STATE OF WASHINGTON
KING COUNTY SUPERIOR COURT

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY, Plaintiff, v. PORT OF SEATTLE, Defendant.	NO. CONSENT DECREE RE: TERMINAL 30 SITE

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I. INTRODUCTION

A. The mutual objective of the State of Washington, Department of Ecology (Ecology) and Port of Seattle (Defendant) under this Decree is to provide for remedial action at a facility where there has been a release or threatened release of hazardous substances. This Decree requires Defendant to perform final cleanup of the Terminal 30 Site in Seattle, Washington. The final cleanup includes the installation and operation of an air sparging/soil vapor extraction (AS/SVE) treatment system, the recovery of light non-aqueous phase liquid (LNAPL), and the performance of reporting and monitoring activities.

B. Ecology has determined that these actions are necessary to protect human health and the environment.

C. The Complaint in this action is being filed simultaneously with this Decree. An Answer has not been filed, and there has not been a trial on any issue of fact or law in this case. However, the Parties wish to resolve the issues raised by Ecology's Complaint. In addition, the Parties agree that settlement of these matters without litigation is reasonable and in the public interest, and that entry of this Decree is the most appropriate means of resolving these matters.

D. By signing this Decree, the Parties agree to its entry and agree to be bound by its terms.

E. By entering into this Decree, the Parties do not intend to discharge non-settling parties from any liability they may have with respect to matters alleged in the Complaint. The Parties retain the right to seek reimbursement, in whole or in part, from any liable persons for sums expended under this Decree.

F. This Decree shall not be construed as proof of liability or responsibility for any releases of hazardous substances or cost for remedial action nor an admission of any facts; provided, however, that Defendant shall not challenge the authority of the Attorney General and Ecology to enforce this Decree.

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G. The Court is fully advised of the reasons for entry of this Decree, and good cause having been shown:

Now, therefore, it is HEREBY ORDERED, ADJUDGED, AND DECREED as follows:

II. JURISDICTION

A. This Court has jurisdiction over the subject matter and over the Parties pursuant to the Model Toxics Control Act (MTCA), RCW 70.105D.

B. Authority is conferred upon the Washington State Attorney General by RCW 70.105D.040(4)(a) to agree to a settlement with any potentially liable person (PLP) if, after public notice and any required hearing, Ecology finds the proposed settlement would lead to a more expeditious cleanup of hazardous substances. RCW 70.105D.040(4)(b) requires that such a settlement be entered as a consent decree issued by a court of competent jurisdiction.

C. Ecology has determined that a release or threatened release of hazardous substances has occurred at the Site that is the subject of this Decree.

D. Ecology has given notice to Defendant of Ecology's determination that Defendant is a PLP for the Site, as required by RCW 70.105D.020(26) and WAC 173-340-500.

E. The actions to be taken pursuant to this Decree are necessary to protect public health and the environment.

F. This Decree has been subject to public notice and comment.

G. Ecology finds that this Decree will lead to a more expeditious cleanup of hazardous substances at the Site in compliance with the cleanup standards established under RCW 70.105D.030(2)(e) and WAC 173-340.

H. Defendant has agreed to undertake the actions specified in this Decree and consents to the entry of this Decree under MTCA.

III. PARTIES BOUND

This Decree shall apply to and be binding upon the Parties to this Decree, their successors and assigns. The undersigned representative of each party hereby certifies that he

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or she is fully authorized to enter into this Decree and to execute and legally bind such party to comply with this Decree. Defendant agrees to undertake all actions required by the terms and conditions of this Decree. No change in ownership or corporate status shall alter Defendant's responsibility under this Decree. Defendant shall provide a copy of this Decree to all agents, contractors, and subcontractors retained to perform work required by this Decree, and shall ensure that all work undertaken by such agents, contractors, and subcontractors complies with this Decree.

IV. DEFINITIONS

Unless otherwise specified herein, all definitions in RCW 70.105D.020 and WAC 173-340-200 shall control the meanings of the terms in this Decree.

A. Site: The Site is referred to as Terminal 30 (T30) and is generally located at 1901 East Marginal Way South, Seattle, Washington, approximately one mile southwest of downtown Seattle, in King County, Washington on the shoreline of the East Waterway. The Site is defined by the extent of contamination caused by the release of hazardous substances, more particularly described in the Site Diagram (Exhibit A). The Site constitutes a facility under RCW 70.105D.020(8).

B. Parties: Refers to the State of Washington, Department of Ecology and the Port of Seattle.

C. Defendant: Refers to the Port of Seattle.

D. Consent Decree or Decree: Refers to this Consent Decree and each of the exhibits to this Decree. All exhibits are integral and enforceable parts of this Consent Decree. The terms "Consent Decree" or "Decree" shall include all exhibits to this Consent Decree.

V. FINDINGS OF FACTS

Ecology makes the following findings of fact without any express or implied admissions of such facts by Defendant.

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A. The Site is located at 1901 East Marginal Way South, Seattle, Washington, approximately one mile southwest of downtown Seattle, in King County, across the East Waterway from Harbor Island. The Site location is depicted in Exhibit A. The facility is depicted in Exhibit A. The Site is listed on the Department of Ecology's Cleanup Sites List as "Port of Seattle Terminal 30" with the Facility Site ID No. 2055.

B. The Defendant is the owner of the Site, and has owned the Site continuously since 1985. Since 1905, a Chevron bulk fuel terminal occupied a portion of T30. The Chevron bulk fuel terminal consisted of above-ground fuel storage tanks and associated piping and equipment. The Port purchased T30 from Chevron on January 2, 1985. The fuel terminal was demolished between December 1984 and about November 1985. The Port redeveloped the 33.9 acre Terminal 30 as a container facility.

C. Since the early 1990s, petroleum contamination caused by releases at the former Chevron bulk fuel terminal has been the subject of a number of investigations and interim actions.

D. A product recovery system was installed in the 1980s that removed more than 171,000 gallons of petroleum product. As part of the redevelopment in 2007, a site-wide asphalt cover was constructed, and more than 24,000 cubic yards of petroleum-impacted soil were disposed of offsite. However, substantial petroleum product remained in the soil and groundwater at the Site.

E. The primary contaminants identified in soil and groundwater are:

Petroleum Hydrocarbons

- Diesel-Range Organics
- Gasoline-Range Organics
- Oil-Range Organics
- BTEX: Benzene, Toluene, Ethylbenzene, Xylenes (total)

Semi-Volatile Organic Compounds

- 2-methylnapthalene

Polynuclear Aromatic Hydrocarbons (PAHs)

F. As required by the 1991 Agreed Order (AO), a draft Remedial Investigation/Feasibility Study (RI/FS) was developed in 1998 by GeoEngineers (1998 RI/FS) to document the nature and extent of contamination and to evaluate remedial alternatives. Ecology did not approve the draft RI/FS.

G. A draft final RI/FS was prepared by Pacific Groundwater Group (PGG) in 2013 to update the status of petroleum contamination at the site, to identify a preferred final remedial action, and to fulfill the requirements of the 1991 AO.

H. Section V of the 1991 AO was amended on October 23, 2013, such that the Port would prepare and submit a draft Cleanup Action Plan (dCAP) for Ecology review and approval.

I. All requirements under the 1991 AO, as amended, have been completed to Ecology's satisfaction.

VI. WORK TO BE PERFORMED

This Decree contains a program designed to protect human health and the environment from the known release, or threatened release, of hazardous substances or contaminants at, on, or from the Site.

A. The defendant shall perform a cleanup action at the Site by implementing the Cleanup Action Plan (CAP) (Exhibit B), which establishes the required remedial actions at the Site in accordance with the Scope of Work and Schedule (Exhibit C) and all other requirements of this Decree. The CAP, and Scope of Work and Schedule are incorporated by reference and form an integral and enforceable part of this Decree These remedial actions include implementing air sparging/soil vapor extraction (AS/SVE) treatment in the Sheen Area in the vicinity of monitoring wells (going south to north) MW-36, MW-39, and MW-42; light

non-aqueous phase liquid (LNAPL) recovery and AS/SVE treatment in the vicinity of RW-12 and MW-59; and confirmation, performance, and compliance monitoring.

B. Defendant agrees not to perform any remedial actions outside the scope of this Decree unless the Parties agree to modify the CAP (Exhibit B) and Scope of Work and Schedule (Exhibit C) to cover these actions. All work conducted by Defendant under this Decree shall be done in accordance with WAC 173-340 unless otherwise provided herein.

C. All plans or other deliverables submitted by the Port of Seattle for Ecology's review and approval under the CAP (Exhibit B) and Scope of Work and Schedule (Exhibit C) shall, upon Ecology's approval, become integral and enforceable parts of this Decree.

VII. DESIGNATED PROJECT COORDINATORS

The project coordinator for Ecology is:

Sunny Becker
3190 160th Avenue SE
Bellevue, WA 98008
hlin461@ecy.wa.gov
(425) 649-7187

The project coordinator for Defendant is:

Roy Kuroiwa
Port of Seattle
2711 Alaskan Way
Seattle, WA 98121
kuroiwa.r@portseattle.org
(206) 787-3814

Each project coordinator shall be responsible for overseeing the implementation of this Decree. Ecology's project coordinator will be Ecology's designated representative for the Site. To the maximum extent possible, communications between Ecology and Defendant and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Decree shall be directed through the project coordinators. The project coordinators may designate, in writing, working level staff

contacts for all or portions of the implementation of the work to be performed required by this Decree.

Any party may change its respective project coordinator. Written notification shall be given to the other party at least ten (10) calendar days prior to the change.

VIII. PERFORMANCE

All geologic and hydrogeologic work performed pursuant to this Decree shall be under the supervision and direction of a geologist or hydrogeologist licensed by the State of Washington or under the direct supervision of an engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43 and 18.220.

All engineering work performed pursuant to this Decree shall be under the direct supervision of a professional engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

All construction work performed pursuant to this Decree shall be under the direct supervision of a professional engineer or a qualified technician under the direct supervision of a professional engineer. The professional engineer must be registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

Any documents submitted containing geologic, hydrologic, or engineering work shall be under the seal of an appropriately licensed professional as required by RCW 18.43 and 18.220.

Defendant shall notify Ecology in writing of the identity of any engineer(s) and geologist(s), contractor(s) and subcontractor(s), and others to be used in carrying out the terms of this Decree, in advance of their involvement at the Site.

IX. ACCESS

Ecology or any Ecology authorized representative shall have access to enter and freely move about all property at the Site that Defendant either owns, controls, or has access rights to at all reasonable times for the purposes of, *inter alia*: inspecting records, operation logs, and

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contracts related to the work being performed pursuant to this Decree; reviewing Defendant's progress in carrying out the terms of this Decree; conducting such tests or collecting such samples as Ecology may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Decree; and verifying the data submitted to Ecology by Defendant. Defendant shall make all reasonable efforts to secure access rights for those properties within the Site not owned or controlled by Defendant where remedial activities or investigations will be performed pursuant to this Decree. Ecology or any Ecology authorized representative shall give reasonable notice before entering any Site property owned or controlled by Defendant unless an emergency prevents such notice. All Parties who access the Site pursuant to this section shall comply with any applicable health and safety plan(s) in compliance with Transportation Worker Identification Credential (TWIC) requirements, or will be TWIC escorted. Ecology employees and their representatives shall not be required to sign any liability release or waiver as a condition of Site property access.

X. SAMPLING, DATA SUBMITTAL, AND AVAILABILITY

With respect to the implementation of this Decree, Defendant shall make the results of all sampling, laboratory reports, and/or test results generated by it or on its behalf available to Ecology. Pursuant to WAC 173-340-840(5), all sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with Section XI (Progress Reports), Ecology's Toxics Cleanup Program Policy 840 (Data Submittal Requirements), and/or any subsequent procedures specified by Ecology for data submittal.

If requested by Ecology, Defendant shall allow Ecology and/or its authorized representative to take split or duplicate samples of any samples collected by Defendant pursuant to the implementation of this Decree. Defendant shall notify Ecology seven (7) days in advance of any sample collection or work activity at the Site. Ecology shall, upon request, allow Defendant and/or its authorized representative to take split or duplicate samples of any samples collected by Ecology pursuant to the implementation of this Decree, provided that

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doing so does not interfere with Ecology's sampling. Without limitation on Ecology's rights under Section IX (Access), Ecology shall notify Defendant prior to any sample collection activity unless an emergency prevents such notice.

In accordance with WAC 173-340-830(2)(a), all hazardous substance analyses shall be conducted by a laboratory accredited under WAC 173-50 for the specific analyses to be conducted, unless otherwise approved by Ecology.

XI. PROGRESS REPORTS

Defendant shall submit to Ecology written calendar quarterly Progress Reports that describe the actions taken during the previous quarter to implement the requirements of this Decree. The Progress Reports shall include the following:

A. A list of onsite activities that have taken place during the quarter;

B. Detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests;

C. Description of all deviations from the CAP (Exhibit B) and Scope of Work and Schedule (Exhibit C) during the previous quarter and any planned deviations in the upcoming quarter;

D. For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule;

E. All quality assurance/quality control reviewed data (including laboratory analyses) received by Defendant during the past quarter and an identification of the source of the sample; and

F. A list of deliverables for the upcoming month if different from the schedule.

All Progress Reports shall be submitted during the month following completion of a quarter. At Ecology's discretion, the frequency of progress reports may be adjusted. Unless otherwise specified, Progress Reports and any other documents submitted pursuant to this

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Decree shall be sent by certified mail, return receipt requested, to Ecology's project coordinator.

XII. RETENTION OF RECORDS

During the pendency of this Decree, and for ten (10) years from the date this Decree is no longer in effect as provided in Section XXVIII (Duration of Decree), Defendant shall preserve all records, reports, documents, and underlying data in its possession relevant to the implementation of this Decree and shall insert a similar record retention requirement into all contracts with project contractors and subcontractors. Upon request of Ecology, Defendant shall make all records available to Ecology and allow access for review within a reasonable time.

Nothing in this Decree is intended by Defendant to waive any right it may have under applicable law to limit disclosure of documents protected by the attorney work-product privilege and/or the attorney-client privilege. If Defendant withholds any requested records based on an assertion of privilege, Defendant shall provide Ecology with a privilege log specifying the records withheld and the applicable privilege. No Site-related data collected pursuant to this Decree shall be considered privileged.

XIII. TRANSFER OF INTEREST IN PROPERTY

No voluntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the Site shall be consummated by Defendant without provision for continued operation and maintenance of any containment system, treatment system, and/or monitoring system installed or implemented pursuant to this Decree.

Prior to Defendant's transfer of any interest in all or any portion of the Site, and during the effective period of this Decree, Defendant shall provide a copy of this Decree to any prospective purchaser, lessee, transferee, assignee, or other successor in said interest; and, at least thirty (30) days prior to any transfer, Defendant shall notify Ecology of said transfer. Upon transfer of any interest, Defendant shall notify all transferees of the restrictions on the

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activities and uses of the property under this Decree and incorporate any such use restrictions into the transfer documents.

XIV. RESOLUTION OF DISPUTES

A. In the event that Defendant elects to invoke dispute resolution, Defendant must utilize the procedure set forth below.

1. Upon the triggering event (receipt of Ecology's project coordinator's written decision or an itemized billing statement), Defendant has fourteen (14) calendar days within which to notify Ecology's project coordinator in writing of its dispute (Informal Dispute Notice).

2. The Parties' project coordinators shall then confer in an effort to resolve the dispute informally. The parties shall informally confer for up to fourteen (14) calendar days from receipt of the Informal Dispute Notice. If the project coordinators cannot resolve the dispute within those 14 calendar days, then within seven (7) calendar days Ecology's project coordinator shall issue a written decision (Informal Dispute Decision) stating: the nature of the dispute; the Defendant's position with regards to the dispute; Ecology's position with regards to the dispute; and the extent of resolution reached by informal discussion.

3. Defendant may then request regional management review of the dispute. This request (Formal Dispute Notice) must be submitted in writing to the Northwest Region Toxics Cleanup Section Manager within seven (7) calendar days of receipt of Ecology's Informal Dispute Decision. The Formal Dispute Notice shall include a written statement of dispute setting forth: the nature of the dispute; the disputing Party's position with respect to the dispute; and the information relied upon to support its position.

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4. The Section Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute (Decision on Dispute) within thirty (30) calendar days of receipt of the Formal Dispute Notice.

5. If Defendant finds Ecology's Regional Section Manager's decision unacceptable, Defendant may then request final management review of the decision. This request (Final Review Request) shall be submitted in writing to the Toxics Cleanup Program Manager within seven (7) calendar days of Defendant's receipt of the Decision on Dispute. The Final Review Request shall include a written statement of dispute setting forth: the nature of the dispute; the disputing Party's position with respect to the dispute; and the information relied upon to support its position.

6. Ecology's Toxics Cleanup Program Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute (Final Decision on Dispute) within thirty (30) calendar days of receipt of the Final Review Request. The Toxics Cleanup Program Manager's decision shall be Ecology's final decision on the disputed matter.

B. If Ecology's Final Decision on Dispute is unacceptable to Defendant, Defendant has the right to submit the dispute to the Court for resolution. The Parties agree that one judge should retain jurisdiction over this case and shall, as necessary, resolve any dispute arising under this Decree. In the event Defendant presents an issue to the Court for review, the Court shall review the action or decision of Ecology on the basis of whether such action or decision was arbitrary and capricious and render a decision based on such standard of review.

C. The Parties agree to only utilize the dispute resolution process in good faith and agree to expedite, to the extent possible, the dispute resolution process whenever it is used. Where either party utilizes the dispute resolution process in bad faith or for purposes of delay, the other party may seek sanctions.

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D. Implementation of these dispute resolution procedures shall not provide a basis for delay of any activities required in this Decree, unless Ecology agrees in writing to a schedule extension or the Court so orders.

E. In case of a dispute, failure to either proceed with the work required by this Decree or timely invoke dispute resolution may result in Ecology's determination that insufficient progress is being made in preparation of a deliverable, and may result in Ecology undertaking the work under Section XXV (Implementation of Remedial Action).

XV. AMENDMENT OF DECREE

The project coordinators may agree to minor changes to the work to be performed without formally amending this Decree. Minor changes will be documented in writing by Ecology.

Substantial changes to the work to be performed shall require formal amendment of this Decree. This Decree may only be formally amended by a written stipulation among the Parties that is entered by the Court, or by order of the Court. Such amendment shall become effective upon entry by the Court. Agreement to amend the Decree shall not be unreasonably withheld by any party.

Defendant shall submit a written request for amendment to Ecology for approval. Ecology shall indicate its approval or disapproval in writing and in a timely manner after the written request for amendment is received. If the amendment to the Decree is a substantial change, Ecology will provide public notice and opportunity for comment. Reasons for the disapproval of a proposed amendment to the Decree shall be stated in writing. If Ecology does not agree to a proposed amendment, the disagreement may be addressed through the dispute resolution procedures described in Section XIV (Resolution of Disputes).

XVI. EXTENSION OF SCHEDULE

A. An extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least thirty (30) days prior to expiration of the

deadline for which the extension is requested, and good cause exists for granting the extension. All extensions shall be requested in writing. The request shall specify:

1. The deadline that is sought to be extended;

2. The length of the extension sought;

3. The reason(s) for the extension; and

4. Any related deadline or schedule that would be affected if the extension were granted.

B. The burden shall be on Defendant to demonstrate to the satisfaction of Ecology that the request for such extension has been submitted in a timely fashion and that good cause exists for granting the extension. Good cause may include, but may not be limited to:

1. Circumstances beyond the reasonable control and despite the due diligence of Defendant including delays caused by unrelated third parties or Ecology, such as (but not limited to) delays by Ecology in reviewing, approving, or modifying documents submitted by Defendant;

2. Acts of God, including fire, flood, blizzard, extreme temperatures, storm, or other unavoidable casualty; or

3. Endangerment as described in Section XVII (Endangerment).

However, neither increased costs of performance of the terms of this Decree nor changed economic circumstances shall be considered circumstances beyond the reasonable control of Defendant.

C. Ecology shall act upon any written request for extension in a timely fashion. Ecology shall give Defendant written notification of any extensions granted pursuant to this Decree. A requested extension shall not be effective until approved by Ecology or, if required, by the Court. Unless the extension is a substantial change, it shall not be necessary to amend this Decree pursuant to Section XV (Amendment of Decree) when a schedule extension is granted.

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D. An extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. Ecology may grant schedule extensions exceeding ninety (90) days only as a result of:

1. Delays in the issuance of a necessary permit which was applied for in a timely manner;

2. Other circumstances deemed exceptional or extraordinary by Ecology; or

3. Endangerment as described in Section XVII (Endangerment).

XVII. ENDANGERMENT

In the event Ecology determines that any activity being performed at the Site under this Decree is creating or has the potential to create a danger to human health or the environment, Ecology may direct Defendant to cease such activities for such period of time as it deems necessary to abate the danger. Defendant shall immediately comply with such direction.

In the event Defendant determines that any activity being performed at the Site under this Decree is creating or has the potential to create a danger to human health or the environment, Defendant may cease such activities. Defendant shall notify Ecology's project coordinator as soon as possible, but no later than twenty-four (24) hours after making such determination or ceasing such activities. Upon Ecology's direction, Defendant shall provide Ecology with documentation of the basis for the determination or cessation of such activities. If Ecology disagrees with Defendant's cessation of activities, it may direct Defendant to resume such activities.

If Ecology concurs with or orders a work stoppage pursuant to this section, Defendant's obligations with respect to the ceased activities shall be suspended until Ecology determines the danger is abated, and the time for performance of such activities, as well as the time for any other work dependent upon such activities, shall be extended, in accordance with Section XVI

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(Extension of Schedule), for such period of time as Ecology determines is reasonable under the circumstances.

Nothing in this Decree shall limit the authority of Ecology, its employees, agents, or contractors to take or require appropriate action in the event of an emergency.

XVIII. COVENANT NOT TO SUE

A. Covenant Not to Sue: In consideration of Defendant's compliance with the terms and conditions of this Decree, Ecology covenants not to institute legal or administrative actions against Defendant regarding the release or threatened release of hazardous substances covered by this Decree.

This Decree covers only the Site specifically identified in the Site Diagram (Exhibit A) and those hazardous substances that Ecology knows are located at the Site as of the date of entry of this Decree. This Decree does not cover any other hazardous substance or area. Ecology retains all of its authority relative to any substance or area not covered by this Decree.

This Covenant Not to Sue shall have no applicability whatsoever to:

1. Criminal liability;

2. Liability for damages to natural resources; and

3. Any Ecology action, including cost recovery, against PLPs not a party to this Decree.

If factors not known at the time of entry of this Decree are discovered and present a previously unknown threat to human health or the environment, the Court shall amend this Covenant Not to Sue.

B. Reopeners: Ecology specifically reserves the right to institute legal or administrative action against Defendant to require it to perform additional remedial actions at the Site and to pursue appropriate cost recovery, pursuant to RCW 70.105D.050 under the following circumstances:

1. Upon Defendant's failure to meet the requirements of this Decree;

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2. Failure of the remedial action to meet the cleanup standards identified in the Cleanup Action Plan (CAP) (Exhibit B);

3. Upon Ecology's determination that remedial action beyond the terms of this Decree is necessary to abate an imminent and substantial endangerment to human health or the environment;

4. Upon the availability of new information regarding factors previously unknown to Ecology, including the nature or quantity of hazardous substances at the Site, and Ecology's determination, in light of this information, that further remedial action is necessary at the Site to protect human health or the environment; or

5. Upon Ecology's determination that additional remedial actions are necessary to achieve cleanup standards within the reasonable restoration time frame set forth in the CAP.

C. Except in the case of an emergency, prior to instituting legal or administrative action against Defendant pursuant to this section, Ecology shall provide Defendant with fifteen (15) calendar days' notice of such action.

XIX. CONTRIBUTION PROTECTION

With regard to claims for contribution against Defendant, the Parties agree that Defendant is entitled to protection against claims for contribution for matters addressed in this Decree as provided by RCW 70.105D.040(4)(d).

XX. LAND USE RESTRICTIONS

In consultation with Defendant, Ecology will prepare the Environmental (Restrictive) Covenant consistent with WAC 173-340-440 and RCW 64.70. After approval by Ecology, Defendant shall record the Environmental (Restrictive) Covenant with the office of the King County Auditor within three (3) months of completion of performance monitoring. The Environmental (Restrictive) Covenant shall restrict future activities and uses of the Site as

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agreed to by Ecology and Defendant. Defendant shall provide Ecology with the original recorded Environmental (Restrictive) Covenant within thirty (30) days of the recording date.

XXI. FINANCIAL ASSURANCES

Pursuant to WAC 173-340-440(11), Defendant shall maintain sufficient and adequate financial assurance mechanisms to cover all costs associated with the operation and maintenance of the remedial action at the Site, including institutional controls, compliance monitoring, and corrective measures.

Within sixty (60) days of the effective date of this Decree, Defendant shall submit to Ecology for review and approval an estimate of the costs that it will incur in carrying out the terms of this Decree, including operation and maintenance, and compliance monitoring. Within sixty (60) days after Ecology approves the aforementioned cost estimate, Defendant shall provide proof of financial assurances sufficient to cover all such costs in a form acceptable to Ecology.

Defendant shall adjust the financial assurance coverage and provide Ecology's project coordinator with documentation of the updated financial assurance for:

A. Inflation, annually, within thirty (30) days of the anniversary date of the entry of this Decree; or if applicable, the modified anniversary date established in accordance with this section, or if applicable, ninety (90) days after the close of Defendant's fiscal year if the financial test or corporate guarantee is used.

B. Changes in cost estimates, within thirty (30) days of issuance of Ecology's approval of a modification or revision to the CAP that result in increases to the cost or expected duration of remedial actions. Any adjustments for inflation since the most recent preceding anniversary date shall be made concurrent with adjustments for changes in cost estimates. The issuance of Ecology's approval of a revised or modified CAP will revise the anniversary date established under this section to become the date of issuance of such revised or modified CAP.

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XXII. INDEMNIFICATION

Defendant agrees to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action (1) for death or injuries to persons, or (2) for loss or damage to property to the extent arising from or on account of acts or omissions of Defendant, its officers, employees, agents, or contractors in entering into and implementing this Decree. However, Defendant shall not indemnify the State of Washington nor save nor hold its employees and agents harmless from any claims or causes of action to the extent arising out of the negligent acts or omissions of the State of Washington, or the employees or agents of the State, in entering into or implementing this Decree.

XXIII. COMPLIANCE WITH APPLICABLE LAWS

A. All actions carried out by Defendant pursuant to this Decree shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits, except as provided in RCW 70.105D.090. The permits or other federal, state, or local requirements that the agency has determined are applicable and that are known at the time of entry of this Decree have been identified in the List of Applicable or Relevant and Appropriate Requirements (Exhibit E).

B. Pursuant to RCW 70.105D.090(1), Defendant is exempt from the procedural requirements of RCW 70.94, 70.95, 70.105, 77.55, 90.48, and 90.58 and of any laws requiring or authorizing local government permits or approvals. However, Defendant shall comply with the substantive requirements of such permits or approvals. The exempt permits or approvals and the applicable substantive requirements of those permits or approvals, as they are known at the time of entry of this Decree, have been identified in the List of Applicable or Relevant and Appropriate Requirements (Exhibit E).

Defendant has a continuing obligation to determine whether additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Decree. In the event either Ecology or Defendant determines that additional

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permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Decree, it shall promptly notify the other party of this determination. Ecology shall determine whether Ecology or Defendant shall be responsible to contact the appropriate state and/or local agencies. If Ecology so requires, Defendant shall promptly consult with the appropriate state and/or local agencies and provide Ecology with written documentation from those agencies of the substantive requirements those agencies believe are applicable to the remedial action. Ecology shall make the final determination on the additional substantive requirements that must be met by Defendant and on how Defendant must meet those requirements. Ecology shall inform Defendant in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of this Decree. Defendant shall not begin or continue the remedial action potentially subject to the additional requirements until Ecology makes its final determination.

C. Pursuant to RCW 70.105D.090(2), in the event Ecology determines that the exemption from complying with the procedural requirements of the laws referenced in RCW 70.105D.090(1) would result in the loss of approval from a federal agency that is necessary for the state to administer any federal law, the exemption shall not apply and Defendant shall comply with both the procedural and substantive requirements of the laws referenced in RCW 70.105D.090(1), including any requirements to obtain permits.

XXIV. REMEDIAL ACTION COSTS

Defendant shall pay to Ecology costs incurred by Ecology pursuant to this Decree and consistent with WAC 173-340-550(2). These costs shall include work performed by Ecology or its contractors for, or on, the Site under RCW 70.105D, including remedial actions and Decree preparation, negotiation, oversight, and administration. These costs shall include work performed both prior to and subsequent to the entry of this Decree. Ecology's costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2). Ecology has accumulated $10,840.09 in remedial action costs related

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to this facility as of March 3, 2015. Payment for this amount shall be submitted within thirty (30) days of the effective date of this Decree. For all costs incurred subsequent to March 3, 2015, Defendant shall pay the required amount within thirty (30) days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and the amount of time spent by involved staff members on the project. A general statement of work performed will be provided upon request. Itemized statements shall be prepared quarterly. Pursuant to WAC 173-340-550(4), failure to pay Ecology's costs within ninety (90) days of receipt of the itemized statement of costs will result in interest charges at the rate of twelve percent (12%) per annum, compounded monthly.

In addition to other available relief, pursuant to RCW 70.105D.055, Ecology has authority to recover unreimbursed remedial action costs by filing a lien against real property subject to the remedial actions.

XXV. IMPLEMENTATION OF REMEDIAL ACTION

If Ecology determines that the Defendant has failed to make sufficient progress or failed to implement the remedial action, in whole or in part, Ecology may, after notice to Defendant, perform any or all portions of the remedial action or at Ecology's discretion allow the Defendant opportunity to correct. The Defendant shall reimburse Ecology for the costs of doing such work in accordance with Section XXIV (Remedial Action Costs).

Except where necessary to abate an emergency situation, Defendant shall not perform any remedial actions at the Site outside those remedial actions required by this Decree, unless Ecology concurs, in writing, with such additional remedial actions pursuant to Section XV (Amendment of Decree).

XXVI. PERIODIC REVIEW

As remedial action, including groundwater monitoring, continues at the Site, the Parties agree to review the progress of remedial action at the Site, and to review the data accumulated as a result of monitoring the Site as often as is necessary and appropriate under the

circumstances. At least every five (5) years after the initiation of cleanup action at the Site the Parties shall meet to discuss the status of the Site and the need, if any, for further remedial action at the Site. At least ninety (90) days prior to each periodic review, Defendant shall submit a report to Ecology that documents whether human health and the environment are being protected based on the factors set forth in WAC 173-340-420(4). Under Section XVIII (Covenant Not to Sue), Ecology reserves the right to require further remedial action at the Site under appropriate circumstances. This provision shall remain in effect for the duration of this Decree.

XXVII. PUBLIC PARTICIPATION

A Public Participation Plan is required for this Site. Ecology shall review any existing Public Participation Plan to determine its continued appropriateness and whether it requires amendment, or if no plan exists, Ecology shall develop a Public Participation Plan alone or in conjunction with Defendant.

Ecology shall maintain the responsibility for public participation at the Site. However, Defendant shall cooperate with Ecology, and shall:

A. If agreed to by Ecology, develop appropriate mailing lists, prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of work plans, remedial investigation/feasibility study reports, cleanup action plans, and engineering design reports. As appropriate, Ecology will edit, finalize, and distribute such fact sheets and prepare and distribute public notices of Ecology's presentations and meetings.

B. Notify Ecology's project coordinator prior to the preparation of all press releases and fact sheets, and before major meetings with the interested public and local governments. Likewise, Ecology shall notify Defendant prior to the issuance of all press releases and fact sheets, and before major meetings with the interested public and local governments. For all press releases, fact sheets, meetings, and other outreach efforts by Defendant that do not receive prior Ecology approval, Defendant shall clearly indicate to its

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audience that the press release, fact sheet, meeting, or other outreach effort was not sponsored or endorsed by Ecology.

C. When requested by Ecology, participate in public presentations on the progress of the remedial action at the Site. Participation may be through attendance at public meetings to assist in answering questions, or as a presenter.

D. When requested by Ecology, arrange and/or continue information repositories at the following locations:

1. Seattle Public Library
Beacon Hill Branch
2821 Beacon Avenue South
Seattle, WA 98144

2. Ecology's Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

At a minimum, copies of all public notices, fact sheets, and documents relating to public comment periods shall be promptly placed in these repositories. A copy of all documents related to this Site shall be maintained in the repository at Ecology's Northwest Regional Office in Bellevue, Washington.

XXVIII. DURATION OF DECREE

The remedial program required pursuant to this Decree shall be maintained and continued until Defendant has received written notification from Ecology that the requirements of this Decree have been satisfactorily completed. This Decree shall remain in effect until dismissed by the Court. When dismissed, Section XVIII (Covenant Not to Sue) and Section XIX (Contribution Protection) shall survive.

XXIX. CLAIMS AGAINST THE STATE

Defendant hereby agrees that it will not seek to recover any costs accrued in implementing the remedial action required by this Decree from the State of Washington or any of its agencies; and further, that Defendant will make no claim against the State Toxics Control

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Account or any local Toxics Control Account for any costs incurred in implementing this Decree. Except as provided above, however, Defendant expressly reserves its right to seek to recover any costs incurred in implementing this Decree from any other PLP. This section does not limit or address funding that may be provided under WAC 173-322.

XXX. EFFECTIVE DATE

This Decree is effective upon the date it is entered by the Court.

XXXI. WITHDRAWAL OF CONSENT

If the Court withholds or withdraws its consent to this Decree, it shall be null and void at the option of any party and the accompanying Complaint shall be dismissed without costs and without prejudice. In such an event, no party shall be bound by the requirements of this Decree.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

James J. Pendowski, Program Manager
Toxics Cleanup Program
(360) 407-7177

Date: 6/15/17

ROBERT W. FERGUSON
Attorney General

Nels Johnson, WSBA #28616
Assistant Attorney General
(360) 586-3514

Date: 7/7/17

PORT OF SEATTLE

David Soike
Interim Chief Executive Officer
(206) 728-3000

Date: 6/1/17

ENTERED this _____ day of _____ 2017.

JUDGE, King County Superior Court

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
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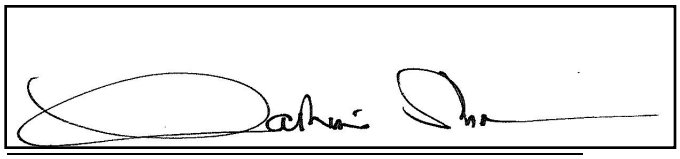
King County Superior Court
Judicial Electronic Signature Page

Case Number: 17-2-19080-2
Case Title: Not available at this time

Document Title: DECREE

Signed by: Catherine Shaffer
Date: 7/19/2017 12:19:45 PM



Judge/Commissioner: Catherine Shaffer

This document is signed in accordance with the provisions in GR 30.
Certificate Hash: 02A0B1FE28017BAC78E9BF6CE00C462718609D94
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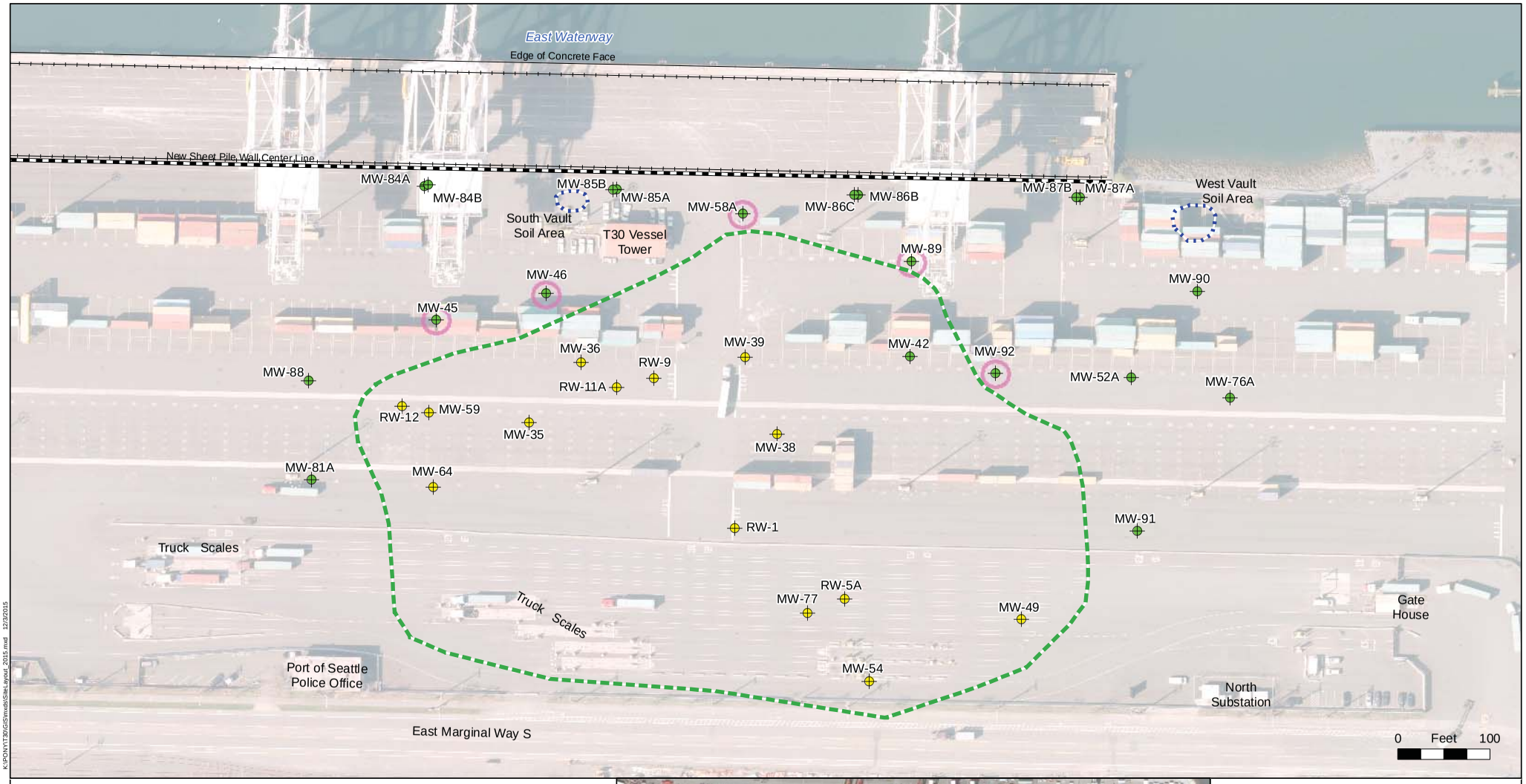
Certificate expiry date: 7/29/2018 11:40:17 AM
Certificate Issued by: C=US, E=kcscefiling@kingcounty.gov, OU=KCDJA, O=KCDJA, CN="Catherine Shaffer:PCh7R3n44hGZOTo3YYhwmw=="



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Gaging/Recovery Well

Water Quality Monitoring Well

Conditional Point of Compliance (CPOC) Wells

T-30 Site Boundary

Soil Areas Not Associated with T-30 Site

2012 USGS Orthophoto

Exhibit A
Site Layout

Port of Seattle
Terminal 30

PgG

CLEANUP ACTION PLAN
PORT OF SEATTLE TERMINAL 30

December 15, 2015

CLEANUP ACTION PLAN
PORT OF SEATTLE TERMINAL 30

Prepared by:

Washington State Department of Ecology

December 15, 2015

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Appendix A Supporting LNAPL Information

1.0 INTRODUCTION

This Cleanup Action Plan (CAP) describes the cleanup action selected by the Washington State Department of Ecology (Ecology) for Terminal 30 (T30) Site. The Site is generally located at 1901 East Marginal Way South, Seattle, Washington, approximately one mile southwest of downtown Seattle, in King County, Washington on the shoreline of the East Waterway.

This CAP was developed using information presented in the Remedial Investigation/Feasibility Study (RI/FS) for the Site, which was prepared by Pacific Groundwater Group (PGG) in 2013 on behalf of the Port of Seattle (Port) in accordance with the Agreed Order (AO) entered between Ecology and Port in 1991.

The CAP:

- presents selected cleanup alternatives
- presents site cleanup standards and remediation levels
- provides the schedule to implement the cleanup action

The T30 Site is being cleaned up under the authority of Model Toxics Control Act Chapter 70.105D of the Revised Code of Washington (RCW), and the Model Toxics Control Act (MTCA) Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code (WAC).

1.1 GENERAL FACILITY INFORMATION

The location and layout of T30 are presented in Figures 1-1 and 1-2.

Site Name:	Port of Seattle Terminal 30
Facility Site ID:	2055
Site Address:	1901 East Marginal Way South, Seattle, Washington
Parcel Number:	7666207830
Current Owner:	Port of Seattle, Roy Kuroiwa Project Manager
Current Operator:	SSA Marine (Port of Seattle Tenant)
Project Consultant:	Pacific Groundwater Group, Janet Knox Project Manager 2377 Eastlake Avenue East, Seattle WA 98102 206-329-0141

1.2 BACKGROUND

A Chevron Bulk fuel terminal occupied a portion of the T30 site since 1905. The Chevron bulk fuel terminal consisted of above-ground fuel storage tanks and associated piping and equipment. The Port purchased the T30 Site from Chevron on January 2, 1985. The fuel terminal was demolished between December 1984 and about November 1985. The Port redeveloped the 33.9 acres Terminal 30 as a container facility

The Port of Seattle (Port) and Ecology entered into an Agreed Order (AO) for cleanup at T30 in 1991, which was amended in 2013 to include preparation of this CAP.

As required by the 1991 AO, a draft Remedial Investigation/Feasibility Study (RI/FS) was developed in 1998 by GeoEngineers (1998 RI/FS) to document the nature and extent of contamination and to evaluate remedial alternatives. The draft RI/FS was not approved by Ecology.

A product recovery system was installed in the early 1990s that removed more than 171,000 gallons of product. As part of the redevelopment in 2007, a site-wide asphalt cover was constructed and more than 24,000 cubic yards of petroleum-impacted soil was disposed of offsite. However, substantial petroleum product remains in the soil and groundwater at the Site.

A final remedial investigation/feasibility study (RI/FS) was prepared by Pacific Groundwater Group (PGG) in 2013 to update the status of petroleum contamination at the site, to evaluate final remedial actions, and to fulfill the requirements of the 1991 AO.

1.3 SITE DESCRIPTION

T30 is located approximately one mile southwest of downtown Seattle, in King County, Washington on the shoreline of the Duwamish River East Waterway (Figure 1-1). The 2013 RI/FS and this CAP focus on approximately 11 acres in the northern portion of the larger 33.9 acre T30 property. The term “T30 site” or “site” refers to the extent of petroleum contamination in the northern portion of T30, inclusive of light non-aqueous phase liquid (LNAPL), soil, and groundwater contamination; the site boundary is shown in Figure 1-2. Soil contamination located at the West Vault and South Vault are from separate sources, and are not considered part of the Terminal 30 site.

The T30 site is bordered on the north by an area of public shoreline access to the East Waterway, on the east by East Marginal Way South, on the south by the southern portion of T30, and on the west by the East Waterway. The East Waterway is an operable unit of the Harbor Island Superfund Site as ordered by the U.S. Environmental Protection Agency (EPA).

1.3.1 Current Operations

T30 and the contiguous Terminal 25 to the south are currently operated as a 70-acre container storage and transfer facility by the Port's tenant SSA Marine, who is leasing the facility through 2023. Containerized freight is transferred between ships, trucks, and temporary terminal storage using a series of rail-mounted overhead cranes and forklifts. Activities are directed from the Vessel Tower and Gate House. The Vessel Tower is within the T30 site, while the Gate House is not (Figure 1-2). The T30 site is entirely paved with asphalt; runoff is controlled by a stormwater management system operated and maintained by SSA Marine (Figures 1-2 and 1-3).

1.3.2 Potential Future Development

The Port anticipates continued and long-term ownership of T30 and long-term use as a container facility. The Port has no plans to redevelop this property for alternate use.

1.3.3 Roads and Utilities Infrastructure

Vehicle access to T30 is directly from East Marginal Way and is controlled at the security Gate House. The City of Seattle provides water, electricity, and sanitary sewer service to T30. Stormwater runoff is managed by SSA Marine using best management practices. The stormwater management system treats runoff with oil/water separators and filtration media prior to discharge at outfalls to the East Waterway. Two of these outfalls, Hanford and Lander, enter the East Waterway south (upstream) of the site.

Utilities on the T30 site have been modified many times with varying levels of documentation. Most recently, additional subsurface utilities including electrical, sanitary sewer, and water were installed during the 2007-2009 container terminal construction (ENSR|AECOM 2010). Underground utilities documented in Port and Seattle Public Utility files are presented in Figure 1-3; additional abandoned or undocumented subsurface utility infrastructure may be present on the site.

1.3.4 Site Access

The site is accessed via the Main Gate on East Marginal Way. Site entry is managed at a staffed gate house at the Main Gate. A Transportation Worker Identification Card (TWIC) is required for access to the site to meet Department of Homeland Security regulations for access to marine port facilities. Site access must be arranged in advance with the Port of Seattle and the site tenant, which is currently SSA Terminals. Tenant contact information will be provided by the Port of Seattle as needed.

1.4 HYDROGEOLOGIC SETTING

Two stratigraphic units have been identified at the T30 site: fill and native deposits. Fill was derived at least in part from dredging and can be difficult to physically differentiate from similar native tidal flat and alluvial deposits (GeoEngineers, 1998). Key characteristics of these units include:

- Fill Unit—consists of sand and gravel with varying amounts of silt, wood, bricks, and construction debris; the unit thickens and dips westward toward the East Waterway (GeoEngineers, 1998). Fill units identified in the 1998 RI/FS by GeoEngineers were described as "laterally discontinuous" with a lower contact approximately 15 to 20 ft below ground surface (bgs) or the approximate historic MLLW tide line. Most of the fill materials tested for grain size distribution were classified as well-sorted sands and less commonly as sandy gravels, silty sand, and silts. During construction of the T30 facility in 1984-1985, additional fill for an engineered slope was placed after dredging operations were completed. This fill included sand with a surface layer of rip-rap extending to the base of the East Waterway.
- Native Deposits—consist of non-glacial, fluvial and estuarine, black, fine-to-medium sand with varying amounts of silt. Shell fragments and occasional organic materials were frequently observed in the native deposits.

Native soils and overlying fill comprise a shallow water table aquifer at the T30 site. Average depth to water ranges from 8 to 14 feet across the site. Recharge to the water table aquifer originates as precipitation in uplands and unpaved areas offsite; insignificant recharge originates at the T30 site due to the asphalt cover and the stormwater management system.

In the Duwamish Valley groundwater moves from upland recharge zones downgradient to Duwamish Waterway discharge zones. Groundwater at the T30 site generally flows toward the East Waterway, although discharge to the waterway is strongly influenced by tidal fluctuations and man-made structures. The average hydraulic gradient across the site is 0.0028 ft/ft with a slight increase near the sheet pile wall (Figure 1-2). Groundwater contours curve slightly northeast at the north end of the sheet pile wall, which is consistent with increased discharge around the end of the sheet pile wall. As tides rise and fall, flow between the East Waterway and the aquifer reverses in a tidal mixing zone that is relatively narrow; however, the zone of tidal influence on groundwater gradients is significantly wider.

Hydraulic conductivity of the shallow aquifer at the T30 site has been estimated based on tidal studies and grain size analysis (GeoEngineers, 1998). Estimates based on grain size analyses range from 0.02 to 0.1 cm/s (57 to 284 ft/day).

Estimates based on tidal studies range from 0.2 to 9 cm/s (567 to 25,500 ft/day) and likely overestimate the hydraulic conductivity of the aquifer given the native and fill lithologies observed at the T30 site. The higher tidal study estimates are typical hydraulic conductivities for clean gravels not for silty sands, which are observed in most borings at the site.

Additional discussion of the T30 hydrogeologic setting and tidal influence are included the RIFS (PGG, 2013b).

1.5 CONTAMINANTS OF CONCERN

The contaminants of concern (COC) in soil and groundwater include:

Petroleum Hydrocarbons

- Diesel-Range Organics
- Gasoline-Range Organics
- Oil-Range Organics
- BTEX: Benzene, Toluene, Ethylbenzene, Xylenes (total)

Semi-Volatile Organic Compounds

- 2-methylnapthalene

Polynuclear Aromatic Hydrocarbons (PAHs)

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Naphthalene
- Phenanthrene
- Pyrene

1.6 POINTS OF COMPLIANCE

For soil at the T30 site, the point of compliance extends through the soil profile to a depth of 15 feet for the direct contact exposure pathway.

The standard MTCA groundwater point of compliance is groundwater throughout the site. For the T30 site, a conditional point of compliance (CPOC) for groundwater is selected to be located as close as practical to the source of the petroleum sheen area and LNAPL area. Monitoring wells MW-45, MW-46, MW-58A, MW-89, and MW-92 (Figure 1-2), located at the edge of tidal flushing and between the sheen and LNAPL area and surface water receptors, are selected as compliance monitoring wells.

1.7 CLEANUP LEVELS

Soil and groundwater cleanup levels are listed in Tables 1-1 and 1-2.

1.7.1 Soil

Soil cleanup levels in Table 1-1, applied to the T30 site, are MTCA Method A values for industrial land use or soil leaching to groundwater protective of surface water values.

1.7.2 Groundwater

The groundwater cleanup levels in Table 1-2 are surface water criteria for marine water. The marine surface water criteria are applicable for groundwater at the T30 site because groundwater discharges to the East Waterway.

Surface water criteria are not established for diesel-, heavy oil-, and gasoline-range organics, and total xylenes. Therefore, MTCA Method A groundwater criteria were selected for those parameters.

1.7.3 LNAPL

Measurable thickness of LNAPL in monitoring wells will be considered an exceedance of WAC 173-340-747(10) regardless of groundwater concentrations in samples collected from the well. A measurable thickness is 0.01-feet, the practical measurement limit with an interface probe. The presence of sheen will not be considered an exceedance of the LNAPL criteria.

1.8 REMEDIATION LEVELS

Remediation levels will be used to track remediation progress in non-CPOC wells. Remediation levels are developed for a subset of COCs that are indicative

of TPH abundance, including: benzene, toluene, ethylbenzene, xylenes (BTEX); diesel range organics; and gasoline range organics. Remediation levels are used to demonstrate reduction in petroleum compound contaminant mass in the sheen area. In this context, remediation levels are a concentration reduction target for operation of the AS/SVE system, and are not a maximum concentration for compliance at performance monitoring wells. Remediation levels (RELs) in Table 1-3 are the maximum of either:

- 75% of the estimated solubility limit or
- twice the cleanup level

The composition of petroleum varies across the T30 site with variable amounts of weathered gasoline and diesel. The equilibrium concentrations of T30's COCs depend on soil and groundwater concentrations and on the petroleum mixtures in that part of the site. As shown in Table 1-3, the solubilities of individual compounds in equilibrium with different petroleum mixtures vary significantly. Therefore, a conservative EPA reference mixture is used to estimate effective solubilities rather than attempting to develop well-specific effective solubilities or one "T30 Product" effective solubility.

The solubility limit is estimated based on equilibration with an EPA 1994 Diesel Fuel Oil reference petroleum mixture. The use of 75% of the solubility is based on the assumption that petroleum at the site is primarily sorbed mass rather than residual saturation when groundwater concentrations are 75% of solubility groundwater concentrations.

Toluene, ethylbenzene and xylenes have cleanup levels above their respective effective solubilities and are not detected above cleanup levels in current groundwater data (see Table 1-4 and T30 RI/FS Table 2-4; PGG, 2013). For these compounds, the remediation level is set at twice the cleanup level. For benzene, the 75% effective solubility and twice the cleanup level criteria are nearly equivalent. Diesel and gasoline remediation levels are set as 75% of the total BTEX effective solubility. Achieving these remediation levels will indicate a significant reduction in sheen area contaminant mass to residual sorbed levels.

1.9 NATURE AND EXTENT OF CONTAMINATION

The nature and extent of contamination are described in the Terminal 30 RI/FS (PGG, 2013). For context, this section briefly describes petroleum contamination at the site pertaining to cleanup action components (Figure 1-4).

1.9.1 Soil

The extent of soil contamination is similar to the maximum historical extent of LNAPL with exceedances of cleanup levels for diesel-, oil- and gasoline-range

hydrocarbons, and toluene. The extent of soil contamination is shown of Figure 1-4. Please refer to the T30 RI/FS for additional information (PGG, 2013).

1.9.2 Groundwater

Groundwater at the site has exceedances of cleanup levels for benzene, PAHs, and diesel-, oil-, and gasoline-range hydrocarbons. The most recent BTEX, diesel, and gasoline data at wells are shown on Figure 1-4, and data are summarized in Table 1-4.

There are no exceedances of cleanup levels at the CPOC in the most recent monitoring data from CPOC wells (Figure 1-4, Table 1-4).

1.9.3 LNAPL

Light non-aqueous phase liquid (LNAPL) is present in measureable quantities at MW-59. Measured product thicknesses range up to 1.3 feet at MW-59 (PGG, 2013).

2.0 CONSIDERED ALTERNATIVES

The 2013 RI/FS considered five remedial alternatives for the T30 site:

- Alternative 1: In-Situ Thermal Desorption
- Alternative 2: Expanded Sheen-Area AS/SVE with Targeted Excavation
- Alternative 3a: Sheen-Area AS/SVE Treatment with LNAPL Recovery
- Alternative 3b: Sheen-Area AS/SVE Treatment with LNAPL Recovery (Expanded Area)
- Alternative 4: Compliance Monitoring with LNAPL Recovery

All remedial alternatives included groundwater monitoring and institutional controls. Additional details for each of the considered alternatives are included in the T30 RI/FS (PGG, 2013a).

Alternative 3a was selected as the preferred alternative through a disproportionate cost analysis and is the cleanup action described in this CAP. As described in Section 3.1, some changes have been made to optimize the remedy. The cleanup actions for the Site were selected in accordance with and comply with the requirements of WAC 173-340-360, Selection of Cleanup Actions.

3.0 SELECTED CLEANUP ACTIONS

Selected cleanup actions at the T30 site will include air sparging/soil vapor extraction (AS/SVE) treatment, LNAPL recovery, long-term compliance

monitoring, and institutional controls. These actions are intended to address specific cleanup goals, including:

- Protect human health and the environment
- Maintain cleanup levels at the conditional point of compliance (CPOC) for protection of surface water
- Reduce Light Non-Aqueous Phase Liquid (LNAPL) thickness near MW-59 to sheen
- Reduce contaminant mass in the sheen area

AS/SVE will reduce groundwater concentrations in the portion of the sheen area between MW-42 and MW-36 (Figure 3-1). LNAPL recovery will address the last remaining area with free product at the water table near MW-59. A later phase of AS/SVE will reduce contaminant mass in the MW-59 area after product thickness has been reduced to sheen. In addition, natural attenuation processes will reduce groundwater concentrations across the site. Institutional controls will prevent contact with subsurface soil and groundwater contamination by maintaining the asphalt cap as a protective barrier and by establishing procedures that prevent exposure below the asphalt cap without appropriate health and safety procedures and Ecology notification.

Targeted groundwater monitoring will confirm compliance with cleanup levels at the CPOC, track performance of the AS/SVE system, and document concentration trends in the interior of the site. Details of the cleanup action components are described in the following sections.

3.1 AS/SVE SYSTEM

The purpose of the AS/SVE system is to reduce contaminant mass in the sheen area. The AS/SVE system is not intended to reduce CPOC concentrations; concentrations are currently below cleanup levels at the CPOC. The AS/SVE system will extend from near MW-42 to MW-36 (Figure 3-1), bounded on the north by the extent of groundwater exceedances and on the south by the edge of the LNAPL area. The AS/SVE will extend into the LNAPL area once the LNAPL thickness is reduced to sheen as sparging could increase LNAPL migration.

AS/SVE will reduce contaminant mass in the sheen area to address primarily gasoline-range organics (Figures 3-1 and 3-2). Contaminant mass reduction will be achieved through a combination of direct extraction of volatile-phase petroleum compounds within the SVE radius of influence and biostimulation in the area downgradient of the AS/SVE system. The AS/SVE system is not expected to reduce contaminant mass upgradient of the sparge well radius of influence (nominally 20 feet).

3.1.1 System Configuration

The AS/SVE system will be operated in two arrays (Figure 3-1):

- Phase 1 array extending from near MW-36 north to near MW-42
- Phase 2 array extending from near MW-36 to near MW-59

Phase 2 will be implemented after LNAPL in the area near MW-59 has been reduced to sheen. Sparging in this area before LNAPL is reduced to sheen could result in LNAPL mobilization. AS/SVE distribution piping for Phase 2 will be installed during Phase 1 construction, but SVE trenching and sparge wells will not be installed until LNAPL has been reduced to sheen.

The AS/SVE system has been modified from the layout presented in the 2013 RI/FS based on subsequently collected soil and groundwater quality and further communications with Ecology (PGG, 2013a; 2013b; 2014).

3.1.2 Phase 1 AS/SVE Configuration

The Phase 1 AS/SVE system will include 14 air sparge wells, soil vapor extraction piping in distribution trenches, an equipment shed, and trenching to connect the system components to the equipment shed (Figure 3-1). The location of the equipment shed and other infrastructure will be established in the Engineering Design Report based on evaluation of site operations, electrical infrastructure, and underground utilities. The location of the equipment shed will not substantially influence the operation of the system. Air sparge (AS) wells will be constructed with 2-inch PVC riser pipe and screens 12- to 14-feet below the water table or approximately 21- to 23-feet below ground surface (Figure 3-2). Compressed air will be delivered to groups of AS wells (sparge zones) through 2-inch, horizontal PVC or HDPE pipes running below ground surface from a distribution manifold in the equipment shed. Each AS wellhead will be instrumented with a pressure gauge and valve to allow adjustment of air sparge rates at each sparge well.

Soil vapor extraction will include a horizontal 4-inch slotted pipe set approximately 4 to 5 feet below ground surface in trenches parallel to AS well alignments (Figures 3-1 and 3-2).

The air sparge compressor, soil vapor extraction blower, and exhaust gas treatment/filtering equipment will be housed in an on-site equipment shed just north of monitoring well MW-87A at the approximate location shown on Figure 3-1. The location of the equipment shed may be revised to accommodate tenant terminal operations or to facilitate connection to electrical infrastructure. Equipment location and utility infrastructure details will be refined in the Engineering Design Report, but will not alter the in-situ function of the AS/SVE system.

3.1.3 Phase 2 AS/SVE Configuration

The Phase 2 AS/SVE system will include 6 air sparge wells and soil vapor extraction piping in the distribution trenches. The system will connect to distribution piping near MW-36 installed during Phase 1 construction (Figure 3-1). Phase 2 AS/SVE wells and extraction lines will be operated from equipment in the equipment shed established during Phase 1.

3.1.4 System Operation

The 14 Phase 1 air sparge wells will be operated in three zones. Zones will initially be sparged sequentially with 30-minutes on and 60-minutes off to allow sparging-induced air channels to close between sparge cycles; sparge cycling may be adjusted based on operational data. The duration of sparging and recovery is based on empirical observations at other AS/SVE systems and run times may be further optimized based on pressure trends observed during system startup and operation. Phase 1 sparge zones will include (Figure 3-1):

- Zone 1: AS-1 through AS-5
- Zone 2: AS-6 through AS-9
- Zone 3: AS-10 through AS-14

Phase 2 sparge zones will be operated as separate zones after installation. Phase 2 sparge zones will include (Figure 3-1):

- Zone 4: AS-15 through AS-17
- Zone 5: AS-18 through AS-20

Figure 3-1 shows conceptual Phase 2 locations. Actual Phase 2 locations will be proposed based on the improved understanding of subsurface contamination and air-flow from several years of Phase 1 AS/SVE operation and the LNAPL recovery operations. The proposed Phase 2 design will be provided to Ecology for approval prior to implementation.

Each sparge zone will have a cumulative air flow of 40-60 standard cubic feet per minute (scfm). Each zone will be supplied air from a central manifold at the air compressor in the equipment enclosure. Pressure drop between the compressor and wellheads is estimated to be less than 2 pounds per square inch (psi) assuming 17 psi at the wellhead, 60 scfm flow rate, and 500 feet of 2-inch distribution pipe.

The air sparge system will be operated at wellhead pressures of approximately 15 psi. With screens located at 12 to 14 feet below the water table, approximately 5.2 to 6 psi will be required to displace water from the well to the screen interval. The remaining pressure will overcome capillary forces in the aquifer and force air into the formation. Each well will be sparged at 10 to 20 scfm.

The SVE system will withdraw a minimum of twice the sparge air quantity to control vapor migration from the treatment area. For example, if the AS system delivers 50 scfm, the SVE system will extract a minimum of 100 scfm. A vacuum blower installed in the equipment shed will draw the extracted vapors into treatment (Section 3.1.3). The onsite stormwater system is the primary accumulation point for vapors that may migrate away from the AS/SVE system. Air spaces in the adjacent stormwater system will be checked for accumulated vapors with a PID during system startup when the potential for elevated vapor concentrations is greatest. The AS and SVE flow rates will be adjusted if vapors above acceptable limits are detected in the stormwater system; monitoring criteria will be specified in the EDR.

3.1.5 Vapor Treatment

Exhaust vapors from the SVE system will require treatment prior to discharge because of elevated volatiles. Initial vapor concentrations are likely to exceed 1,000 parts per million by volume (ppmV), above which thermal oxidation is generally the most cost-effective treatment technology. Thermal oxidation air treatment uses either a catalytic oxidizer or propane flame to combust volatile-laden exhaust vapors; thermal oxidizers typically achieve approximately 99% reduction in VOC concentrations. SVE exhaust vapor concentrations will be periodically monitored in the airstream before treatment to estimate mass loss from the SVE system. The system will be transitioned to carbon filtration as concentrations decrease to below 1,000 ppmV. Exhaust treatment equipment will be specified in the EDR.

Soil vapor extraction discharge concentrations will likely require a permit from the Puget Sound Clean Air Authority (PSCAA) as a condition of operation. The permit may require additional vapor concentration monitoring unrelated to achieving remedial objectives.

3.1.6 Operation Criteria

The AS/SVE system will be operated in the following progression:

- Operate system until groundwater concentrations at performance wells MW-36, MW-39, MW-42, and RW-9 achieve remediation levels (Table 1-3).
- Collect SVE exhaust vapor field photoionization detector (PID) measurements during routine system operations and maintenance visits to estimate mass removal rate, coupled with the SVE flow rate.
- Cycle the AS/SVE system on as concentrations rebound at MW-36, MW-39, MW-42, and RW-9. Rebound from upgradient groundwater influx is anticipated to occur over a 3- to 9-month timeframe.

- Discontinue AS/SVE on-off cycling when the system is no longer significantly reducing contaminant mass in the sheen area, or remediation levels are maintained. Rebound concentrations may exceed remediation levels for some constituents even once the AS/SVE is no longer significantly reducing contaminant mass because of the proximity of performance wells to the upgradient edge of the treatment area. If the system is no longer effectively removing contaminant mass beyond the contaminant mass influx from upgradient, then AS/SVE cycling will be discontinued even if rebound exceeds remediation levels. Efficiency of mass removal will be evaluated from AS/SVE system operational data and groundwater data from performance monitoring wells. With Ecology approval, the AS/SVE system may be decommissioned at this time.
- Operational criteria for Phase 1 and Phase 2 of the AS/SVE system may be met and/or evaluated independently.

The AS wells will be decommissioned in accordance with WAC 173-160.

3.2 LNAPL RECOVERY

The area with remaining free-product is in an active portion of the shipping terminal operations, with most of the area between the rubber tire gantry runways (Figure 3-1). Vacuum-enhanced recovery is preferred over other technologies such as skimmers because it has the smallest equipment footprint, does not require trenching across sensitive structures, and is an effective recovery option.

LNAPL will be recovered from a network of recovery wells by vacuum-truck total fluids recovery. Recovery wells will be installed across the area where wells have measurable LNAPL thickness (Figure 3-1). Recovery events will include purging the wells with a vacuum truck. The recovery program will continue until equilibrium LNAPL remains below measurable thickness. Recovery event frequency will decrease with LNAPL thickness to allow the wells time to recover to equilibrium thicknesses between recovery events.

3.2.1 Conceptual Model for System Operation

LNAPL is present in pore spaces above and below the water table near MW-59. Recoverable LNAPL estimates are based on the soil type, LNAPL density and viscosity, and historic maximum LNAPL thickness. LNAPL that can drain from pore spaces through gravity drainage accumulates in monitoring wells as recoverable LNAPL. LNAPL that cannot drain from pore spaces under gravity is residual LNAPL. The historic maximum LNAPL thickness and pore size distribution of the aquifer determine the residual saturation. Greater LNAPL thicknesses are able to push LNAPL into smaller pore spaces (greater capillary pressure). The resulting capillary forces to push LNAPL into pore spaces can

exceed the gravity drainage forces and leave LNAPL trapped in small pore spaces as residual saturation. Intuitively, LNAPL from small pores will drain more slowly than LNAPL from larger pores will drain. Therefore, the amount of LNAPL observed in a well and the maximum historic saturation together provides the best estimates of LNAPL recovery.

LNAPL recovery estimate calculations and modeling estimates are included in Appendix A. Modeling results and empirical field data indicate that:

- Recovery will reduce the LNAPL pore-space saturation by approximately 0.1 based on modeling the LNAPL maximum and current thickness at MW-59.
- Approximately 275 gallons of LNAPL in the vicinity of MW-59 is recoverable.
- At a measurable LNAPL thickness of 0.5 feet, a two hour vacuum-enhanced recovery event is expected to recover between 3 and 15 gallons of LNAPL per well; range includes both modeled recovery rates and recorded recovery volumes at RW-12.
- The optimal recovery well will have a nominal 17 foot radius of influence (well spacing of 35 feet) to balance between LNAPL recovery rate and number of wells installed in an infrastructure-dense portion of the site.

Applied vacuum in the well casing will increase the head (pressure) gradient from the surrounding aquifer into the well (Charbeneau, 2007a,b). The increased head gradient will increase flow of LNAPL into the well proportional to the LNAPL transmissivity (e.g. proportional to the LNAPL conductivity corrected for physical properties and degree of saturation). LNAPL transmissivity will decrease with progressive product recovery, which will decrease LNAPL saturation.

Vacuum enhanced recovery does not rely on volatilization of LNAPL for enhanced recovery. The SVE effect of vacuum extraction events is expected to be negligible relative to fluid recovery due to the low vapor pressure of weathered diesel.

LNAPL recovery rate is expected to vary between wells depending on the local variations in grain size within the soil matrix and distribution of LNAPL saturation. Therefore some wells will reach the endpoint for LNAPL recovery before others, even if the product thickness is similar at the beginning of the vacuum recovery program (see Section 3.2.4).

3.2.2 Recovery Well Design

Recovery wells will be constructed to enhance LNAPL migration from the surrounding aquifer and to accommodate vacuum enhanced extraction (Figure 3-

3). The recovery well network will include 10 new wells and will continue recovery at existing wells MW-59 and RW-12. New recovery wells will be constructed of 4-inch diameter Schedule 40 PVC in a 12-inch borehole. Well screens will extend from 2 feet above the water table at the combined seasonal and tidal high to 2 feet below the seasonal low at low tide. Combined seasonal and tidal variation near MW-59 is approximately 1.5 feet (nominal 6 foot screen). A 3 foot sump will be installed below the screen to allow the contingent use of alternate skimmer or pump configurations.

Between recovery events, the recovery wells will be capped with 4-inch diameter expanding well caps and protected by flush-to-grade well monuments. During recovery events, temporary vacuum-caps will be placed in the wellheads that are capable of maintaining a vacuum and yet have ports for extraction piping, an air-bleed valve that can also pass a sounder or interface probe, and a pressure gauge (Figure 3-3).

3.2.3 Vacuum-Enhanced Recovery

LNAPL will be removed using a vacuum truck to pump total fluids from recovery wells. Total fluids will be extracted from the wells through a siphon tube with the inlet set below the LNAPL-water interface. A vacuum-cap will be placed at the top of the PVC well casing to maintain negative pressure inside the recovery well, and the vacuum-cap will have an air-bleed valve to regulate pressure in the well. The air bleed valve will be used to reduce pressure in the well if adverse effects such as drawing excessive sediment through the well screen are observed. The top of the siphon tube will be connected to the vacuum truck by a flexible hose. The vacuum truck will apply approximately 5 psi of negative pressure to the well. The negative pressure will create a pressure gradient in the aquifer that will draw LNAPL and water into the well enhancing LNAPL recovery rates (Appendix A).

Vacuum enhanced recovery will be conducted for approximately 1 to 2 hours at each well each event, and initially may recover about 250 gallons of total fluid per event. Wells will be allowed to recover to equilibrium LNAPL thickness between events. Equilibration/recovery times will increase as LNAPL saturation and transmissivity decrease. Because of uncertainties in equilibration/recovery times, the following schedule of recovery events is subject to change based on actual recovery rates:

Project Year	Event Frequency	Cumulative Events
1	Monthly	12
2	Bi-Monthly	18
3	Bi-Monthly	24
4	Bi-Monthly	30
5	Bi-Monthly	36
6	Based on Review	--

Approximately 5 to 10 gallons of product per well will be recovered in the initial recovery events and is expected to decrease to less than 0.5 gallons per well in the later events. Equilibrium product thickness is estimated to approach 0.01 feet after approximately 34 extraction events (Appendix A); Phase II AS/SVE system may be installed at the end of Project Year 5 pending review of LNAPL recovery progress. Individual recovery wells may be removed from the recovery events when they meet termination criteria (Section 3.2.4).

LNAPL thickness will be measured at the beginning and end of each extraction event. Recovery wells that do not have measurable thickness (0.01 ft) will not be pumped during that recovery event.

3.2.4 LNAPL Recovery Termination

LNAPL recovery events at a well will be terminated when product thickness has been reduced to less than a measureable thickness (0.01 feet) for a period of one year of quarterly measurements. Product thickness will be measured with an interface probe. A clear plastic bailer will be used to measure product thickness if a reliable measurement cannot be obtained with the interface probe.

This recovery termination criterion will result in sequential removal of recovery wells from recovery events as the area with measureable LNAPL thickness shrinks. Wells will be left in place for 1 year after the last well meets the termination criteria, after which they will be decommissioned consistent with WAC 173-160.

3.2.5 Recovery Documentation

LNAPL remediation progress will be monitored by documenting total recovered fluids per well and per event, estimated product recovery per event, and LNAPL thickness at each recovery well at the start and finish of each recovery event. Direct measurement of recovered product is unlikely to be feasible due to emulsification of total fluids during recovery. Therefore, a sample of the total recovered fluids will be collected from the vacuum truck tank and the concentration used to estimate the recovered product quantity; for example 1,000

gallons total fluids at 5,000 mg/L is the equivalent of approximately 5.8 gallons of recovered product, based on a LNAPL density of 0.876 g/mL.

Recovered LNAPL will be recycled or disposed of off-site by the vacuum truck contractor.

3.2.6 Phase II AS/SVE System Installation

At the end of Project Year 5, the equilibrium product thickness is estimated to approach 0.01 feet. The Phase II AS/SVE system may be then installed to further extract lighter fraction petroleum.

4.0 MONITORING

Monitoring will include measurements of LNAPL thickness and groundwater monitoring at wells across the site (Table 3-1). Groundwater will be monitored at conditional point of compliance (CPOC) wells, performance monitoring wells, and interior groundwater monitoring wells. Wells are grouped as follows:

- LNAPL Thickness: MW-59 and adjacent LNAPL recovery wells
- CPOC Wells: MW-45, MW-46, MW-58A, MW-89, and MW-92
- Performance Monitoring Wells : MW-36, MW-39, MW-42, and RW-9
- Interior Monitoring Wells: RW-1, RW-5A, and MW-38

The following contaminants of concern (COC) will be analyzed in performance and compliance monitoring wells.

Petroleum Hydrocarbons

- Diesel-Range Organics
- Gasoline-Range Organics
- Oil-Range Organics
- BTEX: Benzene, Toluene, Ethylbenzene, Xylenes (total)

Semi-Volatile Organic Compounds

- 2-methylnapthalene

Polynuclear Aromatic Hydrocarbons (PAHs) (filtered and unfiltered)

- Acenaphthene
- Acenaphthylene

- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Naphthalene
- Phenanthrene
- Pyrene

Key elements of the monitoring are described below.

4.1.1 LNAPL Monitoring

LNAPL thickness will be measured at MW-59 during groundwater compliance monitoring events and at MW-59 and surrounding LNAPL extraction wells at the beginning of LNAPL recovery events.

4.1.2 CPOC Groundwater Monitoring

Groundwater monitoring at the CPOC will be used to assess concentrations of site COCs at the CPOC relative to cleanup levels. Due to the considerable sorbed mass contributing to the dissolved phase exceedances, natural attenuation processes are expected to take between 30 and 60 years to reach cleanup levels across the site. Calculations for petroleum hydrocarbon degradation to cleanup levels indicated approximately 30 years based on typical T30 site soil concentrations and estimated groundwater degradation rates from monitoring well data trends (PGG, 2013; AECOM, 2008).

Based on the petroleum degradation calculations, groundwater quality will be monitored at the CPOC for 30 years (Table 3-1). Groundwater monitoring at the CPOC may be continued beyond 30 years depending on the status of site-wide groundwater concentrations.

Groundwater concentrations above cleanup levels may persist in some non-CPOC wells after the estimated 30 year natural attenuation period due to residual hotspots or physical characteristics of COCs. Residual contamination associated with buried utilities or infrastructure may leave hot spots with localized elevated groundwater concentrations after the majority of the site has reached cleanup

levels. PAHs have lower biodegradation rates and higher soil sorption coefficients than gasoline-, diesel-, and oil-range hydrocarbons. Therefore, natural attenuation of PAHs is expected to be slower than for the petroleum hydrocarbons and may persist as localized hotspots in areas where gasoline- through oil-range hydrocarbons have reached cleanup levels. However, because PAHs sorb more strongly to soil particles than petroleum hydrocarbons, they are not as mobile in groundwater; therefore, the downgradient extent of residual PAH hotspots is expected to be limited.

4.1.3 Performance Groundwater Monitoring

Performance monitoring wells are located within the AS/SVE system radius of influence and will be used to track system effectiveness. Concentrations are expected to decline as contaminant mass is reduced within the AS/SVE treatment area. Groundwater concentrations are expected to rebound over 3- to 9-months after the AS/SVE system is cycled off and groundwater with elevated concentrations from the interior area flows through the AS/SVE treatment area.

4.1.4 Interior Groundwater Monitoring

Interior monitoring wells are located upgradient of the AS/SVE system within the portion of the site with sheen but no measureable product thickness. Interior monitoring wells will be used to track long-term reductions in contaminant mass. Concentrations at the wells furthest upgradient (RW-1 and RW-5A) are expected to first decline to remediation and then to cleanup levels. Groundwater concentrations at MW-38 are expected to decline more slowly due to the downgradient position, and may remain static for 10 or more years due to the persistence of sheen that may maintain groundwater concentrations near saturation for the residual petroleum mixture.

4.1.5 Schedule

Monitoring wells will be sampled on a schedule consistent with the anticipated rate of change at that location and a well's role in operational decision making. Biodegradation processes will continue to reduce groundwater concentrations in the interior sheen area in year to multi-year time scales. AS/SVE will locally reduce groundwater concentrations in month-to-year time scales. Proposed monitoring includes (Table 3-1):

Performance Monitoring

- Performance monitoring will be conducted when the AS/SVE system (Phase I and II) is in operation and when the AS/SVE system is temporarily shut down.

- Performance monitoring wells will be sampled semi-annually when the AS/SVE system is in operation (Phase I and II) and when the AS/SVE system is temporarily shut down.
- The CPOC wells will be sampled biannually when the AS/SVE system is in operation and when the AS/SVE system is temporarily shut down.
- The AS/SVE system is estimated to be in operation for seven years. At the end of seventh year, the system will be temporarily shut down.

Compliance Monitoring

- Once both Phase I and Phase II AS/SVE system are permanently shut down, long term compliance monitoring begins.
- The CPOC wells will be sampled annually for the first 5 years of compliance monitoring, bi-annually for years 5-10, and every 5 years for year 10 and beyond.
- Supplemental monitoring may be conducted to inform AS/SVE operational decision making.

Interior Monitoring

- Interior monitoring wells will be sampled biannually for the first 7 years (4 events), followed by sampling every 5 years. The Interior monitoring well schedule is independent of the transition from Performance to Compliance monitoring at CPOC and Performance monitoring wells.

Individual performance or interior groundwater monitoring wells may be removed from the monitoring program early if concentrations achieve cleanup levels for two consecutive sampling events; this does not apply to CPOC wells or wells within the AS/SVE treatment zone while the AS/SVE system is operating.

4.2 INSTITUTIONAL CONTROLS

A restrictive environmental covenant consistent with the requirements of WAC 173-340-440 will be filed after construction of the AS/SVE and LNAPL recovery systems.

4.3 CONTAMINATED MATERIAL LEFT ON-SITE

The selected remedy may leave concentrations of COCs elevated above soil cleanup levels on site. WAC 173-340-380(1)(a)(ix) requires that remedies with

on-site containment specify the amount of hazardous substances left on site and the measures that will be used to prevent migration.

The volume of impacted soil or material left on site above cleanup levels is estimated to be the volume of soil between the base of asphalt and the water table within the historic extent of measurable LNAPL. This calculation over-estimates the amount of material left on site because LNAPL initially spread laterally at the water table from the release area. We estimate that approximately 63,000 cubic yards of impacted soil will remain on site following completion of the selected remedy.

5.0 SCHEDULE

The schedule for major deliverables and work tasks associated with cleanup actions is included as Exhibit C to this Consent Decree. The schedule provides anticipated submittal task duration for deliverables and actions associated with site cleanup, including progress reports, financial assurances, engineering design documents. Refer to Exhibit C for details on project deliverables and schedules.

5.1 ENGINEERING DESIGN REPORT

The forthcoming T30 Engineering Design Report (EDR) will provide technical details and drawings for system installation including equipment specifications, construction drawings, connections to utility infrastructure, and specific permitting issues. The EDR will be completed within the schedule in the new Consent Decree for the cleanup actions.

The EDR will include specifications for the Port of Seattle bidding process, which is expected to take between 3 and 6 months from Port Commissioner approval to proceed.

5.2 AS/SVE

After construction contract award, the AS/SVE system will be installed. Construction activities will be coordinated with tenant operations.

The AS/SVE system will operate until groundwater monitoring meets the shutdown criteria. The system is nominally expected to operate for 5 years in the Phase 1 and Phase 2 areas.

5.3 LNAPL RECOVERY

After construction contract award, the LNAPL recovery wells will be installed. LNAPL recovery will continue until measurable LNAPL thickness is less than 0.01 feet at MW-59, RW-12, and additional recovery wells installed during system setup. Recovery operations are anticipated to continue for 10 years with a nominal completion date in 2026 assuming system startup in 2016.

5.4 GROUNDWATER MONITORING

Groundwater monitoring will be conducted for 30 years, with possible extension at selected wells based on monitoring results at that time. The forthcoming T30 Compliance Monitoring Plan will describe long term- and operational-groundwater monitoring associated with the AS/SVE and LNAPL recovery actions. The groundwater monitoring schedule for CPOC wells and additional operational groundwater monitoring for the AS/SVE system will be detailed in the plan.

6.0 CONTINGENCY ACTIONS

The selected remedial actions are expected to meet remedial objectives within a reasonable time frame. However, contingency actions may be implemented during the course of remedial activities in response to changes in site conditions, identification of previously unrecognized environmental conditions, or if remedial objectives are not met (Figures 6-1 and 6-2). Section 6.1 describes the process to determine if a contingency action is appropriate. If a contingency action is appropriate, Section 6.2 describes the process for selecting the contingency action. Section 6.3 describes the notification schedule for beginning the contingency action evaluation process.

6.1 CONTINGENCY ACTION EVALUATION

This section describes the process for evaluating if a contingency action is appropriate. Broadly speaking, a contingency action is appropriate if the selected remedial actions are not adequately protective of human health and the environment. This situation could arise due to the following conditions:

- Identification of a previously unrecognized environmental condition
- Change in site conditions
- Groundwater concentrations of site COCs above cleanup level(s) at the CPOC
- Remedial actions not achieving remedial objectives in a reasonable timeframe

Not all occurrences of the conditions listed above will trigger a contingency action. Figure 6-1 diagrams an evidence-driven decision framework for evaluating if contingency action is appropriate. The process and context for evaluating conditions that might trigger a contingency action is described in the following sections.

6.1.1 Unrecognized Environmental Condition

Substantial characterization has been completed at the T30 site since environmental investigations began in the 1980s. It is unlikely that substantial new environmental conditions will be identified at the site. The most probable scenario for an unrecognized environmental condition is discovery of localized hot-spots associated with historic buried materials. These would most likely be encountered during excavation associated with utility work[1] or construction of the AS/SVE or LNAPL recovery systems.

Unrecognized environmental conditions will be assessed on a case by case basis in the following steps:

1. Do CPOC groundwater concentrations exceed site cleanup levels? Contingency action is not appropriate under MTCA if concentrations are below cleanup levels.

2. If CPOC groundwater concentrations exceed site cleanup levels, do existing remedial actions adequately address the contamination? Contingency action is not appropriate within the site context if remedial actions already in progress will address the contamination in a reasonable timeframe.

Contingency action will be initiated if an environmental condition is recognized with concentrations above groundwater cleanup levels that will not be addressed by ongoing remedial actions.

6.1.2 Change in Site Conditions

Changes in site conditions that alter potential exposure pathways could trigger contingency action specific to the exposure pathway. Examples could include:

- Change in groundwater flow system
- Change in site infrastructure resulting in an increased exposure potential
- Natural disaster (flood, earthquake, etc.) causes redistribution of contamination or site boundaries

[1] Future excavation work will be conducted consistent with institutional controls discussed in Section 4.2

Changes in site conditions will be evaluated on a case by case basis with consideration of concentrations relative to T30 site cleanup levels and whether remedial actions already in progress will address the change in site conditions.

6.1.3 Concentrations Above Cleanup Levels

Contingency action could be initiated if groundwater concentrations of site COCs are both above cleanup levels at COPC wells and are demonstrated to have a statistically significant increasing trend. An increasing trend at concentrations below cleanup levels, or exceedances at performance or interior monitoring wells would not trigger contingency action.

Concentrations may exceed site cleanup levels at some CPOC wells at the beginning of remedial action. Therefore, an exceedance of cleanup levels at the CPOC will not automatically trigger a contingency action if remedial measures to reduce concentrations are already in progress. Satisfactory progress towards cleanup objectives is discussed in Section 6.1.4.

Increasing trends will be evaluated using the statistically-based methods for evaluating plume status (Ecology, 2005). The method uses the non-parametric Mann-Kendall and Whitney-U tests to evaluate if constituent concentration trends at monitoring wells are increasing, stable, or decreasing. These tests require four or more independent sampling events to produce valid results.

6.1.4 Remedial Action Progress

Remedial progress will be tracked through groundwater monitoring described in Section 4 and the forthcoming T30 Compliance Monitoring Plan.

Progress relative to remedial objectives will be evaluated during Ecology periodic reviews. Contingency actions will be considered if remedial actions do not meet the remedial goals.

6.2 CONTINGENCY ACTION PROCESS

This section describes the process for planning contingency actions if a contingency action is appropriate after the evaluation in Section 6.1. The contingency action process is divided into three phases:

1. **Action Selection**: this phase describes the nature and extent of the exceedance triggering contingency action and selects an appropriate remedy. This phase may determine that a contingency action is not required to meet remedial objectives.

2. **Design**: this phase prepares the necessary engineering and design plans and reports, addendum to the Compliance Groundwater Monitoring Plan, or other documentation to implement the contingency action.

3. **Implementation**: this phase implements the selected contingency action.

The contingency action process parallels the remedial investigation and feasibility process under MTCA, but is intended to be streamlined towards efficient implementation. Steps may be combined for efficiency.

The action selection phase will define the media to be addressed, the nature and extent of the contamination to be addressed, and the objectives of the contingency action. Depending on the scope of the identified environmental issue, this first phase may also include investigation to fill data gaps and focused assessment of contingency action alternatives.

6.3 CONTINGENCY ACTION SCHEDULE

The Port of Seattle will notify Ecology within 14 days of identifying an environmental issue that potentially meets the criteria for contingency action. The Port of Seattle will provide a schedule and preliminary plan for moving through contingency action selection in consultation with Ecology. The plan may include additional investigation and characterization prior to selecting a contingency action.

Environmental issues that do not meet the criteria for contingency action will be discussed as appropriate in routine monitoring reports submitted to Ecology under the forthcoming T30 Compliance Monitoring Plan.

7.0 REFERENCES

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Pacific Groundwater Group, 2014. Port of Seattle Terminal 30 Draft Cleanup Action Plan Key Revisions. March 26, 2014.

Table 1-1. Soil Cleanup Levels

Port of Seattle Terminal 30

Constituent	Cleanup Levels (mg/kg)
BTEX Compounds	
Benzene	**0.03**
Toluene	**7**
Ethylbenzene	**6**
Xylenes (total)	**9**
Semivoliatile Organic Compounds	
2-Methylnaphthalene	**NV**
PAH Compounds	
Acenaphthene	**NV**
Acenaphthylene	**NV**
Anthracene	**NV**
Benzo[a]anthracene	**NV**
Benzo[a]pyrene	**0.35**
Benzo[b]fluoranthene	**0.44**
Benzo[g,h,i]perylene	**NV**
Benzo[k]fluoranthene	**0.44**
Chrysene	**0.14**
Dibenzo[a,h]anthracene	**0.64**
Fluoranthene	**89**
Fluorene	**547**
Indeno[1,2,3-cd]pyrene	**1.25**
Phenanthrene	**NV**
Pyrene	**3,532**
Naphthalene	**5**
Petroleum Hydrocarbons	
Tph, diesel range organics	**2,000**
Tph, heavy oils	**2,000**
Tph: gasoline range organics, benzene present	**30**
Tph: gasoline range organics, no detectable benzene	**100**

"NV" indicates that no value is available.

Table 1-2. Groundwater Cleanup Levels

Port of Seattle Terminal 30

Constituent	Cleanup Levels (ug/L)
BTEX Compounds	
Benzene	**23**
Toluene	**15,000**
Ethylbenzene	**2,100**
Xylenes (total)	**1,000**
Semivoliatile Organic Compounds	
2-Methylnaphthalene	**NV**
PAH Compounds	
Acenaphthene	**643**
Acenaphthylene	**NV**
Anthracene	**25,900**
Benzo[a]anthracene	**0.018**
Benzo[a]pyrene	**0.018**
Benzo[b]fluoranthene	**0.018**
Benzo[g,h,i]perylene	**NV**
Benzo[k]fluoranthene	**0.018**
Chrysene	**0.018**
Dibenzo[a,h]anthracene	**0.018**
Dibenzofuran	**NV**
Fluoranthene	**90**
Fluorene	**3,460**
Indeno[1,2,3-cd]pyrene	**0.018**
Phenanthrene	**NV**
Pyrene	**2,590**
Naphthalene	**4,940**
Petroleum Hydrocarbons	
Tph: gasoline range organics, no detectable benzene*	**1,000**
Tph: gasoline range organics, benzene present*	**800**
Tph, diesel range organics	**500**
Tph, heavy oils	**500**

"NV" indicates that no value is available.

Table 1-3. Remediation Levels

Port of Seattle Terminal 30

Constituent	Units	Cleanup Level	Remediation Level**	75% Effective Solubility***	EPA Effective Solubility Reference Values				
					1994 Diesel Fuel Oil	No. 1 Diesel	No. 2 Diesel	Diesel Fuel Oil (Alaska)	87 Octane Gasoline	93 Octane Gasoline
Benzene	ug/L	23	47	47	62	138	436	1450	20,000	14,600
Toluene	ug/L	15,000	30,000	1,080	1,440	366	1,120	2,440	23,400	73,200
Ethylbenzene	ug/L	2,100	4,200	76.5	102	57	144	407	1,490	2,450
Xylenes (total)	ug/L	1,000	2,000	878	1,170	1,110	272	2,630	8,740	13,700
Total BTEX	ug/L	--	--	2,085	2,780	1,670	1,980	6,940	52,500	105,000
Gasoline Range Organics*	ug/L	1,000	2,085	--	--	--	--	--	--	--
Diesel Range Organics	ug/L	500	2,085	--	--	--	--	--	--	--

BTEX is Benzene, Toluene, Ethylbenzene, and Xylenes.

Effective solubility of a constituent in water in contact with a petroleum mixture is lower than when in contact with a pure source, such as a pure benzene release.

Effective solubilities are calculated using the EPA Effective Solubility Calculator at: http://www.epa.gov/athens/learn2model/part-two/onsite/es.html

The remediation level for light non-aqueous phase liquid (LNAPL) will be reduction to sheen (no measurable thickness).

*Cleanup Level is 800 ug/L if benzene is present.

** The remediation level for groundwater is taken as the higher of either twice the cleanup level, or 75% of the effective solubility. For diesel and gasoline ranges, this is taken as the effective solubility of total BTEX compounds, which is conservative as BTEX compounds constitute less than 100% of those petroleum mixtures. The EPA 1994 Diesel Fuel Oil reference is used as the effective solubility reference. Other effective solubilities are also included for comparison.

*** These values are 75% of the 1994 Diesel Fuel Oil effective solubility.

Table 1-4. Summary of Most-Recent Analytical Results

Port of Seattle Terminal 30

Well	Sample Date	Benzene	Toluene	Ethylbenzen	m, p-Xylene	o-Xylene	Total	Gasoline	Diesel	Motor Oil
		ug/L	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*	*mg/L*
	Cleanup Level	*23*	*15000*	*2100*	*1000*	*1000*	*1000*	*0.8*	*0.5*	*0.5*
Conditional Point of Compliance (CPOC) Wells										
MW-45	4/19/2011	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	0.05 U	0.05 U	0.25 U
MW-46	4/19/2011	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	0.05 U	0.05 U	0.25 U
MW-58A	10/14/2013	1 U	1.6	1 U	--	--	3 U	0.25	0.18	0.25 U
MW-89	10/14/2013	1 U	2.7	1.6	1.4	0.5 U	4.2	0.59	0.17	0.25 U
MW-92	10/14/2013	1 U	1 U	2.4	--	--	3 U	0.36	0.15	0.25 U
Performance Monitoring Wells										
MW-36	4/19/2011			*Sheen Present, No Measurable Product Thickness, No Analytical Data Available*						
MW-39	10/13/2004	**28**	1 U	2.7	4.3	1 U	--	**1.7**	**120**	**28**
MW-42	10/14/2013	18	5	1.1	2.9	0.7	5.6	0.65	0.17	0.25 U
RW-9	4/19/2011			*Sheen Present, No Measurable Product Thickness, No Analytical Data Available*						
Interior Wells										
MW-38	4/19/2011			*Sheen Present, No Measurable Product Thickness, No Analytical Data Available*						
RW-5A	5/5/2008	1 U	1 U	1.6	1 U	1 U	--	**1.3**	0.25 U	0.5 U
RW-1	4/19/2011			*Sheen Present, No Measurable Product Thickness, No Analytical Data Available*						

Bold indicates exceedance of the cleanup level (CUL).
Wells where sheen or product was observed were typically not sampled.

Table 3-1. Groundwater Monitoring Schedule

Port of Seattle Terminal 30

Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	22	27	32
Interior Monitoring Wells *																				
	Bi-Annual							*5-Year Interval*												
MW-38	x		x		x		x					x					x	x	x	x
RW-1	x		x		x		x					x					x	x	x	x
RW-5A	x		x		x		x					x					x	x	x	x
	Performance Monitoring Period **							*Compliance Monitoring Period*												
Conditional Point of Compliance Wells								*Year :*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*15*	*20*	*25*
	Bi-Annual							*Annual*						*Bi-Annual*				*5-Year Interval*			
MW-45	x		x		x		x	x	x	x	x	x	x		x			x	x	x	x
MW-46	x		x		x		x	x	x	x	x	x	x		x			x	x	x	x
MW-58A	x		x		x		x	x	x	x	x	x	x		x			x	x	x	x
MW-89	x		x		x		x	x	x	x	x	x	x		x			x	x	x	x
MW-92	x		x		x		x	x	x	x	x	x	x		x			x	x	x	x
Performance Monitoring Wells																				
	Semi-Annual																			
MW-36	x	x	x	x	x	x	x													
MW-39	x	x	x	x	x	x	x													
MW-42	x	x	x	x	x	x	x													
RW-9	x	x	x	x	x	x	x													

Notes:

Project Year 1 sampling will be conducted just prior to AS/SVE system startup.

* The Interior monitoring well schedule is independent of the transition from Performance to Compliance monitoring at CPOC and Performance monitoring wells.

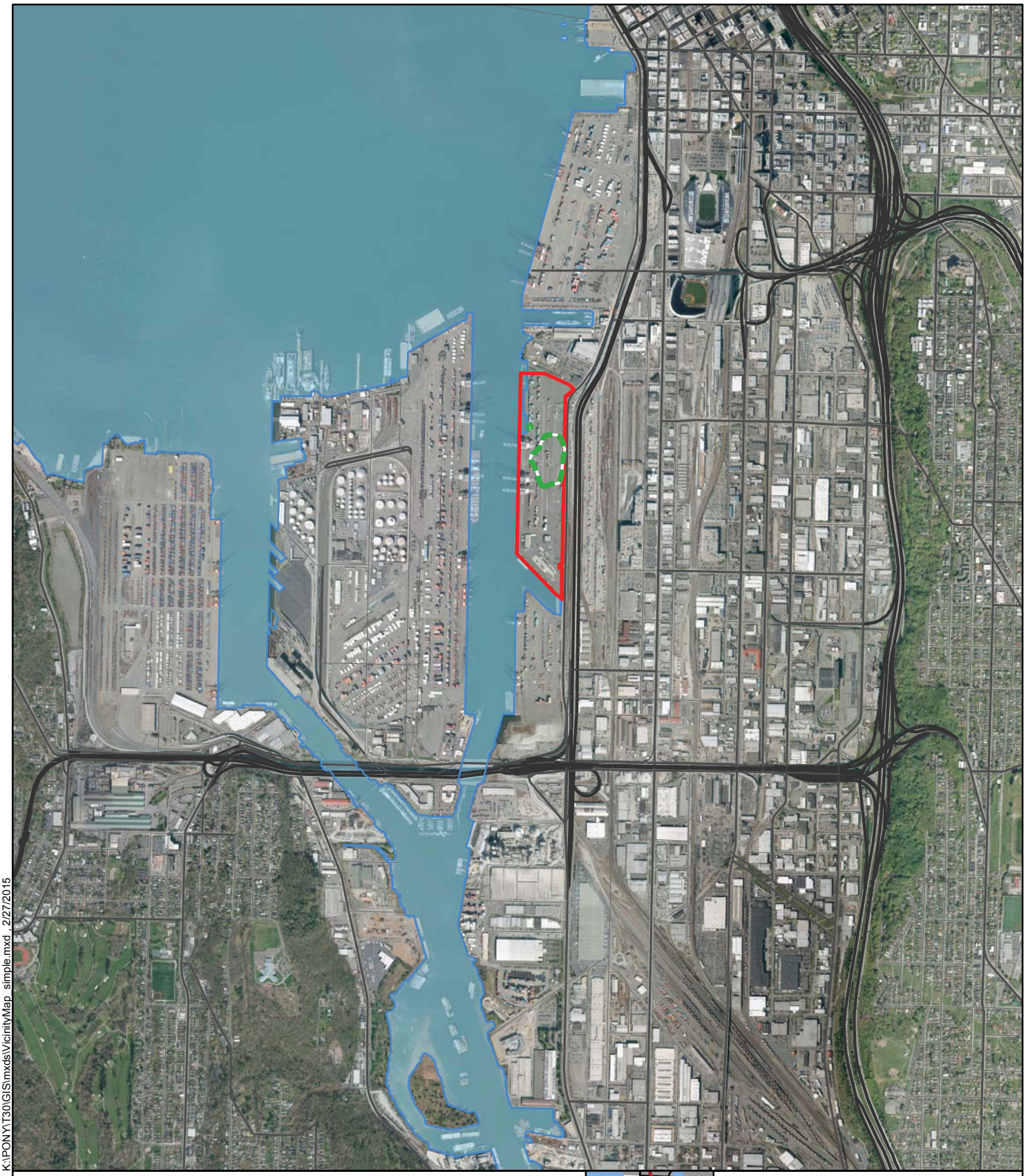
** The duration of the Performance monitoring period is determined by the operation of the AS/SVE system. The bi-annual and semi-annual monitoring frequency at CPOC and Performance monitoring wells will continue until Compliance monitoring begins.

LNAPL thickness will be measured at MW-59 and surrounding wells will on the recovery event schedule.

Sampling may continue beyond year 32 on the 5-year compliance monitoring schedule, as discussed in text.

Monitoring may be discontinued at individual monitoring wells when concentrations achieve cleanup levels for two consecutive events.

x indicates a year with sampling at the indicated wells



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Site Boundary

Terminal 30

0 Feet 2,000

0 Miles 0.5

N

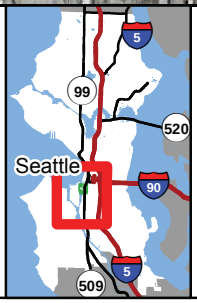
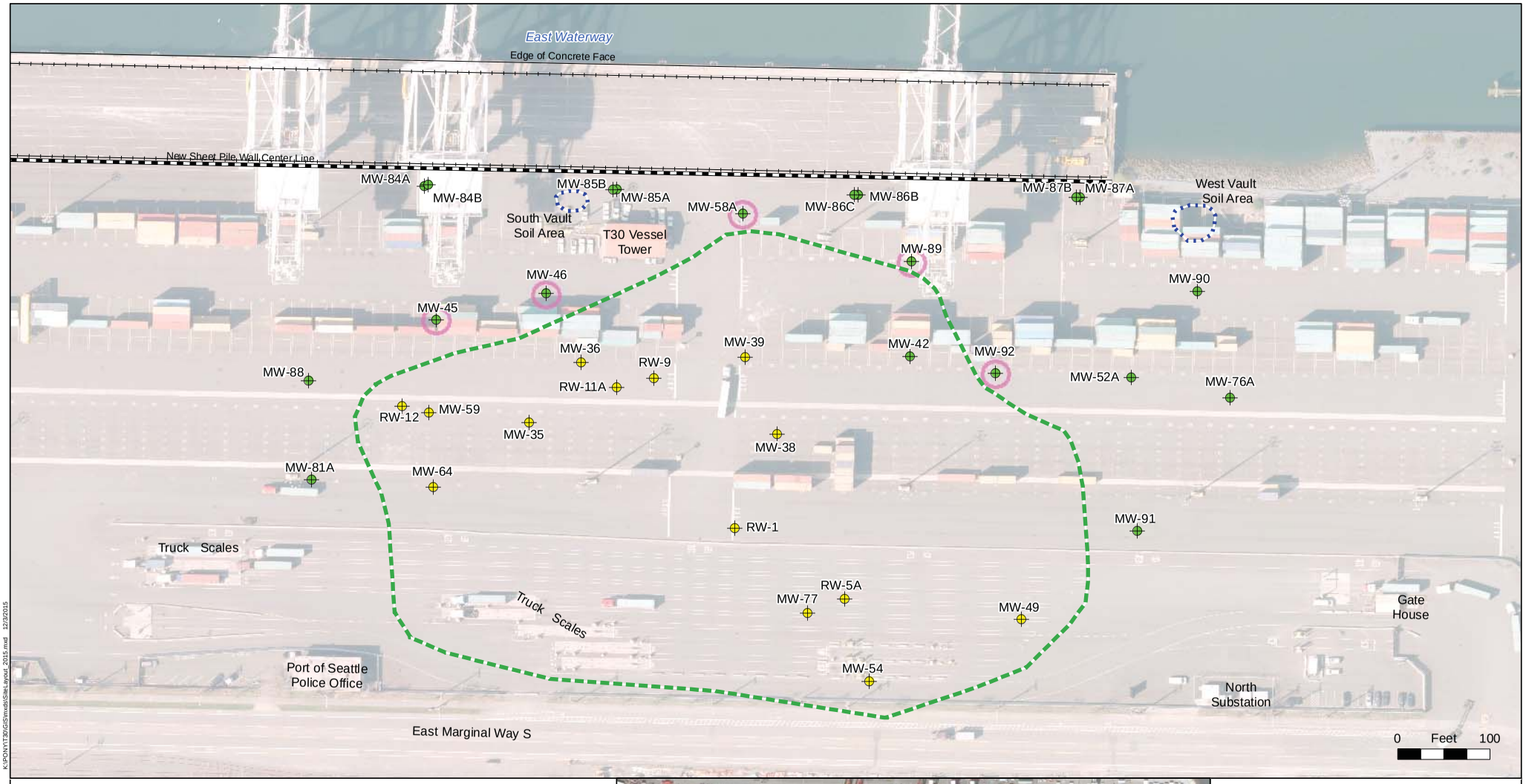


Figure 1-1

Site Location Map

Port of Seattle
Terminal 30

PgG



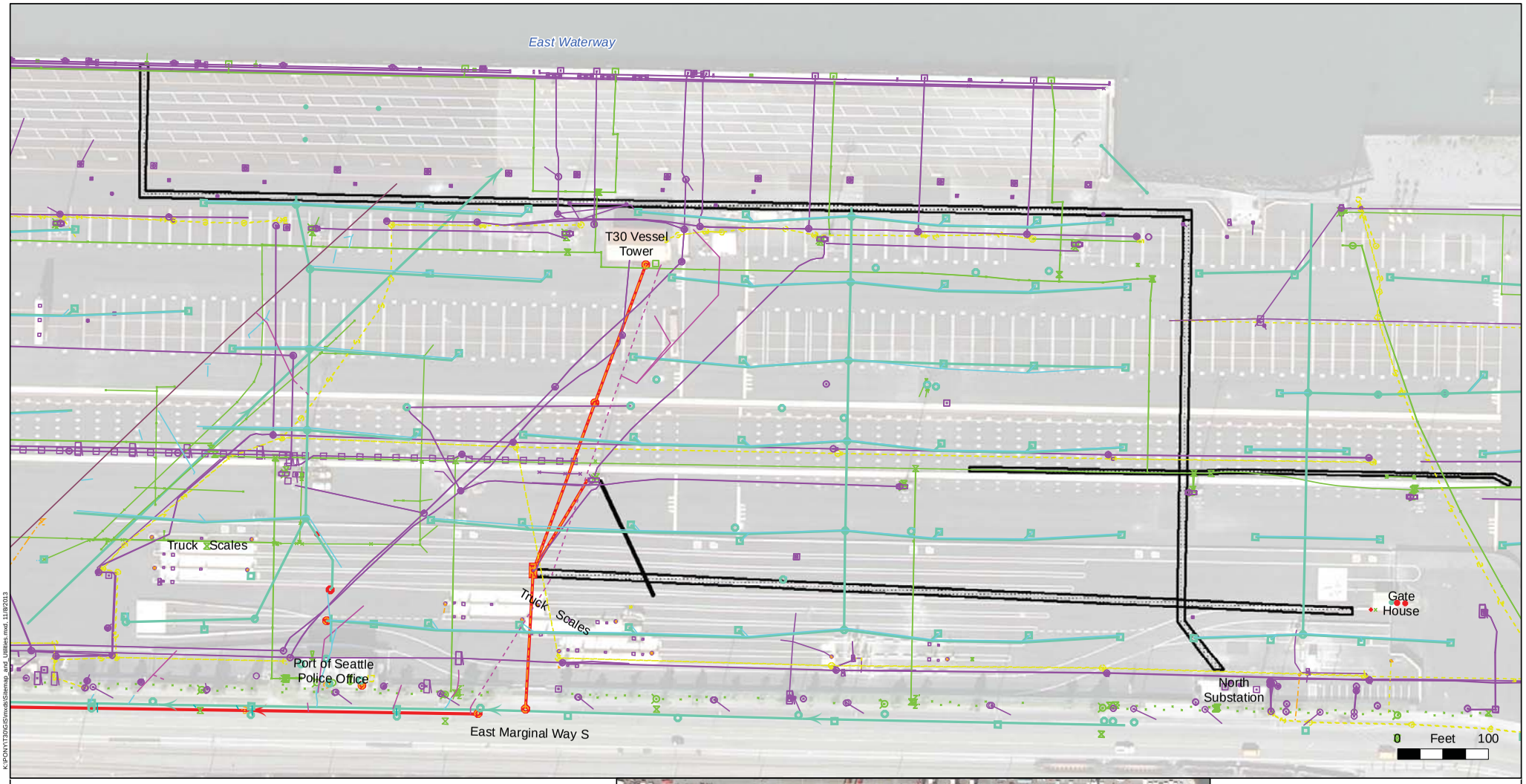
- Gaging/Recovery Well
- Water Quality Monitoring Well
- Conditional Point of Compliance (CPOC) Wells
- T-30 Site Boundary
- Soil Areas Not Associated with T-30 Site

2012 USGS Orthophoto

Figure 1-2
Site Layout

Port of Seattle
Terminal 30

PgG



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Underground Utilities (As Documented by Port of Seattle and SPU)

- Unknown
- Power
- Sanitary Sewer
- Stormwater
- Telephone
- Water
- Construction Completion Report Utility Replacment Areas (ENSR|AECOM, 2010)

Notes:
Co-located utilities may plot on top of each other;
Isolated catch basins or apron drains may not show connections to stormwater system;
Isolated power utilities marked on map may have connecting buried utilities lines that are not documented in available records

2009 USGS Orthophoto

Figure 1-3
Site Map with Utilities

Port of Seattle
Terminal 30

PgG

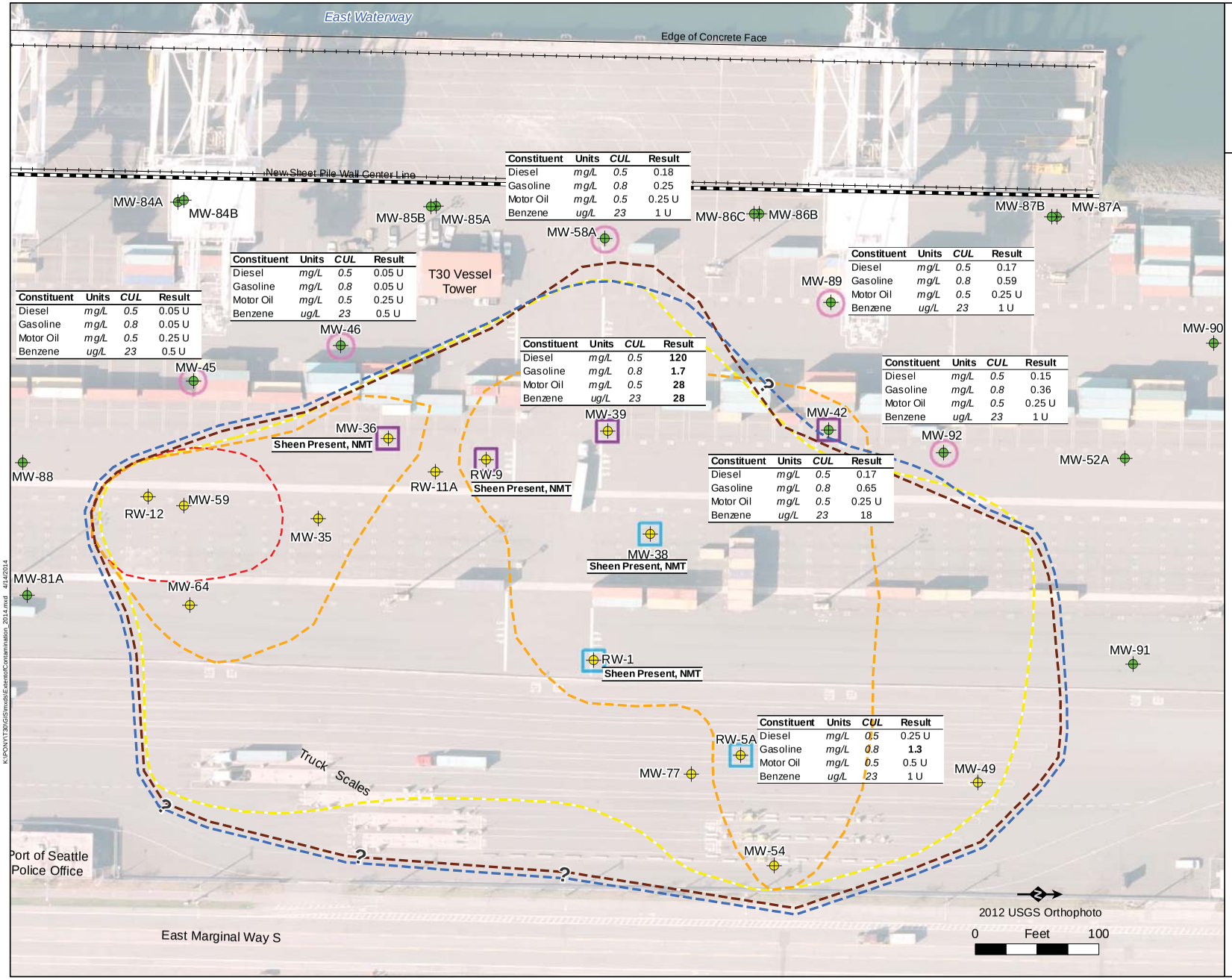

Figure 1-4

Extent of Contamination

Port of Seattle
Terminal 30

PgG

- Site Extent of Contamination
- Gaging/Recovery Well
- Water Quality Monitoring Well
- Conditional Point of Compliance (CPOC) Wells
- Maximum Extent of Produce Plume 1984-1991 (GeoEngineers, 1998)
- LNAPL > 0.1 Feet 2011
- Sheen Area 2011

Extent of Contamination*

- Groundwater Extent
- Soil Extent
- Performance Monitoring Wells
- Interior Wells

Bold indicates exceedance of the cleanup level
CUL: Cleanup Level
Analytical data shown are most recent results, as summarized in Table 1-4.
Analytical data not available for MW-36, MW-38, RW-1 and RW-9
NMT: No Measurable Thickness

*Extents based on a combination of the historic extent of LNAPL, historic and recent data, and distribution of exceedances. Isolated "hot spots" may exist beyond the outlined soil and groundwater extent.

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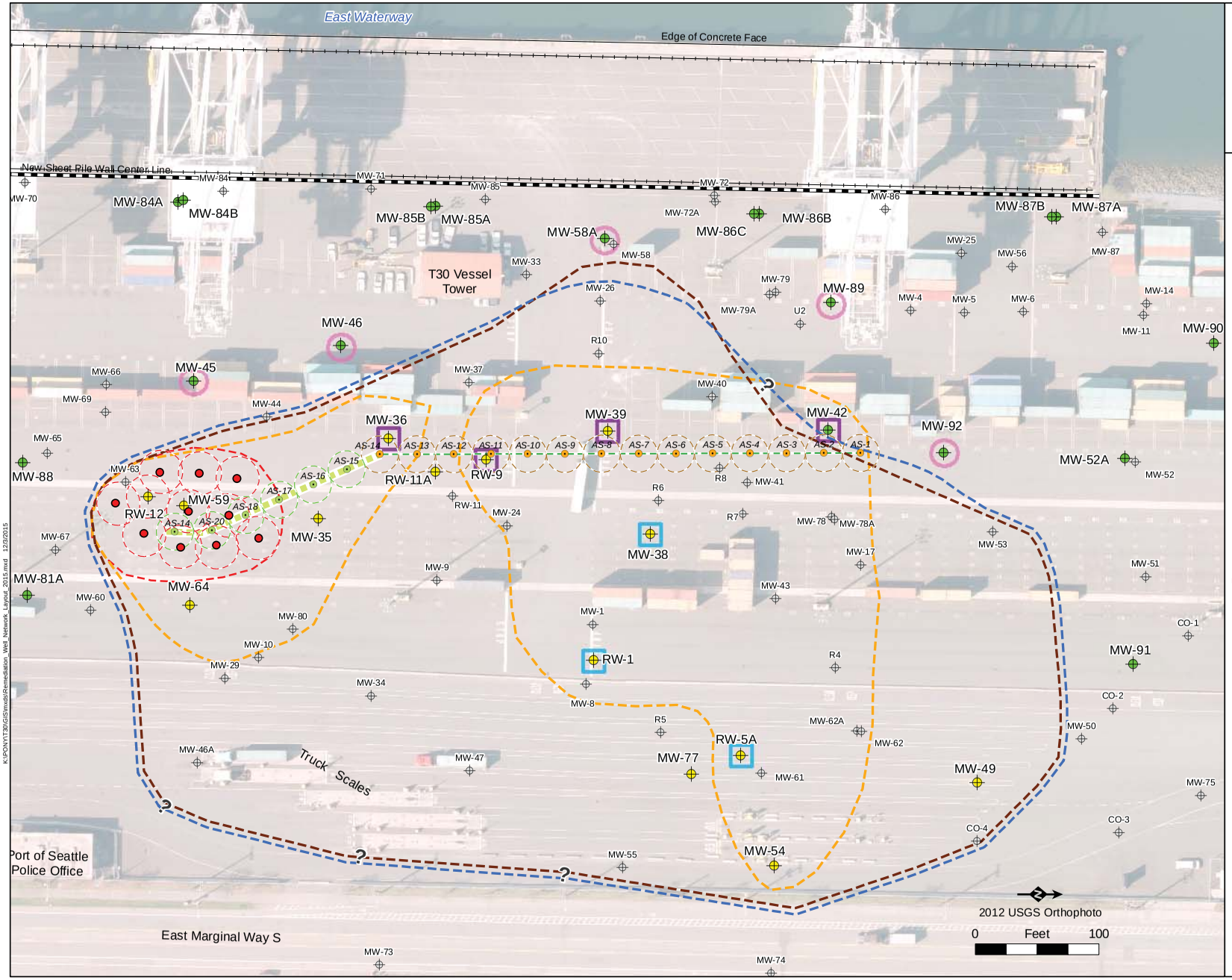


Figure 3-1

Cleanup Action Components

Port of Seattle
Terminal 30

PgG

- Site Extent of Contamination
- Gaging/Recovery Well
- Water Quality Monitoring Well
- Decommissioned Wells
- Conditional Point of Compliance (CPOC) Wells
- LNAPL > 0.1 Feet 2011
- Sheen Area

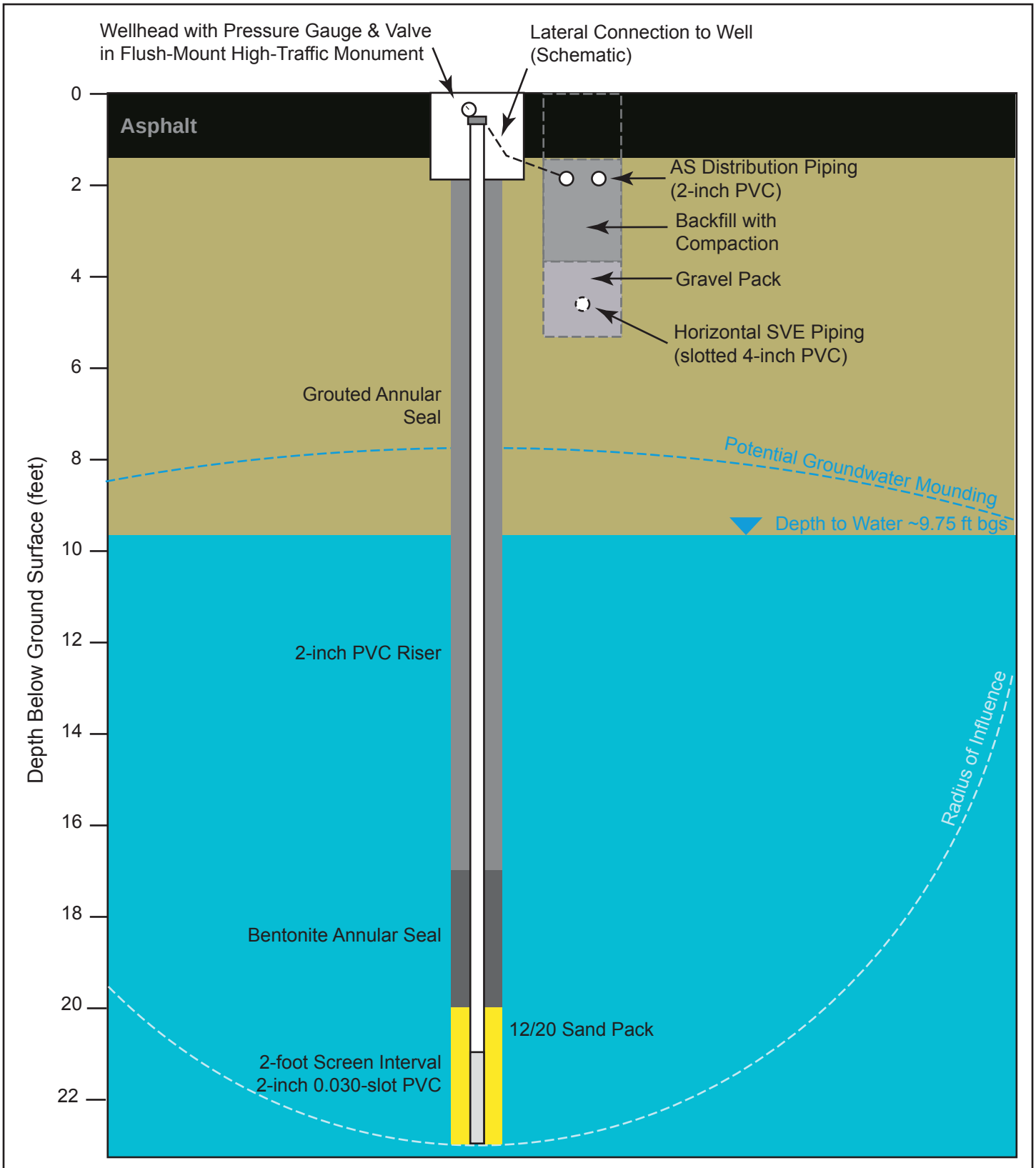
Extent of Contamination*

- Groundwater Extent
- Soil Extent

Remediation Elements

- LNAPL Extraction Well with Radius of Influence
- Phase I Air Sparge Well with Radius of Influence
- Phase II Air Sparge Well with Radius of Influence
- Phase I SVE Pipe in Trench
- Future Phase II AS/SVE
- Performance Monitoring Wells
- Interior Wells

*Extents based on a combination of the historic extent of LNAPL, historic and recent data, and distribution of exceedances. Isolated "hot spots" may exist beyond the outlined soil and groundwater extent.



1 inch = 3 feet

Figure 3-2. AS/SVE Subsurface Components

Port of Seattle
Terminal 30

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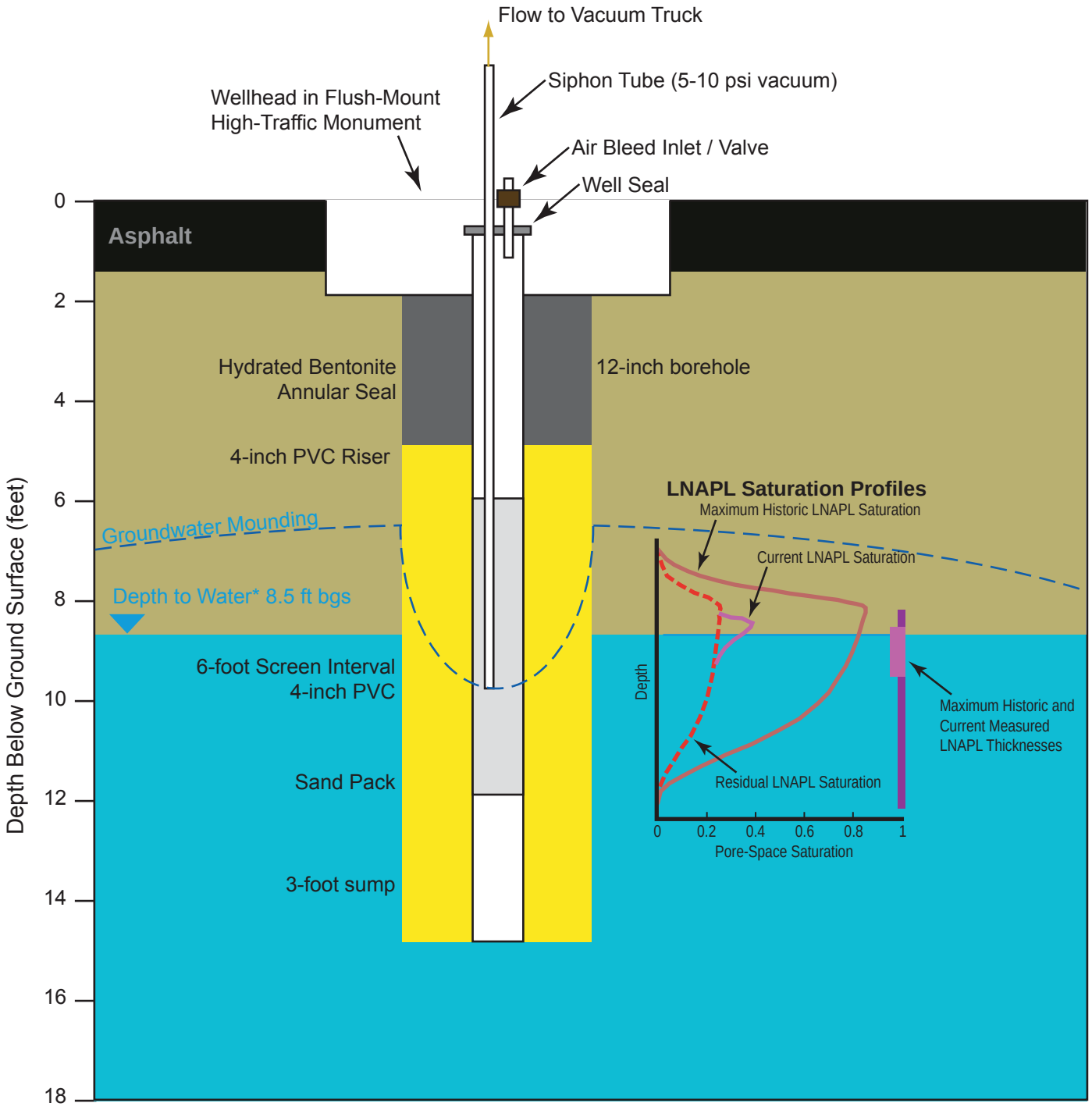


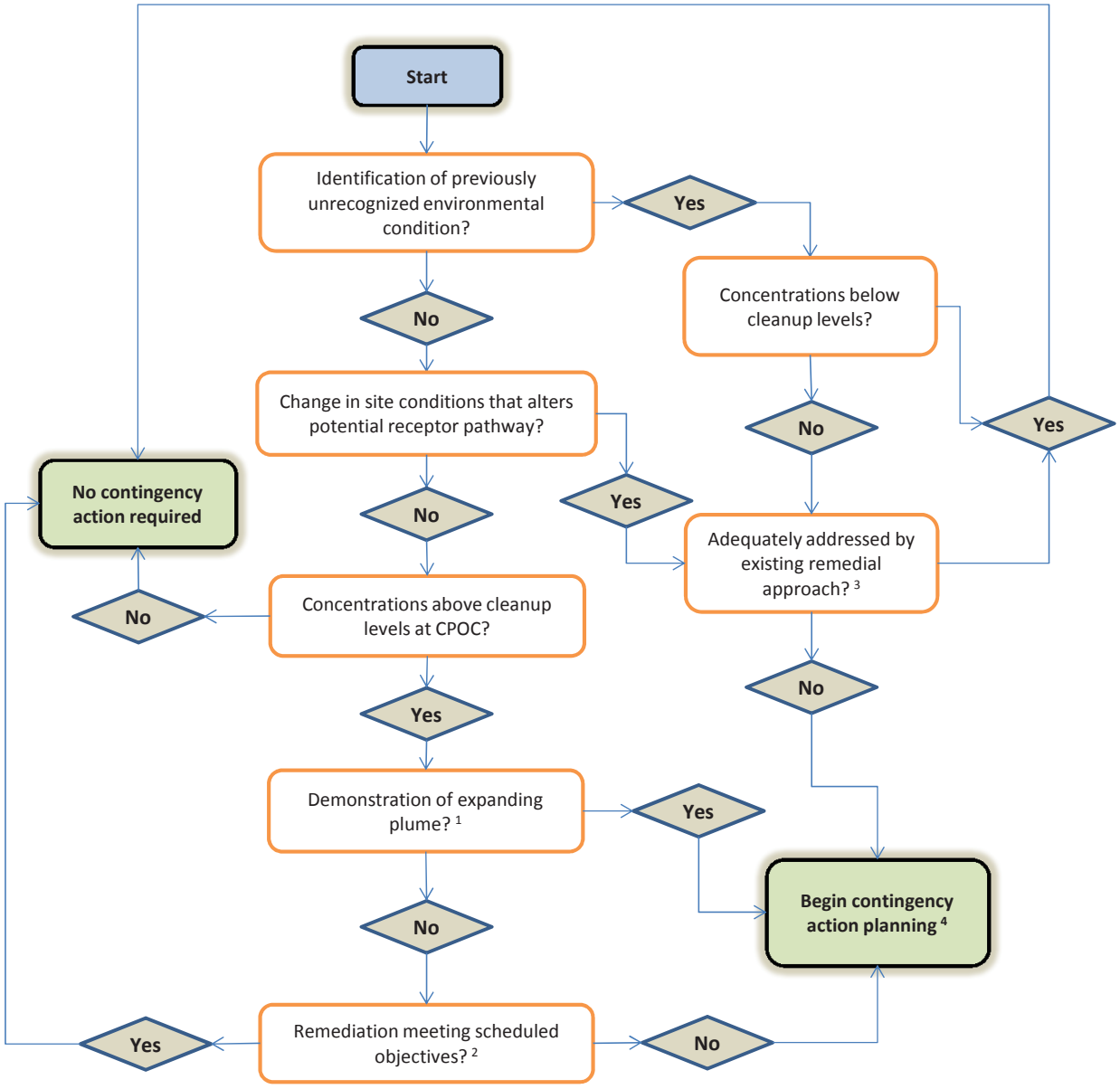
Well not drawn to horizontal scale; vertical scale: 1 inch = 3 feet
Depth to water is the estimated equilibirum water level accounting for LNAPL with density of 0.87 g/mL
LNAPL saturation profiles based on API model of product at MW-59
Groundwater mound schematic, not quantitative

Figure 3-3. High-Vacuum LNAPL Recovery Components

Port of Seattle
Terminal 30

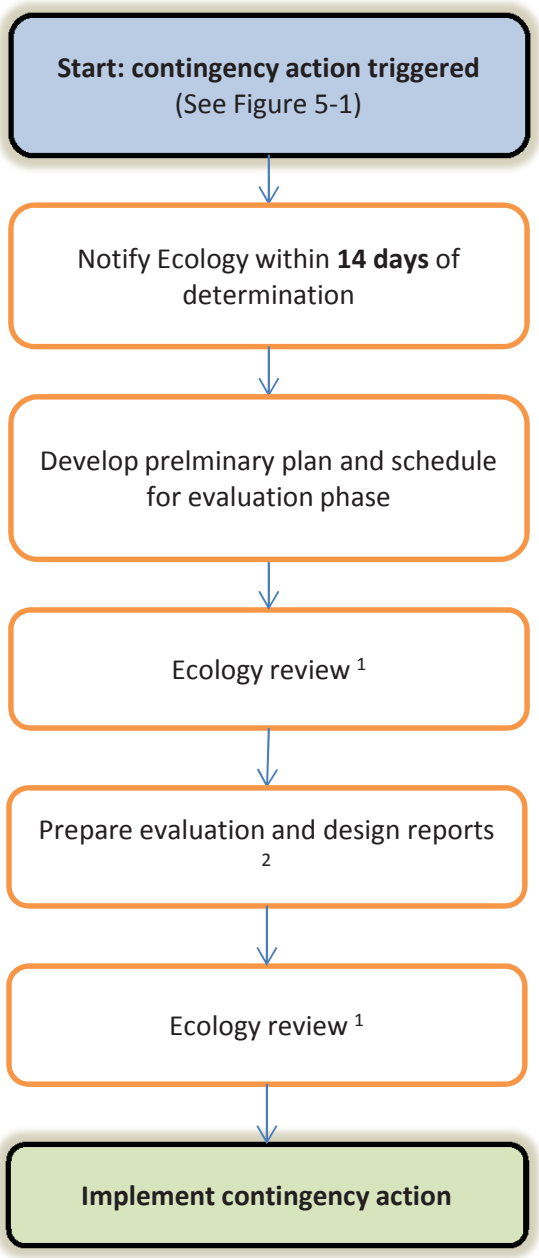
PgG

Figure 6-1. Contingency Action Decision Framework
Port of Seattle Terminal 30



Notes:
[1] Plume expansion to be evaluated using the statistical approach described in Appendix D of Ecology Publication 05-09-091, *Guidance on Remediation of Petroleum-Contaminated Ground Water By Natural Attenuation* . July 2005. Evaluation will include at least 5 years of monitoring data.
[2] Scheduled objectives described in Sections 4 and 5, including objectives for LNAPL removal, AS/SVE system biostimulation, and compliance monitoring.
[3] This will be assessed through a combination of technical analysis and professional judgement in communication with Ecology.
[4] Contingency action will be selected to address the identified environmental condition. See Figure 5-2.
Additional data beyond groundwater monitoring described in the Compliance Monitoring Plan (not yet complete) may be required to evaluate if contingency action is warranted.

Figure 6-2. Contingency Action Process
Port of Seattle Terminal 30



Notes:
[1] Ecology review step includes revision to address Ecology comments.
[2] Evaluation report may be submitted separately depending on complexity of selected contingency action, or if the evaulation demonstrates that no additional contingency actions are required to meet remedial objectives. Evaluation and design reports described in Secton 5.2.

APPENDIX A
SUPPORTING LNAPL INFORMATION

LNAPL RECOVERY CALCULATIONS

This appendix outlines calculations and modeling results conducted in support of LNAPL recovery planning for the Terminal 30 Draft Cleanup Action Plan (PGG, 2013). Modeling was performed using the API LDRM model (Charbeneau, 2007).

Baseline LNAPL saturation is based on historic LNAPL measurements at MW-59 and RW-12 (GeoEngineers, 1998; ENSR|AECOM, 2008). LNAPL saturation models were used to estimate current LNAPL saturation profiles, which form the basis for estimating recoverable LNAPL at MW-59 and RW-12. Other wells to be installed in the vicinity are expected to have similar or thinner LNAPL thicknesses and similar soil conditions.

Baseline LNAPL saturation modeling inputs are listed in Table A1:

Table A1. LNAPL Input Parameters

Input Parameter	Value	Units	Source
Maximum LNAPL Thickness	1.25	m	GeoEngineers (1998)
Current LNAPL Thickness at (t)	0.3	m	PGG (2011)
Ground Surface	0	m	Assigned
Water Table Depth	2.5	m	Assigned based on nominal depth
Water Vertical Gradient	0	--	Assumed zero
LNAPL Density	0.876	g/mL	PGG (2013)
LNAPL Viscosity	9.6	cp	PGG (2013)
Air-Water Surface Tension	65	dyne/cm	Literature
Air-LNAPL Surface Tension	25	dyne/cm	Literature
LNAPL-Water Surface Tension	15	dyne/cm	Literature
Porosity	0.403	--	Default for selected vanGenuchten Parameters
Hydraulic Conductivity	3.77	m/d	PGG (2013)
VanGenuchten "N"	2.75	--	ENSR|AECOM (2008)
VanGenuchten "a"	4.3	1/m	ENSR|AECOM (2008)
Irreducible Water Saturation	0.04	--	ENSR|AECOM (2008)
Residual LNAPL Saturation	Variable	--	Calculated
Residual LNAPL f-factor	0.3	--	Default

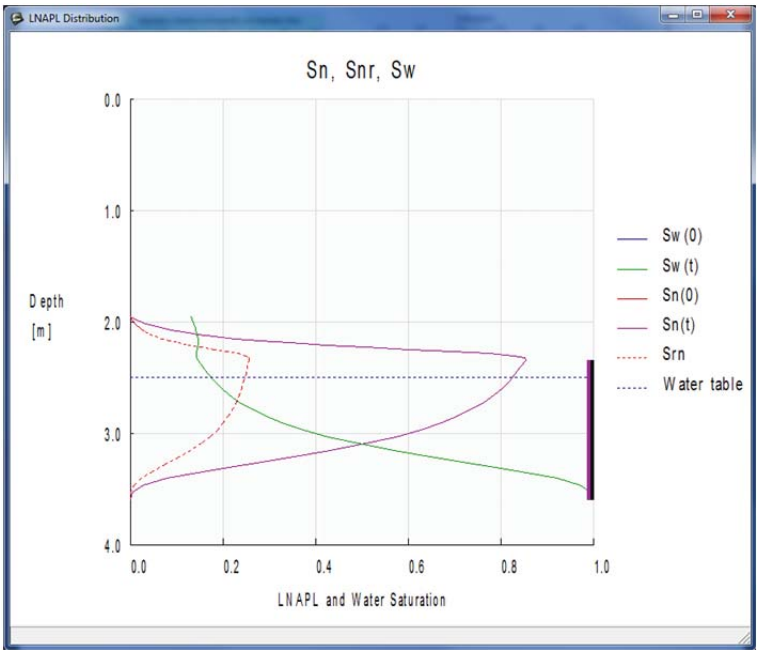
Table A2 lists the symbols used in the API LDRM output plots.

Table A2. LNAPL Plot Parameters

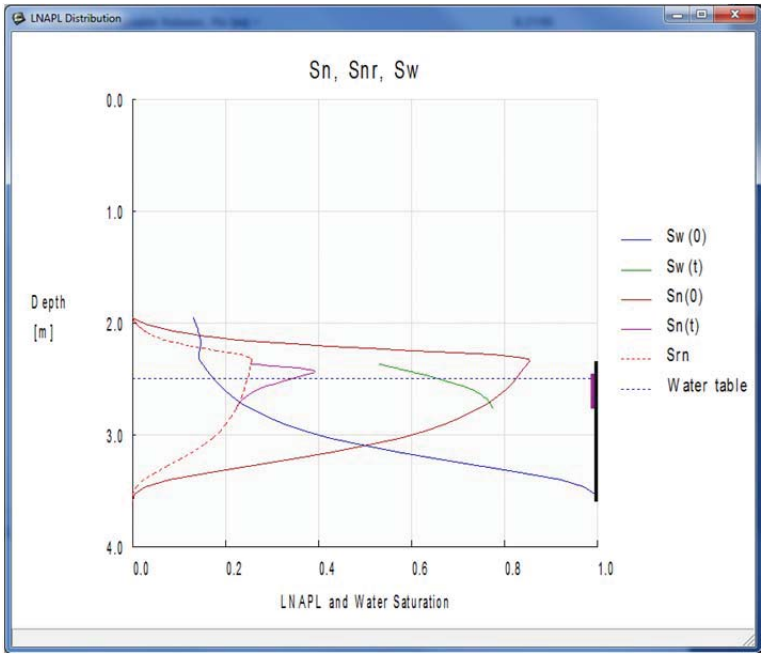
Parameter	Description
Sw (0)	Water Saturation at Initial LNAPL Thickness
Sw (t)	Water Saturation at Intermediate Time (t)
Sn (0)	LNAPL Saturation at Initial LNAPL Thickness
Sn (t)	LNAPL Saturation at Intermediate Time (t)
Srn	Residual LNAPL Saturation
Water Table	Elevation of Equilibrium Water Table

LNAPL and water saturation is measured as the fraction of pore space filled by LNAPL or water while porosity is the fraction of the aquifer not occupied by solids. An LNAPL saturation of 0.1 in an aquifer with a porosity of 0.4 is equivalent to 0.04 of the total soil volume being filled with LNAPL.

Modeled LNAPL saturation curves at peak measured LNAPL thickness (Sn (0)) in the MW-59 area (1.25 meters, or 4.1 feet shown as vertical bars at the right of plots) are:



Product thickness at MW-59 ranged from 0.59 to 0.21 meters (1.93 to 0.69 feet) in 13 measurements between 2006 and 2008 with an average of 0.3 meters (1.0 foot) (ENSR|AECOM, 2008). LNAPL saturation curves at 0.3 meters LNAPL thickness (current condition, time t) after the peak LNAPL thickness of 1.25 meters is:

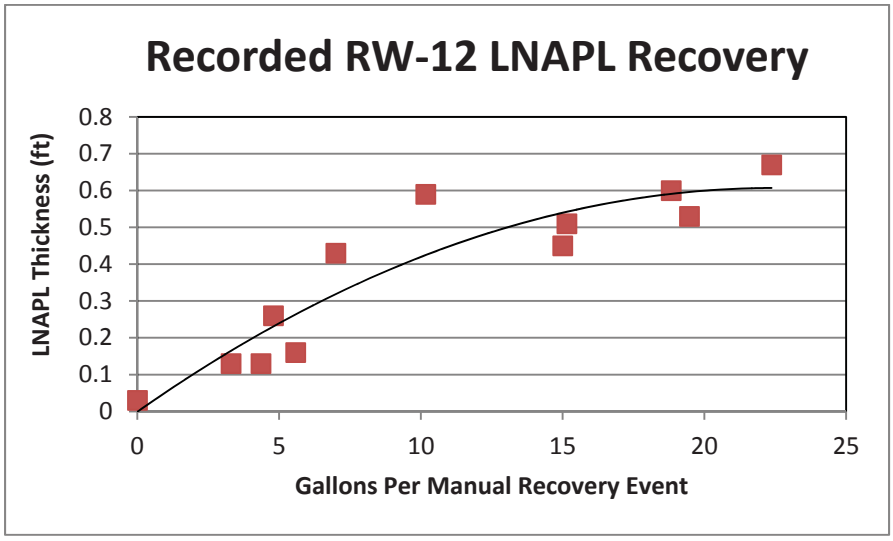


The maximum recoverable product by gravity drainage at each well is the difference in saturation between the current saturation (Sn(t)) and the residual saturation (Srn). The total volume of recoverable product is the difference in saturation scaled to the recovery radius. For the plot above with an average 0.1 difference between current and residual LNAPL saturation, and a recovery radius of 17 feet (well spacing), there is approximately 275 gallons of recoverable LNAPL in the vicinity of MW-59. Note that this likely overestimates the practically recoverable LNAPL because LNAPL transmissivity will decrease with LNAPL thickness and LNAPL may not be adequately mobile to migrate even under the gradient induced by the applied vacuum. Uncertainties in recovery rate increase as the recovery progresses because small-scale heterogeneity becomes more important in overall LNAPL migration.

PRODUCT RECOVERY

The API model predicts approximately 2.25 gallons of recovery per well, per event with an initial product thickness of 0.3 meters (1.0 foot); 5 psi vacuum; an assumed water production rate of 1 gpm; and a 2 hour duration.

Records of manual recovery events at MW-59 and RW-12 suggest that the modeled recovery rates are overly conservative. Approximately 3 gallons of product were manually recovered from MW-59 starting at an initial thickness of 0.96 feet in November 2008. Recovery rates and product thickness relative to actual recovery at RW-12 suggest that recovery rates on the order of 5 to 20 gallons per well per event are reasonable during initial recovery events. Recovery rates will decrease to less than a gallon per event as product thickness decreases to below 0.1 feet. Vacuum-truck total fluids recovery is a more aggressive approach than manual purging and recovery rates are expected to be greater than manual recovery.



Assuming a nominal 8 gallons of LNAPL per recovery event, approximately 34 extraction events would be required to remove the estimated 275 gallons of recoverable LNAPL in the vicinity of MW-59. LNAPL recovery rates will decrease substantially as product thickness declines below 0.1 feet, and 50 LNAPL recovery events are assumed. The actual number of product recovery events is likely to vary due to the uncertainties in the actual LNAPL saturation at MW-59 and at the new recovery wells to be installed.

Exhibit C Scope of Work and Schedule

Deliverable/Milestone	Estimated Start Date/Period	Estimated Time Required to Complete Task After Start Date
Signed Consent Decree	November 2016	--
Progress Reports	Calendar Quarterly after effective date of Consent Decree	--
Cost Estimate for Consent Decree Implementation (per Consent Decree Section XXI)	60 days after effective date of Consent Decree	2 months
Proof of Financial Assurances (per Consent Decree Section XXI)	60 days following Ecology approval of the Cost Estimate for Consent Decree implementation	2 months
Annual Financial Assurance Report (per Consent Decree Section XXI)	Annually, within 30 days of the anniversary date of Consent Decree	2 months
Engineering Design Report (EDR)	Immediately following execution of Consent Decree	18 months
Construct and Operate AS/SVE	Within 12 months following approval of EDR	60 months*
Construct and Operate LNAPL Recovery	Within 12 months following approval of EDR	120 months
Performance Monitoring	3 months after the start of the AS/SVE system	60 to 120 months
Submit proof of recording of Environmental Covenants to Ecology	Within 10 days of completion of performance monitoring	--
Periodic Reviews Conducted by Ecology	Every 5 years from the effective date of Consent Decree	--
Compliance Monitoring	3 months after the start of the AS/SVE system	360 **

* AS/SVE operation and associated performance monitoring may be adjusted based on operational information, including possible extension beyond 5 years. Note that the schedule in Phase 1 and Phase 2 AS/SVE areas will be staggered with a later start date for the Phase 2 area. The AS/SVE system will be discontinued when the system is no longer significantly reducing contaminant mass in the sheen area, as described in the EDR.

**The duration of Compliance Monitoring will be based on achieving compliance goals specified in the Cleanup Action Plan.

Environmental Checklist

Implementation of Cleanup Action Plan (CAP) at the Port of Seattle Terminal 30 Cleanup Site

A. BACKGROUND

1. Name of proposed project, if applicable:

Implementation of Cleanup Action Plan (CAP) at the Port of Seattle Terminal 30 (T30) Cleanup Site

2. Name of applicant:

Port of Seattle

3. Address and phone number of applicant and contact person:

Paul Meyer
Environmental Permitting Manager
Port of Seattle
2711 Alaskan Way
Seattle, Washington 98121
206-787-3127

Sunny Becker
Site Manager
Washington State Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008
425-649-7187

4. Date checklist prepared:

December, 2015

5. Agency requesting checklist:

Washington State Department of Ecology (Ecology)

6. Proposed timing or schedule (including phasing, if applicable):

In 1991, Ecology, and the Port of Seattle (Port), entered into a legal agreement in the form of an Agreed Order (AO). This AO specified that the Port shall prepare and submit a final remedial investigation and feasibility study (RI/FS) for the site. A 2013 RI/FS was prepared to update the status of petroleum contamination at the site and to identify a final, preferred remedial action. The requirements under the 1991 Agreed Order were completed to Ecology's satisfaction in 2013.

An amendment to the AO requires the Port to prepare a draft Cleanup Action Plan (CAP) and an Environmental Checklist in accordance with the State Environmental Policy Act (SEPA) process. The checklist is essential in determining the environmental impacts anticipated from the CAP proposed for the site. This document is the SEPA checklist.

Ecology conducted a 30-day public comment period for the CAP and RI/FS in the second quarter of 2015. Final design and cleanup will commence once the final CAP is approved under a new Consent Decree (CAP CD). This schedule anticipates the design and construction of the cleanup system will occur during the 2018 to 2019 timeframe. Ongoing operation of the below ground systems will occur over 10 years in conjunction with long term monitoring.

Cleanup Action Task	Estimated Completion Date
Public Review of Draft CAP and CD	Q2 2015 (actual)
Finalize CAP	Q2 2016
Finalize Consent Decree (CAP CD)	6 months from CAP finalization
Draft and Finalize Engineering Design Report	18 months from CAP CD effective date
Cleanup Action Construction	2018-2019
Operation -AS/SVE and LNAPL recovery	2018-2028
Monitoring	30 years from construction completion

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

The Port will maintain the project area in a manner consistent with the terms of the CAP CD following implementation of the cleanup remedy. The site is currently operated as an active marine cargo facility, a use that is not expected to change in the future. As an active terminal, the site is currently paved and fenced and access is restricted to industrial adults with appropriate identification and clearance. The Port will coordinate with Ecology as required by the restrictive environmental covenant so that the site remains protective of human health and the environment.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

The following documents are related to this proposal:

- Ecology, 1991. In the Matter of Remedial Action by: Port of Seattle Agreed Order: Terminal 30. Effective Date: August 30, 1991.
- GeoEngineers, Inc., 1998. Terminal 30 Final Report Remedial Investigation/ Feasibility Study. Prepared for the Port of Seattle. December.
- Ecology, 2013. First Amendment to Agreed Order: Terminal 30. Port of Seattle. Effective Date: October 23, 2013.
- Pacific Groundwater Group, 2013. Terminal 30 Remedial Investigation / Feasibility Study. November 2013.
- WA Department of Ecology, 2015. Cleanup Action Plan, Port of Seattle Terminal 30. December 15, 2015.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

The CAP received public comment and review in Q2 2015 with final CAP anticipated in 2016 Q2. The CAP will direct the work to meet CAP CD remedial requirements.

10. List any government approvals or permits that will be needed for your proposal, if known.

Remedial actions at a facility under an AO are exempt from state and local government permits or approvals for the remedial actions. Ecology ensures substantive compliance with requirements of state and local authorization and permits.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. *There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)*

The Port of Seattle is proposing a cleanup action for the T30 site (Figure 1) to fulfill requirements of Ecology's proposed CAP and subsequent CAP CD. The Ecology-preferred cleanup action plan and is described in the CAP, which was prepared by the Port with Ecology review.

The selected alternative described in the CAP focuses on approximately 7 acres in the northern portion of the larger 33.9 acre Terminal 30 property. Cleanup actions at the T30 site will include construction and operation of an air sparging/soil vapor extraction (AS/SVE) treatment system, a non-aqueous phase liquid (LNAPL) product recovery system, long-term compliance monitoring, and institutional controls (Figure 2).

The AS/SVE system injects pressurized air into contaminated groundwater enabling the soluble hydrocarbons to transition from a water-dissolved phase to a vapor phase in the injected bubbles. The injected air and contaminated vapor is extracted from the subsurface through vacuum pipes installed in soil above the water table that transport the vapors to a treatment system above ground. The AS/SVE system's primary purpose is to reduce the concentrations of contaminants in groundwater to below state cleanup levels. AS/SVE is most effective on lighter petroleum mixtures such as gasoline. The AS/SVE system will consist of approximately 20 sparge wells, three soil vapor extraction trenches, one equipment shed, and trenching for utilities to connect the system components. The AS/SVE system will include two phases: phase 1 will include 14 wells to be activated upon system completion; phase 2 will consist of 6 additional air-sparge wells to be activated after completion of LNAPL recovery.

The LNAPL recovery system will include 10 new extraction wells. A vactor truck will apply a vacuum to these wells to recover total fluids (includes groundwater, dissolved petroleum in the groundwater, and free-phase LNAPL) from each extraction well. LNAPL recovery operations will continue at each recovery well (anticipated for about 5 to 10 years) until equilibrium LNAPL thicknesses measured in wells are 0.01-feet or less.

The compliance monitoring phase of the project will assess the effectiveness of remediation efforts. Specified wells will be monitored for an estimated 30 years after remediation efforts are completed. Any deviations from compliance will be documented and preventive actions implemented.

Institutional controls will prevent contact with subsurface soil and groundwater contamination by maintaining an asphalt pavement cover over the treatment area as a protective barrier and by establishing procedures that prevent exposure below the asphalt cap without appropriate health and safety procedures and Ecology notification.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Terminal 30 is located at 2715 E Marginal Way South, Seattle, Washington 98134. It is located on the East Waterway that drains directly to Elliot Bay and the Puget Sound. The approximate latitude and longitude of the site is 47.579 by -122.34013. The Township /Range/Section is 24N/4E/7 respectively

(Figure 1). T30 is bordered on the north by an area of public shoreline access to the East Waterway, on the east by East Marginal Way South, on the south by the southern portion of T30, and on the west by the East Waterway. The East Waterway is an operable unit of the Harbor Island Superfund Site as ordered by the U.S. Environmental Protection Agency (EPA).

The 2013 RI/FS and this CAP focus on approximately 7 acres in the northern portion of the larger 33.9 acre T30 property. The term "T30 site" or "site" refers to the extent of petroleum contamination in the northern portion of T30, inclusive of light non-aqueous phase liquid (LNAPL), soil, and groundwater contamination (Figure 2).

B. ENVIRONMENTAL ELEMENTS

1) Earth

a) General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other…..

The site is generally flat and entirely paved by asphalt.

b) What is the steepest slope on the site (approximate percent slope)?

The entire site is comprised of impervious surface with very little elevation change. The maximum slope at the site stays within the range of 2% to 5%. The elevation change from the east edge of the property to the west edge does not exceed +/-7 feet.

c) What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

Studies undertaken by the Port at T30 in general have identified several geologic units. Most of T30 is covered with undifferentiated fine-grained fill material designated as the "Shallow Sand Unit" that overlies native glacial sediment. The fill material layer extends to depths of 15- to 20-feet below ground surface in the cleanup vicinity. The fill material was taken from upland sources as well as dredging material from the construction of Harbor Island in the Lower Duwamish Waterway. Groundwater levels at the site generally range from 8- to 9-feet below ground surface.

d) Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No

e) Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

An air sparging/soil vapor extraction (AS/SVE) treatment system will be installed to reduce contaminant mass in the subsurface soil and groundwater. The air sparging well network will include 20, 2-inch diameter sparge wells, installed to a depth of approximately 25 feet below ground surface. Well screens will be installed in the lower 2 feet of the sparge wells.

Soil vapor extraction trenches will be constructed by placing a horizontal PVC pipe running below ground surface in trenches parallel to air sparging well alignments. A narrow, shallow trench for electric utilities and air-supply and vapor return piping will connect the AS/SVE system to an equipment shed.

The LNAPL recovery system will consist of 10 new extraction wells, each of which will be approximately 15-feet deep. New recovery wells will be constructed of 4-inch diameter Schedule 40 PVC in a 12-inch borehole.

AS/SVE system well installation will produce approximately 15 cubic yards of soil cuttings. These cuttings will be profiled for soil disposal and sent off-site to an appropriate and Ecology-approved disposal facility, likely a Subtitle D landfill. The wells will be decommissioned as per Washington State regulations (Washington Administrative Code [WAC] 173-160) when they are no longer needed for remediation.

Approximately 1,100 lineal feet of trenching is expected for utility placement and the SVE trenches, each about 5 feet deep. In total, an estimated 550 cy of material will be excavated for the utility and SVE trenches. All excavated materials will be evaluated as to their presence of contamination and geotechnical suitability. Based on this evaluation, material will either be disposed of offsite at an appropriate and Ecology-approved disposal facility, or re-used as fill to cover the utility and pipes. Native fill material purchased from sand and gravel vendors from offsite sources may be required to backfill utility trenches and SVE trenches to replace any contaminated soils encountered during excavation.

f) Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

The site is located in an urban environment; the erosion hazard is slight before and after construction because all areas to be affected by this cleanup action are currently and will be covered with impervious surfaces. Construction associated with planned cleanup could have erosion impacts on soils exposed during construction and temporary soil stockpiles needed during construction. Some migration of sediment could occur over short distances within the work area in rainy conditions.

g) About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The entirety of the cleanup site is now covered with asphalt. An asphalt surface will be reapplied over the trenches after installation.

a) Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

During construction, temporary erosion and sediment control measures and Best Management Plans (BMPs) meeting the substantive requirements of the City of Seattle stormwater control and grading regulations and the Construction General National Pollutant Discharge Elimination System (NPDES) permit will be implemented as necessary to control erosion. Any exposed soils will be within an excavated area, below grade, and unlikely to cause off-site sediment transport. Any stockpiled materials from the project will be contained or covered using appropriate erosion control BMPs.

2) **Air**

a) What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Air emissions are expected from the following sources: emissions from construction equipment, fugitive dust during trenching and filling, and VOC-impacted vapor from air sparging (AS) and soil vapor extraction (SVE) process.

Air sparging increases the rate of volatilization and potential for migration of VOC-impacted vapor to human and/or ecological receptors at potential levels of concern. Exhaust vapors from the AS/SVE system will require treatment prior to discharge because of elevated volatiles. The system will be equipped with emissions control equipment (thermal oxidizer or activated carbon adsorption).

During the three months of construction, approximately 150 diesel truck trips are expected for deliveries and removal of trenching material. A truck-mounted drill rig will install the 30 wells for LNAPL and air sparging system over approximately 10 days. A diesel-powered backhoe will construct the utility and SVE trenches.

During the operation of the AS/SVE system, support vehicles transporting field operators and monitoring technicians will visit the site on an average of 10- to 12-times a year. These visits will decline over time as the product mass is reduced according to schedule in the CAP.

LNAPL will be recovered from the wells by vacuum-truck total fluid recovery. Vacuum enhanced recovery will be conducted for approximately 1- to 2-hours at each well event. Each recovery event will last 12- to 24-hours. Well recovery events are scheduled bi-monthly for the first five years of operation, reducing to quarterly and then semi-annually over the remaining 5 years of vacuum enhanced recovery.

Air emissions could result from exposure related to future site development activities. However, there are currently no plans for the property after the paving is completed and no way to estimate what air emissions may be associated with future use of the property.

b) Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No

c) Proposed measures to reduce or control emissions or other impacts to air, if any:

Fugitive dust will be controlled using best management practices such as spraying exposed soil and storage areas with water during dry periods and/or covering exposed earth stockpiles and loads of excavated material being transported from the site.

Vehicular emissions associated with construction are anticipated to be short-term in nature. Measures to minimize vehicular emissions would be implemented as required and may include:

- Requiring contractors to use best available control technologies.
- Proper vehicle maintenance.
- Minimizing vehicle and equipment idling.

Measures will be taken to minimize emissions and worker exposure to contaminated soil and vapors exposed during construction and remediation. A Health and Safety Plan (HASP) developed for the project will address potential worker exposure to air emissions resulting from construction activities. The HASP will include a vapor monitoring component and all workers on the project will be required to adhere to the elements of the HASP to limit potential exposure to air emissions.

Pollution control devices will be installed to mitigate impacts from AS/SVE exhaust. Exhaust vapors from the SVE system will require treatment prior to discharge because of elevated volatiles. Initial pre-treatment vapor concentrations are likely to exceed 1,000 parts per million by volume (ppmV), above which thermal oxidation is generally the most cost-effective treatment technology. Thermal oxidation air treatment uses either a catalytic oxidizer or propane flame to combust

volatile laden exhaust vapors; thermal oxidizers typically achieve approximately 99% reduction in VOC concentrations. SVE exhaust vapor concentrations will be periodically monitored in the airstream before treatment to estimate mass loss from the SVE system. The system will be transitioned to carbon filtration as concentrations decrease to below 1,000 ppm. Exhaust treatment equipment will be specified in the engineering design report.

After construction, the cleanup area will be covered with impervious surfacing and institutional controls will be implemented to minimize exposure to workers or trespassers.

3) Water

a) Surface Water:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

The East Waterway of the Duwamish River is directly to the west of the project location.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No overwater work is anticipated for this cleanup. No direct negative impacts are anticipated due to the minimal land disturbing activity and restriction of work to wells and shallow trenches protected by impervious surfaces after construction.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

No fill or dredge material will be placed in or removed from surface waters or wetlands.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

The proposal does not involve any discharges of waste materials to surface waters.

b) Ground Water:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known. [help]

Groundwater will be withdrawn during LNAPL total fluid recovery events. Total fluid extraction volumes are expected to average approximately 1,500-gallons per event with some variation depending on the saturation and porosity of the aquifer immediately around each recovery well, and time spent at each recovery well.

The project will not have water discharges to groundwater.

2) **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

No waste material will be discharged into the ground.

c) **Water runoff (including stormwater):**

Remediation system installation and operation will not generate new surface water runoff. Stormwater and surface runoff on the site is managed by a permitted stormwater system.

1) **Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

Stormwater generated by precipitation during construction that contacts contaminated material will be collected and detained within the work area until tested and profiled for appropriate disposal. Incident precipitation and runoff on existing paved surfaces will be allowed to flow to the existing on-site permitted storm water system. Analytical testing performed on detained stormwater will be focused on sanitary discharge requirements or off-site disposal requirements. Other stormwater management controls include requirements to minimize or eliminate stormwater contact to exposed, potentially contaminated soils by:

1. covering stockpiles to protect from weather;
2. minimizing the footprint of the open work area;
3. protecting existing catch basin inlets; and
4. sweeping the ground surface in work areas to avoid migration of soils.

A construction Stormwater Pollution Prevention Plan/Temporary Erosion and Sedimentation Control Plan will be prepared that will detail the proposed plan for stormwater management, containment, and control; protection of catch basin inlets; and methods of covering soil stockpiles. Some stormwater falling into the excavated area may infiltrate into the ground.

2) **Could waste materials enter ground or surface waters? If so, generally describe.**

No waste materials are anticipated to enter the ground or surface waters. Liquid contaminated material will be removed as a result of the cleanup process reducing the amount of contamination in groundwater at the site.

d) **Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:**

All excavated and fill areas will be covered with asphalt to prevent surface water or precipitation from coming in contact with any remaining contaminated soils. During construction, all stormwater from the construction site will be collected, routed, and treated in accordance with Ecology and City of Seattle requirements. Best management practices will be implemented during construction to minimize surface water, groundwater, and runoff water impacts. The proposed cleanup actions are designed to prevent and reduce contaminant mass in soil and groundwater.

Scientists at the University of Washington Climate Impacts Group project that sea level will rise in the Puget Sound region as a result of climate change. In a range of possible scenarios, the medium estimate is that the sea level will rise approximately six inches by 2050 (Ecology's August 19, 2010 news release "Ecology helps communities plan for rising sea level"). The post-cleanup monitoring

of groundwater was projected to continue for a period of 30 years, during which time the projected medium estimate of sea level rise would be less than 6 inches. Minimal changes in groundwater levels that might be associated with a 6-inch rise in water levels are not anticipated affect fuel product recovery or air sparging operations. The monitoring phase of the groundwater sampling program will monitor potential changes in the chemistry of groundwater and adaptively manage changes caused by unanticipated seawater rise.

4) Plants

a) Check or circle types of vegetation found on the site:

No vegetation exists where the work will occur on the site.

____deciduous tree: alder, maple, aspen, other
____evergreen tree: fir, cedar, pine, other
____shrubs
____grass
____pasture
____crop or grain
____wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
____water plants: water lily, eelgrass, milfoil, other
____other types of vegetation

b) What kind and amount of vegetation will be removed or altered?

No vegetation will be removed or altered.

c) List threatened or endangered species known to be on or near the site.

No threatened or endangered plant species are known to occur on the T30 site.

d) Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

None

5) Animals

a) Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: (hawk, heron, eagle, songbirds,) other: osprey, geese, ducks
mammals: deer, bear, elk, beaver, other: raccoons
fish: bass, (salmon, trout, herring, shellfish,) other:

b) List any threatened or endangered species known to be on or near the site.

No threatened or endangered animal species are known to occur on the site. Elliott Bay is known to, or may, be used by federally listed animal species including the Georgia Basin/Puget Sound Distinct Population Segments (DPSs) of bocaccio rockfish (*Sebastes paucispinis*), canary rockfish (*S. pinniger*), and yelloweye rockfish (*S. Ruberrumis*); the Puget Sound Evolutionary Significant Unit (ESU) of Chinook salmon (*Oncorhynchus tshawytscha*); the Puget Sound DPS of steelhead

(*O. mykiss*); and the Coastal-Puget Sound DPS of bull trout (*Salvelinus confluentus*). No additional Washington State listed species are known to occur in Elliott Bay.

c) Is the site part of a migration route? If so, explain.

The site is within the Pacific Flyway, a major north-south route of travel for migratory birds in the Americas.

d) Proposed measures to preserve or enhance wildlife, if any:

BMPs will be employed to prevent materials resulting from remedial activities from entering the East Waterway and Elliot Bay or being available to terrestrial species.

6) Energy and natural resources

a) What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

The site will require the use of electrical utilities already located on the site. These will drive the blower and pump system essential to the AS/SVE system. In addition to electricity usage, gasoline/diesel generators may be used at the site as a backup system. The site has a substantial electrical system in place for day to day operations at the Terminal.

b) Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No

c) What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

None

7) Environmental health

a) Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste that could occur as a result of this proposal? If so, describe.

The proposed CAP has been designed to protect human health and the environment from site-related contamination. The nature of this work, however, may expose workers to levels of toxic and carcinogenic vapor, soil, and groundwater during construction. Post-construction air sparging and soil venting include a vapor treatment system to degrade and remove harmful compounds from the extracted air. Exhaust vapors from the SVE system will require treatment prior to discharge because of elevated volatiles.

To address potential risks to workers, a HASP will be developed prior to and implemented during construction of the project. Public safety concerns have been considered during the development of the Draft CAP and safeguards are included as part of the project to minimize risks to the public. Access to and from the areas to be remediated will be controlled to limit the potential for the public to enter the site.

b) Describe special emergency services that might be required.

No special emergency services are required for the project.

c) Proposed measures to reduce or control environmental health hazards, if any:

The purpose of the project is the reduction of contaminant mass in soil and groundwater. The HASP for the project will be strictly followed throughout construction to minimize human and environmental exposure to contaminated soils and groundwater. Site access will be controlled to prevent public access and limit public safety concerns.

8) Noise

a) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

The noise generated at the site consists of industrial container transportation and cargo handling at Terminal 30, vessel traffic in the Duwamish Waterway and traffic noise from Alaskan Way and State Route 99. These activities will continue during construction and post-construction cleanup air sparging operations, and noise from these activities is not expected to affect the project.

b) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Noise from worker vehicle traffic, support vehicle, and construction equipment including a backhoe for trenching and hollow stem auger for well drilling will occur during construction of the project. Such noise could increase the general drone from activity during construction. Noise generated by construction will be in compliance with the timing restrictions and the noise limits included in the Seattle noise regulations, Seattle Municipal Code [SMC] 25.08.

The AS/SVE will operate until groundwater monitoring meets the shutdown criteria. The air sparge compressor, soil vapor extraction blower, and exhaust gas treatment/filtering equipment will be housed in an on-site equipment shed near the wells. Noise generated from the system will be mitigated by the building enclosure. The system is expected to operate for 5 years beginning at construction completion.

LNAPL will be recovered from the wells by vacuum-truck total fluid recovery. Vacuum enhanced recovery will be conducted for approximately 1- to 2-hours at each well event. Each recovery event will last 12- to 24-hours. Well recovery events are scheduled bi-monthly for the first five years of operation, reducing to quarterly and then semi-annually over the remaining 5 years of vacuum enhanced recovery. Vacuum trucks are significant contributors to the noise environment. However, the activity will occur within an industrial, marine container cargo terminal.

c) Proposed measures to reduce or control noise impacts, if any:

Noise generated by construction and during operation of the system will comply with the timing restrictions and the noise limits included in the Seattle noise rule (SMC 25.08). These regulations limit hours of construction and place limits on noise levels from construction impacts and ongoing operations.

9) Land and shoreline use

a) What is the current use of the site and adjacent properties?

The Site is a shipping container transfer and storage facility. Adjacent facilities, including T-25 and T-46, are also used for container and berthing activity for the Port.

b) Has the site been used for agriculture? If so, describe.

The site has never been used for agriculture.

c) Describe any structures on the site.

Multiple structures exist on the entirety of T30; however, these structures will not be impacted by the remediation activities. The T30 Vessel Tower, used for daily crane operations at the Terminal is located adjacent to the site.

d) Will any structures be demolished? If so, what?

No structures will be demolished.

e) What is the current zoning classification of the site?

General Industrial 1 (IG1) - U/85

f) What is the current comprehensive plan designation of the site?

Industrial Area

g) If applicable, what is the current shoreline master program designation of the site?

The shoreline of the East Waterway is designated Urban Industrial.

h) Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

The site itself has not been classified as an environmentally sensitive area. However, the adjacent East Waterway is a Superfund site as designated by the EPA.

i) Approximately how many people would reside or work in the completed project?

No people would reside or work in the area under this proposal. Future development of the site may include as of yet unidentified industrial uses, parking, or light open storage of equipment. Future uses will be addressed under a separate SEPA process when those uses are identified.

j) Approximately how many people would the completed project displace?

None

k) Proposed measures to avoid or reduce displacement impacts, if any:

None

l) Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The proposal will remediate an existing industrial area that will remain an industrial area after construction. Existing and projected land uses for the area are also industrial in nature. Therefore, the project is compatible with existing and projected land uses and plans.

10) Housing

a) Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None

b) Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None

c) Proposed measures to reduce or control housing impacts, if any:

None

11) Aesthetics

a) What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

A small utility building less than 12 feet in height will be constructed to house monitoring equipment, compressors, and air quality equipment.

b) What views in the immediate vicinity would be altered or obstructed?

None

c) Proposed measures to reduce or control aesthetic impacts, if any:

None

12) Light and glare

a) What type of light or glare will the proposal produce? What time of day would it mainly occur?

No light or glare would be produced from the project.

b) Could light or glare from the finished project be a safety hazard or interfere with views?

No

c) What existing off-site sources of light or glare may affect your proposal?

None

d) Proposed measures to reduce or control light and glare impacts, if any:

None

13) Recreation

a) What designated and informal recreational opportunities are in the immediate vicinity?

Jack Perry Memorial Park is a 1.1 acre park located directly north of T30 and south of Terminal-46. The amenities include 120 feet of shoreline access, views of T30 and T-18 crane operations, views of the U.S. Coast Guard station, and parking facilities.

b) Would the proposed project displace any existing recreational uses? If so, describe.

No recreational uses would be displaced from remediation activities.

c) Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

None.

14) Historic and cultural preservation

a) Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

Two sites of historical importance occur north of the site. The first site, known as the 'First Service Station Site' (Smithsonian #: 45KI00132), is nationally recognized as the first fuel filling station directly dispensing gasoline to motorists. The site is approximately on the North East side of T30, address: Holgate Street and Alaskan Way, and was built in 1907 for the Standard Oil Company (Chevron) and declared a historical building in 1970. No negative effects from the cleanup activities are expected at the historical station site.

The second site is characterized as the Pacific Maritime Institute (Historic name: California Ink Company) and sits on the North side of T30. Although it shows up on the Washington Department of Archaeology & Historic Preservation's database, the site carries an 'Unable to Determine' tag on its criteria to meet the requirements of a national historic property. The only reason it is noted in this document is because of its appearance on the WISAARD database. Regardless, no adverse effects are anticipated at the property due to cleanup activities.

b) Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

None. Undifferentiated fine-grained fill material designated as the "Shallow Sand Unit" overlies native glacial sediment. The fill material layer extends to depths of 15 to 20 feet below ground surface in the cleanup vicinity. Excavations will stop at native soil level where pre-contact or ethno-historic archaeological materials could be encountered.

c) Proposed measures to reduce or control impacts, if any:

No measures are proposed to reduce or control impacts to cultural or historic resources.

15) Transportation

a) Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

The site is accessed via the Alaskan Way Viaduct and E Marginal Way S. S Stacy St. provides direct access to the site along with S Lander St. Because the entirety of T30 is paved for everyday operations of a functioning container terminal, direct access to the site is not an issue.

b) Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

The site is not directly served by any public transportation system. The closest bus stop is found at the corner of 1st Avenue South and S Hanford St. From there, it is approximately a 0.3 mile walk to the site.

c) How many parking spaces would the completed project have? How many would the project eliminate?

The project would neither create nor eliminate parking spaces.

d) Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

The proposal will not require any new roads, streets, or improvements to existing public roadways.

e) Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No

f) How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

During the three months of construction, approximately 150 diesel truck trips are expected for deliveries and removal of trenching material. A truck mounted drill rig will bore the 24 wells for LNAPL and air sparging system for approximately 10 days. A diesel powered backhoe will construct the utility and SVE trenches.

During the operation of the AS/SVE system, one to two support pickup trucks and monitoring equipment trucks transporting field operators and monitoring technicians will visit the site on an average of 12 times a year over a period of up to 10 years. These visits will decline over time as the product mass is reduced according to schedule in the CAP.

The LNAPL will be recovered from the wells by vacuum-truck total fluid recovery. Vacuum enhanced recovery will be conducted for approximately 1 to 2 hours at each well event. Each recovery event will last 12- to 24-hours. Well recovery events are scheduled bi-monthly for the first five years of operation, reducing to quarterly and then semi-annularly over the remaining 5 years of vacuum enhanced recovery.

g) Proposed measures to reduce or control transportation impacts, if any:

None. The number of vehicles from project actions is inconsequential to total vehicle traffic entering and exiting the site.

16) Public services

a) Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

b) Proposed measures to reduce or control direct impacts on public services, if any.

None.

17) Utilities

a) Circle utilities currently available at the site:

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system,

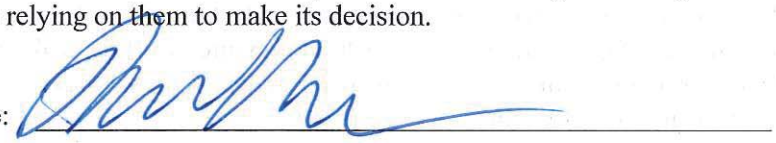
other _____

b) Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

No new utilities are proposed for the project. Existing utilities will be modified to supply power to utility shed to run compressors and blowers associated with AS/SVE system.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Name of signee: Paul Meyer

Position and Agency/Organization: Port of Seattle, Manager, Environmental Permitting and Compliance

Date Submitted: December 15, 2015

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Site Boundary

Terminal 30

Sections

0 Feet 2,000

0 Miles 0.5

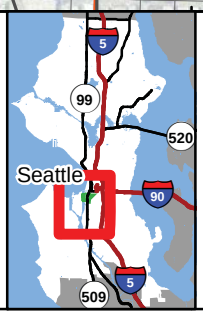

Figure 1

Site Location Map

Port of Seattle
Terminal 30

PgG

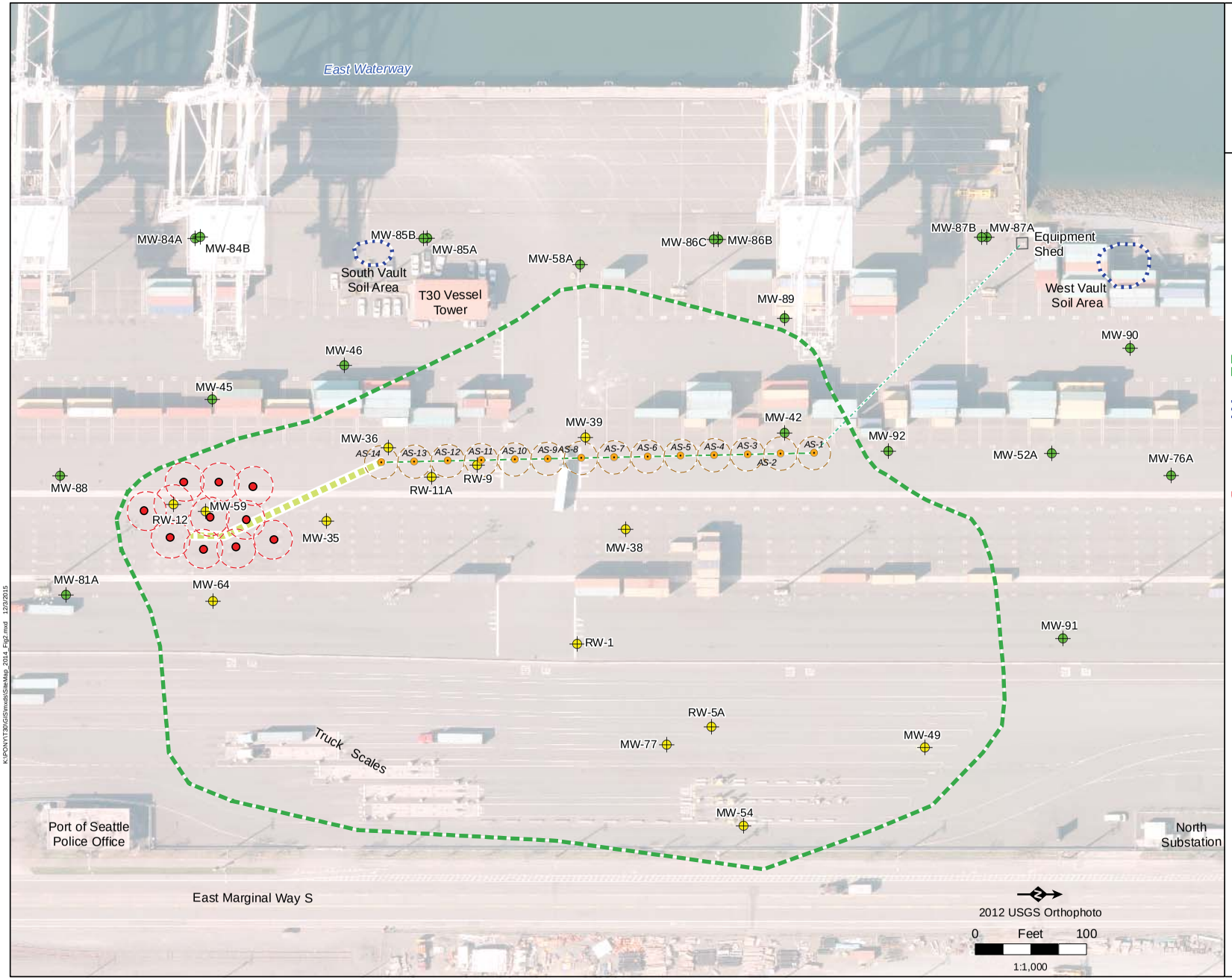

Figure 2

Site Map

Port of Seattle
Terminal 30

PgG

- Gaging/Recovery Well
- Water Quality Monitoring Well
- Site Extent of Contamination
- Soil Areas Not Associated with T-30 Site

Remediation Elements

- LNAPL Extraction Well with Radius of Influence
- Phase I Air Sparge Well with Radius of Influence
- Phase I SVE Pipe in Trench
- Future Phase II AS/SVE Expansion
- Utility Trench

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List of Applicable or Relevant and Appropriate Requirements

- City of Seattle electrical permit or permits for installation of remediation equipment
-
- Puget Sound Clean Air Authority (PSCAA) Air Emission Permit, or Permit Requirements for discharge from the air sparging system