site setting.
 - i. Geology.
 - ii. Hydrogeology.
 - iii. Surface water.
 - iv. Aquatic and terrestrial habitat
 - v. Climatology.
- d. Historic, current and reasonably likely future land use at the facility and in the locality of the facility. The report shall include as appropriate:
 - i. Maps and descriptions of current and historic land use zoning.
 - ii. Other land use designations.
 - iii. Land use plans as established in the local comprehensive plans and land use implementing regulations of any governmental body having land use jurisdiction.
 - iv. Concerns of the facility owner, neighboring owners, and the community.
 - v. Any other relevant information.
- e. Current and reasonably likely future beneficial uses of groundwater and surface water in the locality of the facility. This report shall include as appropriate:
 - i. Nature and extent of current groundwater and surface water users.
 - ii. Suitability of groundwater and surface water for beneficial uses.
 - iii. Reasonably likely future uses of groundwater and surface water, based on:
 - (a) Historical land and water uses.
 - (b) Anticipated future land and water uses.
 - (c) Community and nearby property owners' concerns regarding future water use.
 - (d) Regional and local development patterns.
 - (e) Regional and local population projections.
 - (f) Federal, state, and/or local regulations governing the appropriation and/or use of water.
 - (g) Availability of alternate water sources including, but not limited to, public water supplies, groundwater sources and surface water sources.
 - (h) The contribution of water in the locality of the facility to the maintenance of aquatic or terrestrial habitat.
 - (i) The potential for contaminant migration.
- f. Previous investigations.
 - i. Summary of previous investigations.
 - ii. List of reports referenced.

4. **Study Area Investigation.**

- a. **Soils.** The report shall include, but not be limited to, the following:
 - i. A map and description of the location of soil samples, including depth of sample, sampling parameters, sampling interval, sampling methods, analytical methods and any deviations from the SAP.
 - ii. Description of soil samples.
 - iii. Geologic cross-sections.
 - iv. A map showing the locations of geologic cross-sections.
 - v. Presentation of results and data analysis, including data limitations.

- b. **Groundwater.** The report shall include, but not be limited to, the following:
 - i. Describe the groundwater investigation plan, including well locations, well depths, length of screened intervals, drilling methods, construction materials and installation methods, analytical methods, well development and completion methods and any deviations from the SAP.
 - ii. A map of all groundwater sampling locations.
 - iii. Characterize the hydrogeology, including a description of formation materials, the hydrogeology, and hydrogeologic properties of each pertinent aquifer.
 - iv. Present water table/potentiometric maps. Describe hydraulic influences from groundwater wells and surface water bodies.
 - v. Identify areas of recharge/discharge.
 - vi. Present results of the well inventory to identify all active and inactive water wells within an acceptable radius of the facility.
 - vii. Present results and data analysis, including data limitations.

- c. **Surface Water and Sediments.** The report shall include, as applicable:
 - i. Identify, and show on a map, all relevant surface water bodies within an acceptable radius of the facility.
 - ii. Delineate past and present surface drainage patterns at the site and include a map showing the storm water collection system.
 - iii. A map and description of all surface water and sediment sampling locations, including depth of sample, sampling parameters, sampling methods, analytical methods and any deviations from the SAP.
 - iv. Present results and data analysis, including data limitations.

- d. **Air.** The report shall include as applicable:
 - i. Provide a map and description of air sampling locations, including sampling parameters, sampling methods, analytical methods and any deviations from the SAP.
 - ii. An analysis of ambient air conditions.
 - iii. Present results and data analysis, including data limitations.

5. **Summary and Conclusions**

- a. A discussion of the nature and extent of contamination, including a discussion of data limitations.
- b. A discussion of the fate and transport of contaminants in all affected environmental media.

6. **Appendices.**

Supporting information of the Remedial Investigation shall be submitted in the Appendices of the report. The report shall include, at a minimum:

- a. All boring and lithologic logs for soil borings and monitoring wells.
- b. Well construction details, including:
 - i. Surveyed location (latitude or longitude).
 - ii. Elevation of top of casing.
 - iii. Size and depth of well.
 - iv. Screened interval.
 - v. Well construction diagrams.
- c. Results of all chemical and physical analyses.
- d. Quality assurance and quality control data and a data validation report.

C. **RISK ASSESSMENT REPORT**

The Risk Assessment Report shall quantify risk as outlined below, and provide a preliminary identification of hot spots.

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:

a. Introduction

Provide a detailed description of the site, its environmental problems, its geographic location, and its history. Also, provide the specific objectives, scope and organization of the risk assessment report.

b. Chemicals of Concern

Provide a detailed description of how data was gathered or generated in order to identify a set of chemicals that are likely to be site-related. The concentrations of these chemicals that are of acceptable quality for use in the quantitative analysis of the risk should be reported.

c. Exposure Assessment

Provide a detailed description of the exposure pathways (source, release mechanisms, transfer or transport mechanisms, potentially exposed population, exposure routes). The quantitative estimate of exposure based on both current and future land use scenarios should be included.

d. Toxicity Assessment

Provide a summary of current toxicity information on the carcinogenic and non-carcinogenic effects of the chemicals of concern, and provide up-to-date reference levels (reference doses and slope factors) for chemicals of concern.

e. Risk Characterization

Present the quantitative current or reasonably likely future risks to human receptors potentially associated with the site. In addition, present an assessment of uncertainty and consideration of any site-specific human health studies, if available and appropriate. If portions of these sections have been prepared for other sections of the RI Report, these may be referenced.

f. Uncertainty Analysis

Present a quantitative and qualitative uncertainty analysis as appropriate for each element of the risk assessment.

2. **Ecological Risk Assessment Report**

The main sections of the Ecological Risk Assessment Report should include the following:

a. Problem Formulation

Identify contaminants of ecological interest, potential ecological effects, ecological receptors, including individual threatened and endangered species and populations of plants or animals in the locality of the facility, relevant exposure pathways, initial definition of assessment and measurement endpoints, all with respect to current and reasonably likely future land and water uses, as shown in a conceptual site model.

b. Exposure Analysis.

Identify and select potential contaminants of ecological concern; identify and select target ecological receptors; develop an exposure pathway model relating target receptors, exposure routes and measurement endpoints; and present a quantitative estimate of exposure for both current and reasonably likely future land and water use scenarios.

c. Ecological Response Analysis.

Summarize current information regarding the toxicological effects, ecological effects, bioconcentration potential, bioaccumulation potential, biomagnification potential, and persistence of the identified contaminants of ecological concern as well as ecological benchmark values.

d. Risk Characterization

Present the quantitative ecological current or reasonably likely future risks potentially associated with the facility; a weight-of-evidence analysis of risk; identifications of contaminants of ecological concern; a discussion of risks associated with the bioconcentration potential, bioaccumulation potential, biomagnification potential, and persistence of each contaminant; and consideration of any other available, published and peer-reviewed scientific information on other sources of stress as appropriate.

e. Uncertainty Analysis.

Present a quantitative and qualitative uncertainty analysis as appropriate for each element of the risk assessment.

D. INTERIM REMOVAL MEASURE ASSESSMENT REPORT

The results of the Interim Removal Measure Assessment shall be submitted to DEQ in a report, which includes the identification and screening of general response actions and technologies, and the development and detailed evaluation of a representative number of potential IRMs. For each alternative, the report shall discuss its technical and administrative feasibility, its advantages and disadvantages, its estimated construction/implementation time, its operational and maintenance (O&M) requirements (including monitoring activities), and its associated capital and O&M costs. The report shall also include AMCC's conclusions and recommendations.

E. 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 and baseline human health and ecological risk assessments. 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. 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 or waters 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 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 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.

4. **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 removal alternatives to be developed. Develop and discuss general response actions for each medium of interest defining containment, treatment, and removal actions singly or in combination, that may be taken to satisfy the RAOs for the site.

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

Identify potential containment, treatment, and removal technologies applicable to each general response 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 removal combinations.

6. **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.

7. **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. The extent to which the remedial action treats hot spots of contamination, as follows:
 - i. For hot spots of contamination in groundwater or surface water 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 or surface water 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 or surface water, 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 or surface water, 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 or surface water, 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.

8. **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.

9. **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.

F. REPORT DISTRIBUTION.

- 1. [One electronic copy,] one bound and two (2) unbound hard copy(s) of all reports will be submitted to DEQ.
- 2. DEQ requests that all copies of work plans and reports be duplex printed on recycled paper.
- 3. Electronic copies of work plans and reports, including all data and figures, if requested, shall be submitted in Microsoft Office or ArcView compatible format. All photographs must be submitted in both hard copy and electronic file formats.