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**IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON
KING COUNTY**

STATE OF WASHINGTON,
DEPARTMENT OF ECOLOGY,

Plaintiff,

v.

Equilon Enterprises LLC

Defendant.

No.

CONSENT DECREE

TABLE OF CONTENTS

I.	INTRODUCTION	3
II.	JURISDICTION	4
III.	PARTIES BOUND	5
IV.	DEFINITIONS	5
V.	STATEMENT OF FACTS	6
VI.	WORK TO BE PERFORMED	8
VII.	DESIGNATED PROJECT COORDINATORS	10
VIII.	PERFORMANCE	11
IX.	ACCESS	11
X.	SAMPLING, DATA REPORTING, AND AVAILABILITY	11
XI.	PROGRESS REPORTS	12
XII.	RETENTION OF RECORDS	13
XIII.	TRANSFER OF INTEREST IN PROPERTY	13
XIV.	RESOLUTION OF DISPUTES	14
XV.	AMENDMENT OF CONSENT DECREE	15
XVI.	EXTENSION OF SCHEDULE	16
XVII.	ENDANGERMENT	17

1	XVIII.	COVENANT NOT TO SUE.....	18
2	XIX.	INDEMNIFICATION.....	19
3	XX.	COMPLIANCE WITH APPLICABLE LAWS.....	20
4	XXI.	REMEDIAL AND INVESTIGATIVE COSTS.....	21
5	XXII.	IMPLEMENTATION OF REMEDIAL ACTION.....	22
6	XXIII.	FIVE YEAR REVIEW.....	22
7	XXIV.	PUBLIC PARTICIPATION.....	23
8	XXV.	DURATION OF DECREE.....	23
9	XXVI.	CLAIMS AGAINST THE STATE.....	24
10	XXVII.	EFFECTIVE DATE.....	24
11	XXVIII.	PUBLIC NOTICE AND WITHDRAWAL OF CONSENT.....	24
12	XXIX.	LAND USE RESTRICTIONS.....	25
13	XXX.	CONTRIBUTION PROTECTION.....	25
14	XXXI.	RESERVATION OF RIGHTS.....	26

15 Exhibit A: Site Diagram

16 Exhibit B: Draft Cleanup Action Plan

17 Exhibit C: Site Access and Operating Procedures

18 Exhibit D: Restrictive Covenant

19 Exhibit E: Schedule

20 Exhibit F: Groundwater Compliance Monitoring Plan

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I. INTRODUCTION

A. In entering into this Consent Decree (Decree), the mutual objective of the Washington State Department of Ecology (Ecology), and Equilon Enterprises LLC and Texaco Refining and Marketing Inc. (TRMI), here and after referred to collectively as Equilon is to provide for remedial action at a facility where there has been a release or threatened release of hazardous substances. This Decree requires Equilon to undertake the following remedial action(s):

1. Implement the Cleanup Action Plan (CAP)
2. Provide for public participation
3. Provide Remedial Design (RD)
4. Implement the Groundwater Compliance Monitoring that includes:
 - a. Protection monitoring
 - b. Performance monitoring
 - c. Confirmational monitoring

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

B. 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.

C. In signing this Decree, Equilon agrees to its entry and agrees to be bound by its terms.

D. By entering into this Decree, the parties do not intend to discharge nonsettling parties from any liability they may have with respect to matters alleged in the complaint. The

1 parties retain the right to seek reimbursement, in whole or in part, from any liable persons for
2 sums expended under this Decree.

3 E. This Decree is not an admission of and shall not be construed as proof of liability
4 or responsibility for any releases of hazardous substances or cost for remedial action nor an
5 admission of any facts; provided, however, that Equilon shall not challenge the jurisdiction of
6 Ecology in any proceeding to enforce this Decree. This Decree supercedes Agreed Order No.
7 DE-92 TC-N160.

8 F. The Court is fully advised of the reasons for entry of this Decree, and good cause
9 having been shown: IT IS HEREBY ORDERED, ADJUDGED, AND DECREED AS
10 FOLLOWS:

11 II. JURISDICTION

12 A. This Court has jurisdiction over the subject matter and over the parties pursuant to
13 Chapter 70.105D RCW, the Model Toxics Control Act (MTCA), and venue is proper in King
14 County.

15 B. Authority is conferred upon the Washington State Attorney General by RCW
16 70.105D.040(4)(a) to agree to a settlement with any potentially liable person if, after public notice
17 and hearing, Ecology finds the proposed settlement would lead to a more expeditious cleanup of
18 hazardous substances. RCW 70.105D.040(4)(b) requires that such a settlement be entered as a
19 consent decree issued by a court of competent jurisdiction.

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

22 D. Ecology has given notice to Equilon, as set forth in RCW 70.105D.020(15), of
23 Ecology's determination that Equilon is a potentially liable person for the Site and that there has
24 been a release or threatened release of hazardous substances at the Site.

1 E. The actions to be taken pursuant to this Decree are necessary to protect public
2 health, welfare, and the environment, AND TO COMPLY WITH MTCA AND CERCLA.

3 F. Equilon has agreed to undertake the actions specified in this Decree and consents
4 to the entry of this Decree under the MTCA.

5 III. PARTIES BOUND

6 This Decree shall apply to and be binding upon the signatories to this Decree (parties),
7 their successors and assigns. The undersigned representative of each party hereby certifies that he
8 or she is fully authorized to enter into this Decree and to execute and legally bind such party to
9 comply with the Decree. Equilon agrees to undertake all actions required by the terms and
10 conditions of this Decree and not to contest state jurisdiction regarding this Decree. No change in
11 ownership or corporate status shall alter the responsibility of Equilon under this Decree. Equilon
12 shall provide a copy of this Decree to all agents, contractors and subcontractors retained to
13 perform work required by this Decree and shall ensure that any contract for such work will be in
14 compliance with this Decree.

15 IV. DEFINITIONS

16 Except as specified herein, all definitions in WAC 173-340-200 apply to the terms in this
17 Decree.

18 A. Site: The Site, owned by Equilon, is divided into three parcels: the Main Terminal
19 and Tank Farm, the North Tank Farm, and the Shoreline Manifold Area located at 2555 13th
20 Avenue SW, 1835 13th Avenue, and 1711 13th Avenue SW, respectively, Seattle, Washington,
21 98124 (collectively referred to as the "Site") on Harbor Island. The Site is part of the Tank Farm
22 Operable Unit One (OU1) for the Harbor Island Superfund Site. The Site is more particularly
23 described in Exhibit A to this Decree which is a detailed site diagram.

24 B. Parties: Refers to the Washington State Department of Ecology and Equilon.
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1 C. Equilon: Refers to Equilon Enterprises LLC and Texaco Refining and Marketing
2 Inc. (TRMI).

3 D. Consent Decree or Decree: Refers to this Consent Decree and each of the exhibits
4 to the Decree. All exhibits are by this reference incorporated herein, and are integral and
5 enforceable parts of this Consent Decree. The terms “Consent Decree” or “Decree” shall include
6 all exhibits to the Consent Decree.

7 **V. STATEMENT OF FACTS**

8 Ecology makes the following finding of facts without any express or implied admissions by
9 Equilon.

10 A. Equilon presently owns the following property known as Equilon Seattle Sales
11 Terminal. The facility is divided into three parcels: the Main Terminal and Tank Farm, the North
12 Tank Farm, and the Shoreline Manifold Area located at 2555 13th Avenue SW, 1835 13th
13 Avenue, and 1711 13th Avenue SW, respectively, Seattle, Washington, 98124 (collectively
14 referred to as the “Site”). The Main Terminal consists of two office buildings, a warehouse, a
15 former bottle filling building, a blending building, a light oil truck loading rack, a lube oil truck
16 loading rack, pipeline receipt facilities, two regulated underground storage tanks (USTs), five
17 unregulated USTS, eighty-three above-ground storage tanks, piping, pumps, a boiler, and a
18 garage. The products stored at the Main Terminal and Tank Farm include three grades of motor
19 gasoline, aviation gasoline, jet fuel, middle distillates (e.g., diesel #2), and lubricating oils. The
20 North Tank Farm contains two above-ground storage tanks that store diesel. The Shoreline
21 Manifold Area and Dock consists of manifolds controlling the flow of product between the tank
22 farms and the dock.

23 B. Ecology files contain the following report: Remedial Investigation, Texaco Harbor
24 Island Terminal, Seattle, Washington. EMCON Northwest, Inc., Final 1996 RI Report. Based
25 on the RI Report, Ecology finds as follows:
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1. Free-phase hydrocarbons are confirmed to be present on the Site situated at the top of the water table at the Main Terminal, North Tank Farm, and beneath the Shoreline Manifold Area next to Elliott Bay; and

2. Residual hydrocarbons exceeding MTCA methods A and B matrix concentrations are confirmed to be present in the soil at the Site beneath portions of the Main Terminal, North Tank Farm, and the Shoreline Manifold Area.

3. Dissolved petroleum hydrocarbons exceeding the Surface Water Quality Standards are confirmed to be present in the groundwater at the Site beneath areas of the Main Terminal, North Tank Farm, and the Shoreline Manifold Area.

4. Lead and arsenic above Method A concentrations are confirmed to be present in the surface soil at the Tank Farm of the Main Terminal and the North Tank Farm.

C. Ecology files contain the following report: Final Focused Feasibility Study Report; Texaco Harbor Island Terminal, Seattle, Washington. EMCON, Inc., May 14, 1997 (FFS Report). Based on the FFS Report, Ecology finds as follows:

1. Equilon identified a preferred remedy after evaluating other alternative remedies to address the hazardous substances located on site. Ecology concurs that the remedy preferred by Equilon is appropriate. The preferred remedy is to:

a. Continue product recovery and associated dissolved TPH hydrocarbons plume removal at the Shoreline Manifold Area;

b. Remove free product from the groundwater throughout the site;

c. Excavate accessible TPH hot spots over 10,000 mg/kg (EPA ROD for TPH hot spot is 10,000 mg/kg for Harbor Island) in the subsurface soil to improve groundwater quality at the shoreline;

d. Excavate accessible TPH hot spots over 20,000 mg/kg (EPA Guideline for Corrective Action Plan and Monitored Natural Attenuation Documents) in the

1 subsurface soil to improve groundwater quality, enhance biodegradation of residual TPH and
2 provide a more timely restoration of the inland portions of the site;

3 e. Excavate lead hot spots in surface soils adjacent to the oil/water
4 separator, and dispose or treat off-site;

5 f. Cap or excavate surface soils in which concentrations exceed 1,000
6 mg/kg for lead and 32.6 mg/kg for arsenic (EPA ROD for Surface Soils on Harbor Island) to
7 prevent direct contact, prevent infiltration to the groundwater, and prevent surface runoff to the
8 bay through storm drains; and

9 g. Implement a groundwater monitoring program, institutional
10 controls, and, contingency plans. The groundwater monitoring program may include
11 bioassay/sediment sampling at the Shoreline Manifold and evaluation of additional remedial
12 actions if triggered by the contingency plans.

13 D. In August, 1995, the United States District Court for Western District of
14 Washington (Civil Action No. 95-01495-Z) entered a Consent Decree (Federal Consent Decree)
15 in *U.S. v. The Port of Seattle et al.* relating to claims under the Comprehensive Environmental
16 Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq., involving the
17 Harbor Island Superfund Site. Article I, Paragraph 8 of the Federal Consent Decree identifies
18 operable units within the Harbor Island Superfund Site and recites that the Petroleum Tank Farm
19 Operable Unit is under the management of the Department of Ecology. The Environmental
20 Protection Agency and Ecology have entered into Memorandums of Understanding, dated
21 February 5, 1991 and March 3, 1994, setting forth the duties and responsibilities of each agency
22 with regard to site management and enforcement activities at the Harbor Island Superfund Site.

23 VI. WORK TO BE PERFORMED

24 This Decree contains a program designed to protect public health, welfare and the
25 environment from the known release, or threatened release, of hazardous substances at, on, or
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1 from the Site. Equilon agrees to take the following remedial actions and to conduct all work in
2 accordance with Ch. 173-340 WAC, unless otherwise specifically provided herein. These actions
3 are more specifically described in the Draft Cleanup Action Plan attached as Exhibit B.

4 A. Task 1: Implement the Cleanup Action Plan:

5 1. Continue with product and associated dissolved TPH hydrocarbon
6 recovery along the Shoreline Manifold Area next to Elliott Bay. In addition, remove free product
7 from the groundwater throughout the site;

8 2. Excavate TPH hot spots above 10,000 mg/kg in the subsurface soil along
9 the shorelines and above 20,000 mg/kg at the inland portions of the site to improve groundwater
10 quality, enhance biodegradation of the residual TPH and provide a more timely restoration of the
11 affected areas;

12 3. Excavate lead hot spots in the surface soil next to the oil/water separator;

13 4. Cap or excavate surface soils in which lead and arsenic concentrations
14 exceed 1000 mg/kg and 32.6 mg/kg, respectively (EPA ROD for Harbor Island Surface Soils);

15 5. Implement groundwater monitoring program;

16 6. As part of the groundwater monitoring program, implement
17 sediment/bioassay sampling and additional remedial actions if triggered by the contingency plan,

18 7. Implement institutional controls and Restrictive Covenant; and

19 8. Implement contingency plans, if necessary.

20 B. Task 2: Provide for public participation.

21 C. Task 3: Provide Remedial Design (or Engineering Report).

22 D. Task 4: Implement the Compliance Groundwater Monitoring Program Exhibit F,
23 that includes:

24 1. Protection monitoring;

25 2. Performance monitoring;

1 3. Confirmational monitoring.

2 E. Task 5: Implement Schedule as outlined in Exhibit E.

3 F. Equilon agrees not to perform any remedial actions on the Site that are
4 inconsistent with the remedial actions required under this consent decree.

5 **VII. DESIGNATED PROJECT COORDINATORS**

6 The project coordinator for Ecology is:

7 Nnamdi Madakor, Senior Hydrogeologist
8 Washington State Department of Ecology
9 Northwest Regional Office
10 3190 160th Avenue SE
11 Bellevue, WA 98008-5452
12 (425) 649-7112

13 The project coordinator for Equilon is:

14 Jeff Goold, Project Manager
15 Equilon Enterprises LLC
16 3400 188th St SW, Suite 630
17 Lynnwood, WA 98037
18 (425) 774-6090 (ext. 223)

19 Each project coordinator shall be responsible for overseeing the implementation of this
20 Decree. The Ecology project coordinator will be Ecology's designated representative at the Site.
21 To the maximum extent possible, communications between Ecology and Equilon and all
22 documents, including reports, approvals, and other correspondence concerning the activities
23 performed pursuant to the terms and conditions of this Decree, shall be directed through the
24 project coordinators. The project coordinators may designate, in writing, working level staff
25 contacts for all or portions of the implementation of the remedial work required by this Decree.
26 The project coordinators may agree to minor modifications to the work to be performed without
formal amendments to this Decree. Minor modifications will be documented in writing by
Ecology.

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

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VIII. PERFORMANCE

All work performed pursuant to this Decree shall be under the direction and supervision, as necessary, of a professional engineer or hydrogeologist, or equivalent, with experience and expertise in hazardous waste site investigation and cleanup. Any construction work must be under the supervision of a professional engineer. Equilon shall notify Ecology in writing as to the identity of such engineer(s) or hydrogeologist(s), or others and of any contractors and subcontractors to be used in carrying out the terms of this Decree, in advance of their involvement at the Site.

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IX. ACCESS

Ecology or any Ecology-authorized representatives shall have the authority to enter and freely move about all property at the Site at all reasonable times for the purposes of, inter alia: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Decree; reviewing Equilon'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 Equilon. Without limitation on Ecology's rights under this section, Ecology will provide Equilon advance notice of its entry onto the Site when feasible. All parties with access to the Site pursuant to this paragraph shall comply with Site access and operating procedures, Exhibit C. Ecology shall make available to Equilon the results of all sampling, laboratory reports, videos and other test results generated by Ecology or on its behalf.

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X. SAMPLING, DATA REPORTING, AND AVAILABILITY

Equilon shall make available to Ecology the results of all sampling, laboratory reports, and/or test results generated by Equilon, or on its behalf, in the implementation of this Decree and shall submit these results in accordance with Section XI of this Decree.

1 In accordance with WAC 173-340-840(5), ground water sampling data shall be submitted
2 according to the requirements that will be established in the Groundwater Compliance Monitoring
3 Program.

4 Each party shall allow split or replicate samples to be taken by the other and shall provide
5 5 working days notice before conducting any sampling activities.

6 **XI. PROGRESS REPORTS**

7 Equilon shall submit to Ecology written progress reports that describe the actions taken to
8 implement the requirements of this Decree. The progress report shall be prepared no more
9 frequently than set forth in the following schedule:

- 10 • Quarterly during remedial design activities;
- 11 • Monthly during construction phase activities;
- 12 • Monthly for the first quarter after remedial system startup.

13 The frequency of progress reports to be submitted following the first quarter after remedial
14 system startup shall be established in the Groundwater Compliance Monitoring Program.

15 Progress reports shall include the following:

- 16 A. A list of on-site activities that have taken place during the reporting period;
- 17 B. Detailed description of any deviations from required tasks not otherwise
18 documented in project plans or amendment requests;
- 19 C. Description of all deviations from the schedule (Section VI, Work To Be
20 Performed: Task 5) during the current reporting period and any planned deviations in the
21 upcoming reporting period;
- 22 D. For any deviations in schedule, a plan for recovering lost time and maintaining
23 compliance with the schedule;
- 24 E. All raw data (including laboratory analysis) received by Equilon during the past
25 month and an identification of the source of the sample; and
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1 F. A list of deliverables for the upcoming month if different from the schedule.

2 All progress reports shall be submitted by the fifteenth day of the reporting period in
3 which they are due after the effective date of this Decree. Unless otherwise specified, progress
4 reports and any other documents submitted pursuant to this Decree shall be sent to Ecology's
5 project coordinator.

6 **XII. RETENTION OF RECORDS**

7 Equilon shall preserve, during the pendency of this Decree and for ten (10) years from the
8 date this Decree is no longer in effect as provided in Section XXV, all records, reports,
9 documents, and underlying data in its possession relevant to the implementation of this Decree
10 and shall insert in contracts with project contractors and subcontractors a similar record retention
11 requirement. Upon request of Ecology, Equilon shall make all non-archived, non-privileged
12 records available to Ecology and allow access for review. All archived non-privileged records
13 shall be made available to Ecology within a reasonable period of time.

14 **XIII. TRANSFER OF INTEREST IN PROPERTY**

15 Prior to any voluntary or involuntary conveyance or relinquishment of title, easement,
16 leasehold, or other interest in any portion of the Site, Equilon shall provide for continued
17 operation and maintenance of any containment system, treatment system, and monitoring system
18 installed or implemented pursuant to this Decree.

19 Prior to transfer of any legal or equitable interest in all or any portion of the property, and
20 during the effective period of this Decree, Equilon shall serve a copy of this Decree upon any
21 prospective purchaser, lessee, transferee, assignee, or other successor in interest of the property;
22 and, at least thirty (30) days prior to any transfer, Equilon shall notify Ecology of said
23 contemplated transfer.

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XIV. RESOLUTION OF DISPUTES

A. In the event a dispute arises as to an approval, disapproval, payment obligation, proposed modification or other decision or action by Ecology's project coordinator, the parties shall utilize the dispute resolution procedure set forth below.

1. Upon receipt of the Ecology project coordinator's decision, Equilon has fourteen (14) days within which to notify Ecology's project coordinator of its objection to the decision.

2. The parties' project coordinators shall then confer in an effort to resolve the dispute. If the project coordinators cannot resolve the dispute within fourteen (14) days, Ecology's project coordinator shall issue a written decision.

3. Equilon may then request Ecology management review of the decision. This request shall be submitted in writing to the Toxics Cleanup Program Manager within seven (7) days of receipt of Ecology's project coordinator's decision.

4. Ecology's Program Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute within thirty (30) days of Equilon request for review. The Program Manager's decision shall be Ecology's final decision on the disputed matter.

B. If Ecology's final written decision is unacceptable to Equilon, the parties may, by mutual agreement, submit the dispute to a neutral mediator. If the parties reach agreement as a result of the mediation, they shall jointly prepare a written resolution of the dispute immediately following the mediation session. If the parties fail to reach agreement as a result of the mediation, then Ecology shall, within thirty (30) days after the conclusion of the mediation, issue a written statement either reaffirming its original decision or setting forth a new decision. Equilon has the right to submit the dispute to the Court for resolution within thirty (30) days after any of the following: (i) Equilon receives written notice that Ecology does not agree to submit the dispute to mediation; (ii) after mediation, Equilon receives a written statement from Ecology that is

1 unacceptable to Equilon; or (iii) Ecology fails to issue the final decision described earlier in this
2 paragraph. The parties agree that one judge should retain jurisdiction over this case and shall, as
3 necessary, resolve any dispute arising under this Decree.

4 C. For disputes that involve Ecology's investigative and remedial decisions, and
5 others covered by RCW 70.105D.060, the standard of review shall be arbitrary and capricious.
6 For all other disputes, the court shall decide the standard of review.

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

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

14 **XV. AMENDMENT OF CONSENT DECREE**

15 Except for an extension granted pursuant to Section XVI below or technical revisions to
16 Section VI or Exhibit B affecting the nature or scope of remedial work, this Decree may only be
17 amended by a written stipulation among the parties to this Decree that is entered by the Court or
18 by order of the Court. Such amendment shall become effective upon entry by the Court.
19 Agreement to amend shall not be unreasonably withheld by any party to the Decree.

20 Equilon shall submit any request for an amendment to Ecology for approval. Ecology
21 shall indicate its approval or disapproval in a timely manner after the request for amendment is
22 received. If the amendment to the Decree is substantial, Ecology will provide public notice and
23 opportunity for comment. Reasons for the disapproval shall be stated in writing. If Ecology does
24 not agree to any proposed amendment, the disagreement may be addressed through the dispute
25 resolution procedures described in Section XIV of this Decree. Technical revisions to Section VI
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1 or Exhibit B, affecting the nature or scope of remedial work, may be made by mutual written
2 agreement of the parties without approval of the court.

3 **XVI. EXTENSION OF SCHEDULE**

4 A. An extension of schedule shall be granted only when a request for an extension is
5 submitted in a timely fashion, generally at least 15 days prior to expiration of the deadline for
6 which the extension is requested, and good cause exists for granting the extension. All extensions
7 shall be requested in writing. The request shall specify the reason(s) the extension is needed.

8 An extension shall only be granted for such period of time as Ecology determines is
9 reasonable under the circumstances. A requested extension shall not be effective until approved
10 by Ecology or the Court. Ecology shall act upon any written request for extension in a timely
11 fashion. It shall not be necessary to formally amend this Decree pursuant to Section XV when a
12 schedule extension is granted.

13 B. The burden shall be on Equilon to demonstrate to the reasonable satisfaction of
14 Ecology that the request for such extension has been submitted in a timely fashion and that good
15 cause exists for granting the extension. Good cause includes, but is not limited to, the following.

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

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

21 3. Endangerment as described in Section XVII; or

22 4. Other circumstances deemed by Ecology to be exceptional, extraordinary,
23 or otherwise necessary to protect the environment or public interest.

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2 However, neither increased costs of performance of the terms of the Decree nor changed
3 economic circumstances shall be considered circumstances beyond the reasonable control of
4 Equilon.

5 C. Ecology may extend the schedule for a period not to exceed ninety (90) days,
6 except where an extension is needed as a result of:

- 7 1. Delays in the issuance of a necessary permit which was applied for in a
8 timely manner; or
9 2. Other circumstances deemed exceptional or extraordinary by Ecology; or
10 3. Endangerment as described in Section XVII.

11 Ecology shall give Equilon written notification in a timely fashion of any extensions
12 granted pursuant to this Decree. Ecology shall not unreasonably withhold approval of requested
13 extensions.

14 **XVII. ENDANGERMENT**

15 In the event Ecology determines that activities implementing or in compliance with this
16 Decree, or any other circumstances or activities, are creating or have the potential to create a
17 danger to the health or welfare of the people on the Site or in the surrounding area or to the
18 environment, Ecology may order Equilon to stop further implementation of this Decree for such
19 period of time as needed to abate the danger or may petition the Court for an order as
20 appropriate. During any stoppage of work under this section, the obligations of Equilon with
21 respect to the work under this Decree which is ordered to be stopped shall be suspended and the
22 time periods for performance of that work, as well as the time period for any other work
23 dependent upon the work which is stopped, shall be extended, pursuant to Section XVI of this
24 Decree, for such period of time as Ecology determines is reasonable under the circumstances.

25 In the event Equilon determines that activities undertaken in furtherance of this Decree or
26 any other circumstances or activities are creating an endangerment to the people on the Site or in

1 the surrounding area or to the environment, Equilon may stop implementation of this Decree for
2 such period of time necessary for Ecology to evaluate the situation and determine whether
3 Equilon should proceed with implementation of the Decree or whether the work stoppage should
4 be continued until the danger is abated. Equilon shall notify Ecology's project coordinator as
5 soon as possible, but no later than twenty-four (24) hours after such stoppage of work, and
6 thereafter provide Ecology with documentation of the basis for the work stoppage. If Ecology
7 disagrees with Equilon's determination, it may order Equilon to resume implementation of this
8 Decree. If Ecology concurs with the work stoppage, Equilon's obligations shall be suspended
9 and the time period for performance of that work, as well as the time period for any other work
10 dependent upon the work which was stopped, shall be extended, pursuant to Section XVI of this
11 Decree, for such period of time as Ecology determines is reasonable under the circumstances.
12 Any disagreements arising under this clause shall be resolved through the dispute resolution
13 procedures in Section XIV.

14 **XVIII. COVENANT NOT TO SUE**

15 A. In consideration of Equilon's compliance with the terms and conditions of this
16 Decree, Ecology covenants that compliance with this Decree shall stand in lieu of any and all
17 administrative, legal, and equitable remedies and enforcement actions available to Ecology against
18 Equilon for the release or threatened release of hazardous substances covered by the terms of this
19 Decree.

20 B. This covenant is strictly limited in its application to the Site specifically described
21 in Exhibit A and to those hazardous substances that Ecology knows to be located at the Site as of
22 the date of entry of this Decree. This covenant is not applicable to any other hazardous substance
23 or area, and Ecology retains all of its authority relative to such substances and areas.
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1 C. In the following circumstances Ecology may exercise its full legal authority to
2 address releases of hazardous substances at the Site notwithstanding the Covenant Not to Sue
3 set forth above:

4 1. If Equilon fails to comply with the terms and conditions of this Decree,
5 including all exhibits, and, after written notice of noncompliance, fails to comply; or

6 2. If factors not known at the time of entry of this Decree, including factors
7 listed in WAC 173-340-420(2), are discovered and Ecology determines, in light of these factors,
8 that further remedial action is necessary at the Site to protect human health or the environment,
9 provided that, if this paragraph becomes operative, Ecology will allow Equilon to propose the
10 further action where such proposal can be made promptly and without endangering human health
11 or the environment; or

12 3. If Ecology determines that conditions at the Site cause an endangerment to
13 human health or the environment, and that actions beyond those required under this Decree are
14 necessary.

15 D. The Covenant Not to Sue set forth above shall have no applicability whatsoever to

16 1. Criminal liability;
17 2. Any liability for damages to natural resources;
18 3. Any Ecology action against potentially liable persons not a party to this
19 Decree.

20 **XIX. INDEMNIFICATION**

21 Equilon agrees to indemnify and save and hold the State of Washington, its
22 employees, and agents harmless from any and all claims or causes of action for death or injuries to
23 persons or for loss or damage to property arising from or on account of acts or omissions of
24 Equilon, its officers, employees, agents, or contractors in entering into and implementing this
25 Decree. However, Equilon shall not indemnify the State of Washington nor save nor hold its
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1 employees and agents harmless from any claims or causes of action arising out of the intentional
2 misconduct or negligent acts or omissions of the State of Washington, or the employees or agents
3 of the State, in implementing the activities pursuant to this Decree.

4 **XX. COMPLIANCE WITH APPLICABLE LAWS**

5 A. All actions carried out by Equilon pursuant to this Decree shall be done in
6 accordance with all applicable federal, state, and local requirements, including requirements to
7 obtain necessary permits, except as provided in Paragraph B. of this section.

8 B. Exhibit B, the Draft Cleanup Action Plan, will be amended to include the
9 substantive requirements of chapters 70.94, 70.95, 70.105, 75.20, 90.48, and 90.58 RCW and of
10 any laws requiring or authorizing local government permits or approvals for the remedial action
11 under this Decree.

12 Equilon has a continuing obligation to determine whether additional permits or approvals
13 addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this
14 Decree. In the event either Equilon or Ecology determines that additional permits or approvals
15 addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this
16 Decree, it shall promptly notify the other party of this determination. Ecology shall determine
17 whether Ecology or Equilon shall be responsible to contact the appropriate state and/or local
18 agencies. If Ecology so requires, Equilon shall promptly consult with the appropriate state and/or
19 local agencies and provide Ecology with written documentation from those agencies of the
20 substantive requirements those agencies believe are applicable to the remedial action. Ecology
21 shall make the final determination on the additional substantive requirements that must be met by
22 Equilon and on how Equilon must meet those requirements. Ecology shall inform Equilon in
23 writing of these requirements. Once established by Ecology, the additional requirements shall be
24 enforceable requirements of this Decree. Equilon shall not begin or continue the remedial action
25 potentially subject to the additional requirements until Ecology makes its final determination.
26

1 Ecology shall ensure that notice and opportunity for comment is provided to the public
2 and appropriate agencies prior to establishing the substantive requirements under this section.

3 C. Pursuant to RCW 70.105D.090(2), in the event Ecology determines that the
4 exemption from complying with the procedural requirements of the laws referenced in RCW
5 70.105D.090(1) would result in the loss of approval from a federal agency which is necessary for
6 the State to administer any federal law, the exemption shall not apply and TRMI shall comply with
7 both the procedural and substantive requirements of the laws referenced in RCW 70.105D.090(1),
8 including any requirements to obtain permits.

9 D. In implementing this Decree for purposes such as sampling, it is contemplated that
10 Equilon may remove limited quantities of soil, groundwater, and other materials (collectively,
11 "Materials") from real property within or adjacent to the Site. Any removal shall be done in
12 compliance with all applicable laws as required by this Section XX. It is agreed that any
13 disposition of the Material by Equilon, including documents generated pursuant to such
14 disposition, shall not be deemed to be an admission by such party of liability for purposes of the
15 Model Toxics Control Act.

16 **XXI. REMEDIAL AND INVESTIGATIVE COSTS**

17 A. Equilon agrees to pay costs incurred by Ecology pursuant to this Decree which
18 have not been previously paid. These costs shall include work performed by Ecology or its
19 contractors for, or on, the Site under Ch. 70.105D RCW, both prior to and subsequent to the
20 issuance of this Decree, for investigations, remedial actions, and Decree preparation, negotiations,
21 oversight and administration. Ecology costs shall include costs of direct activities and support
22 costs of direct activities as defined in WAC 173-340-550(2). Equilon agrees to pay the required
23 amount within ninety (90) days of receiving from Ecology an itemized statement of costs that
24 includes a summary of costs incurred, an identification of involved staff, and the amount of time
25 spent by involved staff members on the project. A general statement of work performed will be
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1 provided upon request and Equilon has submitted such a request to Ecology. Itemized statements
2 shall be prepared quarterly. Failure to pay Ecology's costs within ninety (90) days of receipt of
3 the itemized statement will result in interest charges at the rate of twelve percent per annum.
4 Equilon reserves the right to review and approve any charges prior to payment. Any dispute
5 regarding remedial and investigation costs for the Site shall be subject dispute resolution pursuant
6 to Section XIV. Equilon reserves the right to pay the undisputed portion of an invoice and not
7 pay the disputed portion.

8 **XXII. IMPLEMENTATION OF REMEDIAL ACTION**

9 If Ecology determines that Equilon has failed without good cause to implement the
10 remedial action, Ecology may, after notice and reasonable opportunity to Equilon to cure the
11 failure, perform any or all portions of the remedial action that remain incomplete. If Ecology
12 performs all or portions of the remedial action because of Equilon's failure to comply with its
13 obligations under this Decree, Equilon shall reimburse Ecology for the costs of doing such work
14 in accordance with Section XXI, provided that Equilon is not obligated under this section to
15 reimburse Ecology for costs incurred for work inconsistent with or beyond the scope of
16 this Decree.

17 **XXIII. FIVE YEAR REVIEW**

18 As remedial action, including ground water monitoring, continues at the Site, the parties
19 agree to review the progress of remedial action at the Site, and to review the data accumulated as
20 a result of site monitoring as often as is necessary and appropriate under the circumstances or as
21 agreed upon in the Compliance Groundwater Monitoring Program for the Site. The parties agree
22 to meet to discuss the Site status every five years upon request from Ecology, or at Equilon's
23 request. Ecology reserves the right to require further remedial action at the Site under
24 appropriate circumstances. This provision shall remain in effect for the duration of the Decree.
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XXIV. PUBLIC PARTICIPATION

Ecology shall maintain the responsibility for public participation at the Site. However, Equilon shall cooperate with Ecology and, if agreed to by Ecology, shall:

A. Prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of engineering design reports. Ecology will finalize (including editing if necessary) and, after receiving and considering comments from Equilon, 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 and consult with Equilon prior to the issuance of all press releases and fact sheets, and before major meetings with the interested public and local governments;

C. 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; and

D. Provide Ecology with copies of documents to be placed in information repositories to be located at the Seattle Public Library, Downtown Branch, Magazines, Newspapers and Government Publications Dept., 1000 4th Ave., Seattle, Washington 98104 and Ecology's Northwest Regional Office at 3190 160th Avenue SE, Bellevue, Washington 98008-5452. At a minimum, copies of all public notices, fact sheets, and press releases; all quality assured ground water, surface water, soil sediment, and air monitoring data; remedial actions plans, supplemental remedial planning documents, and all other similar documents relating to performance of the remedial action required by this Decree shall be promptly placed in these repositories.

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XXV. DURATION OF DECREE

A. This Decree shall remain in effect and the remedial program described in the Decree shall be maintained and continued until Equilon has received written notification from

1 Ecology that the requirements of this Decree have been satisfactorily completed. Ecology shall
2 issue such notification within sixty (60) days after the requirements of this Decree have been
3 satisfactorily completed. Thereafter the parties within thirty (30) days shall jointly request that the
4 Court vacate this Consent Decree.

5 B. Upon completion of each action specified in the Final CAP, Ecology shall issue a
6 Certificate of Completion within sixty (60) days after such action has been completed.

7 **XXVI. CLAIMS AGAINST THE STATE**

8 Equilon hereby agrees that it will not seek to recover any costs incurred in implementing
9 the remedial action required by this Decree from the State of Washington or any of its agencies,
10 with the exception of the Department of Natural Resources; and further, that Equilon will make
11 no claim against the State Toxics Control Account or any Local Toxics Control Account for any
12 costs incurred in implementing this Decree. Except as provided above, however, Equilon
13 expressly reserves its right to seek to recover any costs incurred in implementing this Decree from
14 any other potentially liable person. Equilon further reserves its right to make a claim against the
15 State or Local Toxics Control Account for the costs incurred in remediating hazardous substances
16 released as a result of third-party offsite activities, but only if future amendments to MTCA allow
17 for such claims, and operate retroactively. No determination has been made whether such a claim,
18 if filed, would be valid, and both parties agree that any claim would have to be evaluated under
19 the law in effect at the time the claim was made.

20 **XXVII. EFFECTIVE DATE**

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

22 **XXVIII. PUBLIC NOTICE AND WITHDRAWAL OF CONSENT**

23 This Decree has been the subject of public notice and comment under RCW
24 70.105D.040(4)(a). As a result of this process, Ecology has found that this Decree will lead to a
25 more expeditious cleanup of hazardous substances at the Site.
26

1 If the Court withholds or withdraws its consent to this Decree, it shall be null and void at
2 the option of any party and the accompanying Complaint shall be dismissed without costs and
3 without prejudice. In such an event, no party shall be bound by the requirements of this Decree.
4

5 **XXIX. LAND USE RESTRICTIONS**

6 Equilon agrees that the restrictive covenant, Exhibit D, shall be recorded with the office of
7 the King County Auditor within 10 days of the entry of this Decree and shall restrict future uses
8 of the Site. With Ecology's prior written approval, and after completion of the remedial action
9 required by this Decree, Equilon, or its successor(s), may record an instrument that provides that
10 the restrictive covenant provided in Exhibit D shall no longer limit uses of the Site or be of any
11 further force
12 or effect.

13 **XXX. CONTRIBUTION PROTECTION**

14 A. With regard to claims or cross-claims for contribution against Equilon for Matters
15 Addressed in this Consent Decree, the parties hereto agree that Equilon is entitled to contribution
16 protection from any actions, claims, or cross-claims pursuant to MTCA, RCW 70.105D.080,
17 CERCLA § 107 or 113, or any other federal or state claim or cross-claim seeking, under other
18 theories, substantially similar relief, to the fullest extent allowed by MTCA, RCW 70.105D.080,
19 CERCLA § 107 or 113(f)(2). The contribution protection conferred in this section shall not be
20 frustrated by the use of non-CERCLA or non-MTCA theories to seek relief in the nature of
21 contribution or indemnification. For the purpose of this paragraph, "Matters Addressed" shall
22 include all past and future investigation and remedial measures taken at the Site by Equilon
23 pursuant to this Consent Decree or under Ecology oversight.

24 B. The percentage of response costs paid by Equilon under this Decree shall not in
25 any way constitute an admission as to an appropriate allocation of liability, if any, at the Site.
26

1 This Section XXX shall apply to, but is not limited to, successors in interest who assume
2 obligations under this Decree.

3 **XXXI. RESERVATION OF RIGHTS**

4 By agreeing to this Decree, Equilon and Ecology agree to abide by its items. The
5 execution and performance of the Decree is not, however, an admission by Equilon of any fact or
6 liability for any purpose other than as a foundation for the entry of this Decree. Equilon's
7 performance under the Decree is undertaken without waiver of or prejudice to any claims or
8 defenses whatsoever that may be asserted in the event of further administrative proceedings or
9 litigation not associated with, or related to, this Decree.

10 **STATE OF WASHINGTON**
11 **DEPARTMENT OF ECOLOGY**

STATE OF WASHINGTON
ATTORNEY GENERAL'S OFFICE

12
13 By: _____
14 JAMES PENDOWSKI
15 Program Manager
16 Toxics Cleanup Program

By: _____
TANYA BARNETT
WSBA #17491
Assistant Attorney General

17 **EQUILON ENTERPRISES LLC**

18 By: _____
19 (On behalf of TRMI and EQUILON)
20 STEVEN PEYTON
21 Seattle Terminal Manager

22
23 Dated this _____ day of _____, 1998.

24
25 _____
26 JUDGE
King County Superior Court

EXHIBIT B
CLEANUP ACTION PLAN (CAP)
EQUILON SEATTLE SALES TERMINAL
HARBOR ISLAND SITE
SEATTLE, WASHINGTON

ISSUED BY

WASHINGTON STATE DEPARTMENT OF ECOLOGY
NORTHWEST REGIONAL OFFICE, BELLEVUE
SEPTEMBER 28, 1998

TABLE OF CONTENT

1.0 INTRODUCTION.....	3
2.0 SUMMARY OF SITE CONDITIONS AND INTERIM REMEDIATION SYSTEM....	3
2.1 SITE.....	4
2.1.1 Nature and Extent.....	4
2.1.2 Exposure Pathways.....	6
2.1.2.1 Product to Groundwater and Surface Water.....	6
2.1.2.2 Soil to Groundwater Pathway.....	6
2.1.2.3 Inland Soil to Groundwater to Surface Water Pathway.....	7
2.1.2.4 Soil Particulate to Air Pathway.....	8
2.1.2.5 Soil Direct Contact Pathway.....	9
2.1.2.6 Groundwater to Marine Sediments.....	9
2.2 INTERIM REMEDIATION SYSTEM.....	9
3.0 SUMMARY OF CLEANUP STANDARDS.....	11
3.1 INDICATOR HAZARDOUS SUBSTANCES.....	11
3.2 CLEANUP LEVELS.....	11
4. SUMMARY OF SELECTED CLEANUP ACTION	13
5. JUSTIFICATION FOR THE SELECTED REMEDIAL ACTION.....	18
6. IMPLEMENTATION SCHEDULE.....	21
7. REFERENCES.....	22

FIGURES

1. Site Map
2. Impacted Areas Subject To Cleanup

EXHIBIT B
CLEANUP ACTION PLAN (CAP)
EQUILON SEATTLE SALE TERMINAL

SEATTLE, WASHINGTON

September 28, 1998

1.0 INTRODUCTION

This Cleanup Action Plan (CAP) is provided to describe the proposed remediation at the Equilon Enterprises LLC and Texaco Refining and Marketing Inc. (TRMI) Seattle Sales Terminal site (Equilon), on Harbor Island in Seattle, Washington. It has been prepared to satisfy the requirements of the Model Toxics Control Act (MTCA) Agreed Order No. DE 92 TC-N160, cooperatively entered into between Texaco Refining and Marketing Inc. (TRMI) and the Washington State Department of Ecology (Ecology).

The purposes of this CAP are to: 1) describe the site, including a summary of its history and extent of contamination; 2) identify the site-specific cleanup standards, 3) summarize the remedial cleanup action alternatives presented in the Focused Feasibility Studies (FFS), 4) identify and describe selected remedial action alternative for the site and 5) a discussion of the implementation schedule. Detailed information regarding site history, characterization, and the evaluation of alternative cleanup actions is contained in the final RI and final FFS reports [EMCON 1994, Lovely Consulting, Inc. (LCI) and EMCON, 1997].

The remedial actions selected for the site are to occur under the legal framework of a Consent Decree between Equilon and Ecology.

2.0 SUMMARY OF SITE CONDITIONS AND INTERIM REMEDIATION SYSTEM

This section provides a summary of site conditions, including the nature and extent of impacts and a description of the interim remediation system. In addition, the exposure pathways identified for the site are briefly described.

2.1 SITE

The Equilon Seattle Sales Terminal consists of the main terminal and main tank farm, located inland in the north-central part of Harbor Island; the north tank farm, located north of the main terminal; and the Shoreline Manifold Area and Dock, located adjacent to Elliott Bay at the north end of Harbor Island (Figure 1). Groundwater flows in a radial pattern outward from the center of Harbor Island and enters the marine surface water at the island's edge. The site is zoned industrial and meets the industrial criteria established under WAC 173-340-745. In addition, the site will likely remain an industrial facility in the foreseeable future because of the site zoning, and, perhaps more importantly, because of the substantial industrial improvements to Harbor Island (e.g., construction of cargo handling facilities and construction of major petroleum distribution pipelines for the island). Ecology and EPA have determined that there is no current or planned future use of groundwater beneath Harbor Island for drinking water purposes. The cleanup objective is to protect the surface water and associated ecosystem.

2.1.1 Nature and Extent

The following section summarizes the nature and extent of contamination at the site based on the results of the RI, Interim Actions and FFS. A general discussion of the contaminants detected at the site is presented first. A summary of the floating product plume beneath the Shoreline Manifold Area is presented next since this is the primary area of concern at the site. Sections on TPH, BTEX and cPAHs; and arsenic, copper, and lead follow.

The results of the site characterization activities conducted during the RI indicate that contaminants present in soil and groundwater at the inland portions of the site are primarily weathered total petroleum hydrocarbons as diesel (TPH-D) with lesser amounts of weathered gasoline (TPH-G) and heavier oil (TPH-O), and a few inorganic metals (arsenic, copper and lead). Arsenic and lead in the surface soil are the result of airborne releases from the former smelter located adjacent to but not owned or operated by the Equilon terminal. Copper, only found in groundwater, is attributed to natural background on Harbor Island. The inorganic metals are present at low concentrations at a few locations in groundwater. In the north tank farm, there is a small amount of measurable floating product at one location, in the vicinity of MW-204. Since completion of the RI, approximately 700 gallons of unleaded gasoline was released in 1996 from a 'pinhole' leak in a section of a pipe at the Shoreline Manifold Area. At the Shoreline Manifold area, in addition to weathered TPH-D in soil, there is localized contained floating product on the water table. At the main terminal and main tank farm, lead is present at higher concentrations in surface soil than subsurface soil due to airborne transport of lead particulate in stack emissions from historic lead smelter activities adjacent to the Equilon Terminal.

Floating Product. Data collected during the FFS show that the impacted area of primary concern at the site is a small product plume located beneath the Shoreline Manifold Area adjacent to Elliott Bay. A small lens of floating product is trapped behind the foundation of the island bulkhead that forms a partial barrier to groundwater flow to the Bay. The bulkhead structure acts as a "hanging wall" which allows groundwater and some dissolved petroleum hydrocarbons to flow beneath the foundation while trapping the floating product. The water table elevations fluctuate seasonally due to rainfall and in response to tidal influence from the Bay; however, the

water table elevation does not drop below the base of the bulkhead. Due to the dampening effect of the bulkhead structure, water table fluctuations in response to tidal influence and seasonal fluctuations are 1 to 2 feet near Elliott Bay. The resulting “smear” zone of product in soil beneath the product plume is more than 2 feet thick.

An interim product recovery system has been in operation under the Shoreline Manifold Area since the release was discovered in 1996 (Figure 2). This system has been effective in removing product on top of the groundwater table, preventing migration of product sheen into Elliott Bay, and ensuring protection of receptors in Elliott Bay. Based on the amount of product and vapor recovered (about 500 gallons), and dissolved constituents in water recovered to date, the interim system has recovered nearly all of the released product. Accessible TPH soil hot spots at this location that act as potential ongoing sources to groundwater contamination will be excavated to the extent practicable.

TPH, BTEX, and cPAHs. RI data also indicate that elevated concentrations of TPH are present in subsurface soil within localized inland areas of the main terminal, main tank farm, north tank farm; and Shoreline Manifold Area. Concentrations of TPH-G and TPH-D have been detected in groundwater above cleanup levels within or in close proximity to areas where the historical spills or one recent (1996) spill occurred. Groundwater monitoring results indicated concentrations of TPH-G exceeded the cleanup level in 25 percent of the samples, exceeded the cleanup level of TPH-D in 2 percent of the samples, and did not exceed the cleanup level for TPH-O in any samples. Benzene and carcinogenic polynuclear aromatic hydrocarbons (cPAHs) have also been detected in groundwater above cleanup levels. Concentrations of benzene exceeded the cleanup level in approximately 35 percent of the groundwater samples. Concentrations of cPAHs exceeded the cleanup level in 1 percent of the samples collected and only in one well (MW-208). In addition to collecting groundwater quality data, groundwater contaminant modeling was conducted during the RI and FFS. The ground water quality and modeling results indicate that dissolved-phase hydrocarbons are not migrating off site at concentrations that pose a threat to surface water at the shorelines of Harbor Island, but slightly exceeds criteria at the property boundaries.

Arsenic, Copper, and Lead. Arsenic was found in surface soil within portions of the main tank farm above Harbor Island action levels set in the EPA ROD for the surface soils but below MTCA cleanup levels. Lead was identified in surface soil in portions of the main tank farm and adjacent to the oil/water separator above the levels designated in the EPA ROD for the surface soils. EPA conducted surface soil investigations for the island including the Texaco site. Ecology and EPA in a memorandum of agreement (MOA), agreed not to duplicate investigation efforts on the island except where data gaps exist. Ecology concurred with the EPA ROD on Harbor Island. The occurrence of lead and arsenic are most likely associated with stack emissions from the former lead smelter located adjacent to the terminal but was never owned nor operated by Equilon. Dissolved copper and lead are the only metals detected in groundwater above cleanup levels during the RI monitoring. Concentrations of dissolved copper and lead exceeded the cleanup level in approximately 44 percent and 1 percent of the samples collected, respectively. Dissolved copper and lead were also detected across much of the northern portion of Harbor Island during the USEPA RI, indicating elevated background concentrations. Copper and lead were not detected in subsurface soils above the cleanup level. These inorganic metals are

associated with the former lead smelter and marine paints used at shipbuilding and repair facilities adjacent to the Equilon Terminal (Tetra Tech 1988).

Marine Sediments. Based on the results of marine sediment sampling conducted by EPA adjacent to the site, sediments have not been impacted by adjacent shoreline activities (e.g., Equilon operations) above levels that would cause adverse effects to aquatic life. No further action is proposed by EPA for the marine sediments adjacent to Equilon property.

2.1.2 Exposure Pathways

The following pathways were evaluated at the site as part of the FFS (LCI and EMCON 1997):

- Product to Groundwater and Surface Water
- Soil to Groundwater
- In land Groundwater to Surface Water
- Soil Particulate to Air
- Soil Direct Contact
- Groundwater to Marine Sediments

As described in the following sections, the primary exposure pathways identified for the site are associated with the Shoreline Manifold Area and associated TPH contaminated soil hot spot and dissolved petroleum hydrocarbons in groundwater (Section 1.1.2.1, 1.1.2.2 & 1.1.2.3), and lead and arsenic particulate in surface soil (Section 1.1.2.4.). Secondary exposure pathways identified for the site are associated with the dissolved petroleum hydrocarbon plume in the inland portions of the site in Main and North Tank areas (Section. 1.1.2.3)

2.1.2.1 Product to Groundwater and Surface Water

The two potential transport pathways associated with product release and plume beneath the Shoreline include (1) occasional product migration into the Elliott Bay through discontinuities in the subsurface barriers, and (2) partitioning of hydrocarbons from the product or adjacent soil to the groundwater, and then subsequent transport in dissolved phase to the surface water through groundwater discharges. These pathways associated with the product release and plume by the Shoreline area are the primary pathways of concern at the site because they pose a potential threat to the surface water and its ecosystem. The proposed cleanup action will interrupt these pathways by continuing the use of the existing bulkhead and remedial actions which will focus on removal of the product, and associated dissolved petroleum hydrocarbons, if present, as discussed in Section 4. These actions will be effective in meeting cleanup levels in groundwater at the point of compliance, providing protection to day workers, and preventing migration of product sheen and potential dissolved petroleum hydrocarbon plumes into the surface water adjacent to the Equilon site.

2.1.2.2 Soil to Groundwater Pathway

The results of groundwater monitoring data and groundwater modeling conducted during the RI and FFS indicate that the soil to groundwater pathway for the inland sources appears to be complete and are stabilizing. The last recorded spill to inland soils took place over five years ago. Groundwater monitoring data indicate that the dissolved plumes associated with these sources appear to be stabilizing and are generally decreasing. Soil to groundwater pathway from the inland portion of the Equilon site (portions of the main terminal, main terminal tank farm and the north tank farm) does not pose a threat to the surface water at the shorelines based on the results of the fate and transport modeling and groundwater monitoring for the site. Therefore, offsite migration to adjacent properties is considered a secondary concern. Accessible TPH soil hot spots that act as potential ongoing sources to groundwater contamination will be excavated to the extent practicable so that the dissolved petroleum hydrocarbon in groundwater does not adversely impact off-site properties, to improve groundwater general conditions at the source and to enhance the timely restoration of the impacted area through natural degradation. Monitoring wells will be sampled along the property boundaries as part of the Groundwater Compliance Monitoring Program to provide early warning of any pending off property migration. A detailed contingency plan is outlined in the compliance groundwater monitoring program for the site as a 'backup' remediation technology in case the Preferred Corrective Option proves ineffective.

Soil to groundwater pathway at the Equilon site located at the shoreline is a primary concern because of its potential direct threat to the surface water and associated ecosystem. The soil to groundwater pathway at the shoreline was not considered in the fate and transport modeling for the site. Equilon has implemented interim actions at the Shoreline Manifold Area which includes excavation of TPH-impacted soil, active product recovery, vapor extraction, treatment of recovered groundwater with BTEX constituents, product sparging, and passive product recovery. These actions have been effective at recovering almost all the product in well points at along the bulkhead.

Accessible TPH soil hot spots that reflect the most recent spill of 1996 will be excavated to the extent practicable. The completeness of these actions to interrupt vapor and soil to groundwater pathways, and protect human health and the Bay will be verified further through the compliance groundwater monitoring program for the site. If groundwater quality, or other performance and cleanup standards are confirmed above state and federal standards, the contingency plan outlined in this cap will be implemented.

The selected remedy for groundwater cleanup at the shoreline manifold area combines several remedial elements to meet the remedial action objectives of removing petroleum vapors, product and the dissolved petroleum hydrocarbons during product recovery. These elements include the following technologies: extraction monitoring well points system to remove product from the water table and the associated dissolved petroleum hydrocarbons, treatment of the extracted groundwater prior to discharge at a disposal facility, and monitoring/institutional controls. These technologies will enhance and expedite the natural biodegradation of the residual TPH along the shoreline.

2.1.2.3 Inland Soil to Groundwater to Surface Water Pathway

The results of groundwater analytical modeling conducted during the RI and FFS indicate that the dissolved-phase hydrocarbon plumes originating at some locations inland within the main terminal, and the main tank farm will not reach Elliott Bay or the Duwamish River at concentrations above surface water cleanup levels. Accessible TPH soil hot spots will be excavated to the extent practicable to improve groundwater general conditions at these locations that act as potential ongoing sources to groundwater contamination. Continued groundwater monitoring will be conducted as part of the cleanup action to verify protection of Elliott Bay and to ensure that contaminated groundwater is contained within property boundaries.

Accessible areas of the site that contain TPH soil hot spots of primary and secondary concerns at the site are located at the Shoreline Manifold area next to the Bay (primary concern), and other secondary areas of concern are located north of the Main tank area, and east of the warehouse.

Accessible TPH soil hot spots at the Manifold, primary area of concern next to Elliott Bay shall be excavated to the extent practicable using the action levels of 10,000 mg/kg set by U.S. EPA ROD for the rest of the Island.

Accessible TPH soil hot spots at the inland locations, secondary areas of concern at the middle of the island shall be excavated to the extent practicable using the action levels of 20,000 mg/kg. This action level is the EPA (A Guide to Corrective Action, EPA, May 1995) recommended lower threshold criteria to enable natural attenuation to successfully reduce total petroleum hydrocarbons concentrations in soils to acceptable levels within a reasonable restoration time period of few years (5).

The technologies proposed for the accessible inland TPH soil hot spots and the associated dissolved petroleum hydrocarbon in the groundwater will include soil excavation on/off site treatment/disposal. Also, if needed, other remedial technologies identified in the contingency plan will be implemented to prevent adverse off property groundwater impacts. These technologies will improve groundwater quality at the site, enhance timely restoration of the impacted areas and expedite natural biodegradation of the residual TPH left in place.

The completeness of these actions to interrupt groundwater to surface water pathway, and protect human health and the Bay will be verified further through the groundwater compliance monitoring program for the site. If groundwater quality, or other performance and cleanup standards are confirmed above appropriate state and federal standards, the contingency plan outlined in this CAP will be implemented.

2.1.2.4 Soil Particulate to Air Pathway

This pathway is not of concern for TPH because TPH-impacted soil is not located at ground surface and are mostly weathered. The majority of the main terminal is paved with asphalt or concrete. Small areas of the main terminal and all of the main tank farm are covered with gravel. The tanks and tank farm walls also offer some protection from the wind. In addition, the hydrocarbons in soil at the inland portion of the site are very weathered and mostly comprised of diesel and oil, not the volatile and more mobile compounds present in gasoline, except the

Shoreline Manifold Area where a recent gasoline spill occurred in 1996. The surface areas of impact in this location are limited in extent.

EPA ROD for surface soils on Harbor Island requires 3 inches of asphalt cap to the extent practicable on areas of Harbor Island that exceed 32.6 mg/kg, arsenic and 1000.0 mg/kg, lead based on a risk assessment RI study and MTCA, respectively. EPA conducted surface soil investigations for the island including the Equilon site.

The results of the EPA RI surface soil lead and arsenic analyses for the Equilon site indicate that this pathway is not of concern for the portions of the main terminal paved with asphalt, but of primary concern for portions of the main terminal (adjacent to the oil/water separator) and the main tank farm area covered with gravel where lead and arsenic levels exceed Harbor Island surface soil action levels. Ecology concurs with EPA that this is a concern because the gravel cover does not provide adequate protection from primarily direct contact, and secondarily from groundwater infiltration, leaching, and surface runoff discharges to storm drains where these suspended metals are transported directly to the bay and sediments at the island edges.

The proposed cleanup actions to excavate or cap areas of the surface soil lead next to the oil/water separator, and portions of the main terminal tank farms that exceed lead and arsenic EPA Harbor Island surface soil action levels will effectively eliminate the soil to air pathway as discussed in Section 4. The final configuration and details, type of cap, areas to excavate, and justifications will be presented in the Remedial Design Phase of the site.

2.1.2.5 Soil Direct Contact Pathway

This pathway is of limited concern for TPH because all elevated TPH concentrations in soils at the site are below the ground surface and are considered low risks, however, concerns relating to metals, arsenic and lead will be permanently addressed either through capping or excavation. Additional protection will be provided through the restrictive and deed covenant on the property and institutional controls.

2.1.2.6 Groundwater to Marine Sediments

This pathway is not of concern at this time since the results of EPA marine sediment sampling in Elliott Bay (adjacent to the site) did not indicate that impacts due to Equilon operations exceeded the Marine Sediment Cleanup Standards to require active remediation. However, due to the location of the petroleum hydrocarbons plume at the Shoreline Manifold Area next to Elliott Bay of the Equilon site, sediments, biota, and the surface water will be evaluated if groundwater quality is confirmed above state and federal standards at the points of compliance. The details and specifics for implementation of surface water, sediment and biota sampling are described in the Groundwater Compliance Monitoring Program for the site. This is to ensure continued protection of human health and the Bay by the preferred remedial action alternative proposed in this CAP.

2.2 INTERIM REMEDIATION SYSTEM

Interim Actions implemented at the Shoreline Manifold Area and North tank Farm included soil excavation of TPH-impacted soil, passive and active product removal, vapor extraction, and treatment of recovered groundwater with dissolved BTEX constituents. These interim actions were implemented in response to two releases in the Shoreline Manifold Area (a small volume, 200 gallons of diesel release in 1991, a small volume, 700-900 gallons of gasoline release in 1996) and one release in the North Tank Farm (3000 gallons of diesel released). Implementation of these interim actions has provided removal of sources (contaminated soil) in the release areas and significant reduction of the product plume behind the bulkhead.

Since these interim actions were completed without Ecology's direct oversight, the completeness of these interim actions to interrupt vapor, soil to groundwater, and groundwater to surface water pathways, and protect human health and the environment will be verified further through the compliance groundwater monitoring program for the site. After implementing the Preferred Options, if groundwater quality, or other performance and cleanup standards are confirmed above state and federal standards at the points of compliance, the Contingency Plan outlined in this CAP will be implemented.

These interim actions have helped improve the overall groundwater quality at the Shoreline Manifold Area. A description of the interim actions taken is presented below.

January 1991 Interim Action

Approximately 200 gallons of No. 2 diesel was released onto soil on January 11, 1991 from a pinhole leak in a product line at the Shoreline Manifold Area. Nine hundred gallons of diesel and water was recovered from the excavation at the manifolds using a vacuum truck. About 10 cubic yards of petroleum impacted soil was excavated from the area and stockpiled for appropriate disposal/treatment.

August 1991 Interim Action

Approximately 3,000 gallons of diesel was released at the north tank farm on August 31, 1991 during product transfer operations. A vacuum truck was used to recover 3,052 gallons of product. In addition, TPH-impacted soil was excavated and disposed off-site.

August 1996 Interim Action

Interim actions were implemented at the Shoreline Manifold Area upon discovery of a small product release in August 1996. Immediate actions taken after discovery included identification of the product type, pressure testing of the pipelines in the vicinity, and isolation of the release source. A pinhole (approximately 1/16-inch in diameter) was discovered in the pipe. Based on the area of impact and the nature of the leak, it is estimated that approximately 700 to 900 gallons (17 to 21 barrels) of unleaded gasoline were released. Follow-up activities included repair of the pipe, excavation of impacted soil (25 tons) in the vicinity of the release, and manual product recovery from vicinity wells (MW-212 and WP-2).

The interim actions included installation of six additional well points (WP-3 through WP-8) along the bulkhead, installation of a total fluids pump for continuous product recovery, performance of a vapor extraction pilot test, and installation of a vapor extraction/treatment system (blower and catalytic oxidizer). The location of the well points and the treatment system are shown on Figure 2. The current radius of influence of the vapor recovery wells covers the entire area impacted by the spill. Of the estimated 700 to 900 gallons released, approximately 390 to 400 gallons, with an additional 100 gallons in the vapor phase have been recovered to date. The interim action has been effective at removing almost all of the visible product along the bulkhead, thereby significantly reducing the product plume in size and volume. The interim action is in progress and the groundwater analytical results of the newly installed conditional compliance groundwater monitoring wells by the shoreline show that the adjacent surface water (Elliott Bay) is adequately protected.

3.0 SUMMARY OF CLEANUP STANDARDS

The Model Toxics Control Act (MTCA) cleanup regulations provide that a cleanup action must comply with cleanup levels for selected hazardous substances, points of compliance (POCs), and applicable or relevant and appropriate state and federal laws (ARARs) [Washington Administrative Code (WAC) 173-340-710]. The final indicator hazardous substances identified for the site, the associated cleanup levels, and ARARs are briefly summarized in the following sections. POCs will be established within the product plume area and at downgradient edge of the site or property boundary. POCs are outlined in the Groundwater Compliance Monitoring Plan.

3.1 INDICATOR HAZARDOUS SUBSTANCES

Indicator hazardous substances (IHSs) were identified for the Texaco Harbor Island Terminal site as part of the FFS using the criteria outlined in WAC 173-340-708(2). The final list of IHSs for groundwater and soil are a subset of the contaminants detected at the site. The final soil IHSs are arsenic and lead for surface soil; and benzene, toluene, xylenes, TPH-G, TPH-D, and TPH-O for subsurface soil. The final groundwater IHSs are benzene, toluene, ethylbenzene, cPAHs, TPH-G, TPH-D, TPH-O, copper, lead, and free product.

3.2 CLEANUP LEVELS

Soil and groundwater cleanup levels for the final IHSs were developed based on the industrial zoning of the site and the determination by Ecology that there is no current or planned future use of the groundwater for drinking water purposes. The beneficial use of the site groundwater is the protection of the adjacent surface waters and ecosystems and to prevent dissolved petroleum hydrocarbon plume in the groundwater from migrating off site which could impact adjacent properties.

Surface soil cleanup levels were determined based on EPA ROD for Harbor Island. Ecology concurred with EPA's ROD in 1994.

Arsenic	32.6 mg/kg
Lead	1,000 mg/kg

Surface soil (0-6 inches) cleanup levels for BTEX and TPH were not developed because surface soil concentrations did not exceed screening levels. The subsurface soil action level for TPH at the primary areas of concern by the is set to meet the remedial objective of protecting surface water at the property boundaries and shorelines and is:

Total TPH	10,000 mg/kg
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This TPH cleanup is also protective for other chemical constituents in petroleum product (i.e., BTEX).

The subsurface soil action level for TPH at the secondary areas of concerns, inland of the site is set to meet the remedial objective of protecting surface water at the property boundaries by improving groundwater general conditions at the source, enhancing timely restoration of the impacted area through natural biodegradation and to prevent off property migrations and is:

Total TPH	20,000 mg/kg
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Groundwater cleanup levels were determined by Ecology to be surface water standards that are protective of aquatic organisms in Elliott Bay. These surface water standards are the adopted ambient water quality criteria (WAC 173-201A and Section 304 of the federal Clean Water Act). The category of ambient water quality standards selected as relevant and appropriate for the site are the chronic criteria for protection of aquatic organisms (WAC 173-201A-040). Surface water standards are not established for TPH; therefore, the groundwater cleanup levels for TPH-G, TPH-D, and TPH-O were selected as protective cleanup goals at this time.

Product	No Sheen
Benzene	0.071 mg/L
cPAHs	0.000031 mg/L
Copper	0.0029 mg/L
Ethylbenzene	29.0 mg/L
Lead	0.0058 mg/L
Toluene	200.0 mg/L
TPH-G	1.0 mg/L
TPH-D	10 mg/L
TPH-O	10 mg/L

Copper and lead are from off-site sources and are found throughout the groundwater beneath Harbor Island.

3.3 ARARS

The selected cleanup action will comply with federal, state and local ARARs. Applicable requirements are federal and state laws or regulations that legally apply to a hazardous substance, cleanup action, location, or other circumstance at the site. Relevant and appropriate requirements are those federal and state regulations that do not legally apply but address situations sufficiently similar that they may warrant application to the cleanup action. Potential ARARs pertinent to remediation alternatives include substantive requirements of chapters 70.94, 70.95, 70.105, 75.20, 90.48, and 90.58 RCW. Others are identified and defined in the FFS (LCI and EMCON 1997) and they include the Model Toxics Control Act (WAC 173-340), the Washington State Dangerous Waste Regulations (WAC 173-303, Washington State Water Quality Standards for Surface Water (WAC 173-201A), and laws requiring or authorizing local government permits or approvals for the remedial action implementation.

4. SUMMARY OF SELECTED CLEANUP ACTION

Site-specific cleanup action alternatives were developed and analyzed for soil and groundwater in the final FFS (LCI and EMCON, 1997) to ensure the protection of human health and the environment at the site. Based on this initial screening and evaluation of supplemental data collected during the FFS, the following three alternatives were selected for further evaluation.

- **Alternative 1A - No Further Action.** This alternative includes cleanup actions performed at the Terminal to date, groundwater monitoring as part of the island-wide operable unit, passive product recovery, ongoing interim actions, and continued use of the existing bulkhead at the Shoreline Manifold area.
- **Alternative 3A - Product Recovery and Associated Dissolved Petroleum Hydrocarbons and Reuse, Treatment of Groundwater Prior to Proper Disposal, Source Identification and Removal at the Property Boundaries, Surface Soil Excavation or Cap, Excavation of Accessible TPH Subsurface Soil Hot Spots to the Extent Practicable, Groundwater and Product Monitoring, Institutional Controls, Deed Restrictions and Contingency Plans.** This alternative includes continued product recovery with enhanced vapor extraction and passive product recovery at the Shoreline Manifold Area; product monitoring; aggressive passive product recovery at the North Tank Farm; excavation or capping of lead impacted surface soil near the oil/water separator excavation or capping of surface soil impacted with lead and arsenic in the main tank farm; source identification and removal to contain migrating contaminated groundwater within property boundaries, excavation of accessible TPH subsurface soil hot spots to the extent practicable; groundwater monitoring in point of compliance and property wells; natural biodegradation of residual TPH in subsurface soils; and institutional controls including a deed restriction and contingency plans 'backup technology'.
- **Alternative 4A - Product Recovery and Reuse, On-Site Soil Stabilization, and Institutional Controls.** This alternative includes all actions in Alternative 3A except the gravel cover and contingent soil excavation or 3 inches of asphalt cap, stabilization of lead-impacted soil in the main tank farm, and an upgraded storm water collection system.

The proposed cleanup action for the site was selected based on a comparison of each cleanup action alternative with the following criteria (WAC 173-340-360(2) and (3)) and consideration of the MTCA remedy selection requirements:

- Overall Protection of Human Health and the Environment
- Compliance with Cleanup Standards
- Use of Permanent Solutions to the Maximum Extent Practicable
- Compliance with ARARs
- Provision for Compliance Monitoring
- Provision for Reasonable Restoration Time Frame

THE SELECTED REMEDIAL ALTERNATIVE (3A). Alternative No. 3A, the selected alternative in this CAP, includes active and passive product recovery and associated dissolved petroleum hydrocarbons by the shoreline, source identification and removal at property boundaries to contain dissolved petroleum hydrocarbons within property limits, reuse of recovered product, treatment of groundwater with dissolved petroleum hydrocarbons (before disposal), capping or excavating surface soil impacted with lead and arsenic, excavating accessible TPH soil hot spots in the subsurface to the extent practicable, groundwater monitoring at compliance and performance wells, natural attenuation for the TPH residuals in the subsurface below action levels, access restrictions, contingency plans and deed restrictions. The major features of Alternative 3A are presented on Figure 3. A conceptual description of each element of this alternative and how it will be implemented at the site is presented below. Detailed descriptions with engineering drawings, specifications and justifications will be presented in the Remedial Design phase for the site:

Active Product Recovery. Current estimated volume of free product adhered to soil present at the Shoreline Manifold area based on the recovered volume is less than 200 gallons. Measurable product has been reduced to a sheen. Active product recovery has been initiated at the Shoreline Manifold area as part of an interim action. The system includes a network of six well points in the vicinity of MW-212 and a vapor extraction/treatment system (blower and catalytic oxidizer). It is anticipated that the duration of the active product recovery is nearly complete based on the product recovered to date. This will be confirmed through compliance and performance standards evaluations. Detail of this evaluation is contained in the Groundwater Compliance Monitoring Program for the site. Throughout the site, including the inland areas, free product shall be recovered from the water table when ever present.

Passive Product Recovery. Passive product recovery, using peristaltic pumps, product recovery canisters, and absorbent materials (filter “socks”) will be performed in the vicinity of MW-204 and MW-212 until there is no evidence of measurable petroleum hydrocarbon sheen (Figure 3). The details of this system will be presented in the Remedial Design phase. For the wells at the Shoreline Manifold Area, passive product recovery is intended to supplement the active product recovery system as needed. The performance standards (no sheen) of this Passive product recovery will be evaluated periodically. The frequency of this reevaluation will be presented in the Groundwater Compliance Monitoring Plan for the site. Throughout the site, including the inland areas, free product shall be recovered from the water table when ever present.

Reuse of Recovered Product. Recovered product will continue to be recycled into new product.

Groundwater Treatment. During active product recovery, associated petroleum hydrocarbons dissolved in the groundwater may be recovered during the process. The recovered petroleum hydrocarbons in the groundwater will be separated from the product through gravity separation and the water discharged to the King County sewer system under a King County discharge permit or disposed of at an approved facility. Additional treatment (carbon adsorption) will only be used if needed to meet discharge limits.

Location of Accessible Impacted Soils and Volumes.

Accessible areas of the site that contain elevated TPH impacted subsurface soil hot spots that are of primary and secondary concerns at the site are located at the Manifold area next to the Bay (primary concern), and other secondary areas of concern are north of the Main tank area, and east of the warehouse. Accessible TPH soil hot spots at these locations could pose potential threats to Elliot Bay and adjacent properties respectively and will require excavation to the extent practicable.

Elevated lead impacted surface soil (about 13,000 mg/kg) will be capped or excavated adjacent to the oil/water separator. This area is shown on Figure 3. This elevated lead concentration next to the oil/water separator averages 4 inches in thickness, and covers an area approximately 2,785 square feet (sf) in the vicinity of TX-26, SB-129a, and SB-131. The soil volume is approximately 35 cubic yards, comprised of 80 percent gravel and 20 percent sand/silt.

The surface soil impacted areas above the EPA action levels of 32.6 mg/kg and 1000 mg/kg for arsenic and lead respectively that are subject to capping or excavation are shown in Figure 3. The estimated volume of lead and arsenic impacted soil is about 3,500 cubic yards.

The volume of the accessible TPH subsurface soil hot spots subject to excavation to the extent practicable at the shoreline is about 382 cubic yards, while the volume at the inland locations are as follows; Main Tank farm area is about 117 cubic yards, and the Main Terminal Warehouse area is about 50 cubic yards.

Soil Excavation and Off-Site Disposal or Capping

Lead impacted soil adjacent to the oil/water separator would be excavated and transported to an approved hazardous waste disposal facility. Lead and arsenic above EPA action levels will be excavated and transported/treated before disposal at an approved disposal facility. These areas would be backfilled with clean imported material. Excavated TPH subsurface soil hot spots will be treated on/off site, and/or disposed at an approved disposal facility.

Back filling of surface soils, and subsurface soils will comprise of clean fill material or treated material which will be tested before reuse on the site to ensure that it meets minimum requirements under the regulation for metals and TPH respectively. Excavation, disposal and back filling would be accomplished through the legal framework of the Consent Decree.

Excavation or capping of the surface soils above action levels will prevent surface runoff directly to the storm drains and sediments and protect day workers from direct contact of contaminated arsenic and lead surface soils. Excavation of the accessible TPH subsurface soil hot spots that act as ongoing source to groundwater contamination will improve general groundwater conditions at the source, enhance restoration time for the impacted areas and enhance biodegradation of the residual TPH in the subsurface. In addition, groundwater monitoring program will be implemented to monitor the ongoing intrinsic degradation/natural attenuation of the residual TPH in soils as part of the selected cleanup action. A deed restriction will also be implemented to prevent inappropriate future use of the site.

Contingency Plans. A contingency plan is a cleanup technology that serves as a “backup” remediation technology in the event that the Preferred Option fails or proves ineffective in a timely manner (5 years). A Contingency plan that contains engineering plan and design will be triggered and implemented within 30 days of meeting any of the following criteria;

- If the results of the groundwater monitoring program after implementing the Preferred Corrective Options indicate elevated contaminant concentration over the specified restoration time frame of 5 years,
- or contaminants are identified in point of compliance wells located outside of the original plume boundary, indicating renewed contaminant migration,
- or contaminant migration are not decreasing at a sufficient rate to ensure that the primary and secondary concerns identified for the site are being met.

Inland Groundwater Contingency Plan for Property Boundary Shall Include:

- Source identification and removal (and supplemented by treatment) if needed, to prevent adverse impacts to offsite properties.

Shoreline Contingency Plan Shall Include:

- Expand hydraulic control to ensure removal of free product from the water table
- When relocation of the above ground construction of the petroleum delivery pipelines that are currently underground are completed, complete excavation to the extent practicable, TPH soil hot spots.
- Sediment and bioassay sampling as determined necessary through the groundwater compliance monitoring program.

This contingency plan is outlined in detail in the attached Groundwater Monitoring Plan, Exhibit F, developed for the site.

Product Monitoring. Throughout the site, including the inland areas, free product shall be removed from the water table when ever present. Product occurrence or, if appropriate, product thickness, will be monitored at the inland and shoreline locations of the site in the following

proposed monitoring wells, MW-06, MW-204, MW-208, MW-210, MW-211, and MW-212. Use of source identification and removal shall be used as needed to ensure that dissolved petroleum hydrocarbons associated with the free product to prevent adverse impacts to offsite properties. Well points are proposed in the Groundwater Compliance Monitoring Plan for the Site in the vicinity of MW-212 to assess the effectiveness of product recovery and to monitor potential changes in the nature and extent of product at localized areas. The duration of the product monitoring will be based on the performance and cleanup standards outlined in the attached Groundwater Compliance Monitoring Plan, Exhibit F, for the site.

Groundwater Compliance Monitoring. The attached groundwater compliance monitoring plan, Exhibit F, is consistent with WAC 173-340-410 and includes protection monitoring, performance and confirmation monitoring. The three types of compliance monitoring to be conducted include the following:

- **Protection Monitoring** to confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of the cleanup action.
- **Performance Monitoring** to confirm that the cleanup action has attained cleanup standards and other performance standards.
- **Confirmation Monitoring** to confirm the long-term effectiveness of the cleanup action once cleanup actions and other performance standards have been attained.

Points of Compliance: Soil. The determination of adequate soil treatment will be based on the remedial actions ability to comply with the groundwater cleanup standards for the site, to meet performance standards designed to minimize human health or environmental exposure to soils above cleanup levels, and to provide practicable treatment of contaminated soils. Performance standards designed to minimize human and environmental exposure to soils above the cleanup levels set for the site shall include: Performance monitoring is outlined in the Groundwater Monitoring Program for the site and a covenant on the property which limits the site to industrial use only and prohibits any activity which may interfere with the protectiveness of the remedial action.

Groundwater. The achievement of cleanup levels in groundwater shall be measured at points of compliance located within the product plume area and at the downgradient edge of the site. These points of compliance shall consist of monitoring wells located in the product plume area and on the downgradient property boundary. Exact location of these wells are identified in the Groundwater Compliance Monitoring Program for the site.

Access Restrictions. The site is an operating facility and has restricted access (fences, signs, work permit requirements) as part of standard operations. These restrictions are in place 24 hours/day and 7 days/week. The Access and Operating Procedures for the Equilon Site is contained in Exhibit C, of the Consent Decree.

Deed Restrictions. Institutional controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of a cleanup action or result in exposure to hazardous substances at the site. Such measures are required to assure continued protection of human health and the environment when a cleanup action results in residual concentrations of IHS that exceed

MTCA Methods A or B cleanup levels and where conditional points of compliance are established. The site is currently an “industrial” site and is anticipated to be zoned and used as an industrial site in the foreseeable future. Equilon will add a restrictive covenant to the property deed that will restrict the property use to industrial uses or interfering with remedial action implementation proposed in this document. A copy of the proposed Restrictive Covenant for the Equilon Site is contained in Exhibit D, of the Consent Decree.

Work Construction. Schedule to begin work under this proposed CAP are contained in Exhibit E, of the Consent Decree. Work construction at the Equilon site will be conducted under a Safety and Health Plan prepared under WAC 173-340-810.

5. JUSTIFICATION FOR THE SELECTED REMEDIAL ACTION

The cleanup action, as proposed, is designed to accomplish the following requirements: protect human health and the environment, comply with cleanup standards per WAC 173-340-700, comply with applicable state and federal laws per WAC 173-340-710, provide compliance monitoring per WAC 173-340-410, use permanent solutions to the maximum extent practicable per WAC 173-340-360 (2), (3), (4), (5), (7), and (8), provide a reasonable time restoration per WAC 173-340-360 (6) and consider public concerns per WAC 173-340-600. The following sections discusses how the proposed cleanup action will meet these requirements.

Protection of Human Health and the Environment.

Removal of accessible TPH-impacted soil hot spots in the subsurface, removal or capping of lead and arsenic impacted surface soils, product recovery and associated vapor and dissolved petroleum hydrocarbons and extraction well points will prevent free-phase and associated dissolved petroleum hydrocarbon migration into the Bay and beyond property boundaries, enhance timely restoration of site by removing TPH soil hot spots that act as ongoing sources to groundwater, air and sediment contamination.

Completion of the active and passive product recovery at the shoreline will capture and prevent the spread of potential dissolved petroleum hydrocarbons from migration into the Bay and improve overall groundwater quality. Capping or excavation of lead and arsenic surface soils in the main terminal tank farm will effectively eliminate the soil to air particulate pathway, soil to groundwater pathway through infiltration and leaching, hereby effectively protecting day workers through the direct contact and surface water runoffs pathways. Soil excavation of areas with elevated lead concentrations and accessible TPH soil hot spots would remove the source of the surface lead and TPH contamination near the oil/water separator and other accessible areas of the site. Source identification and removal will prevent dissolved petroleum hydrocarbons from migrating off site and impacting adjacent properties. Monitoring wells by the shoreline and the property boundaries will provide additional protection by triggering implementation of Contingency Plans for the site.

Comply with Cleanup Standards per WAC 173-340-700 through 760.

The overall goal of cleaning up groundwater for the protection of surface water quality and containing contaminated groundwater within property limits will be met.

The goal of soil cleanup standards and action levels for petroleum hydrocarbons and metals are to protect the beneficial use of groundwater (surface water quality and associated ecosystem) and to contain residual contamination within property boundaries. The selected remedy that includes completion of the product recovery and associated vapor and dissolved petroleum hydrocarbon, excavation of accessible TPH soil hot spots and capping or excavation of surface soil contaminated metals will result in substantive compliance with the soil cleanup standards by reducing concentrations of contaminants in soils to levels that will support and maintain the attainment of groundwater quality standards in a timely manner.

Compliance with Applicable State and Federal Laws per WAC 173-340-710.

The preferred alternative meets all state and federal laws. All activities carried out to implement the preferred alternative will meet any laws requiring or authorizing local government permits or approval for the remedial action on the site.

Provide Compliance Monitoring per WAC 173-340-410.

The preferred alternative provides for long-term monitoring to ensure that groundwater continues to meet cleanup standards after remedial actions have been completed. During the remedial actions, performance monitoring will be conducted to confirm that cleanup actions have attained cleanup standards and treatment goals. After remedial actions, confirmation monitoring will be conducted to confirm and ensure that cleanup actions have attained cleanup standards and performance standards. Protection monitoring will be used to ensure that human health and the environment are being adequately protected during construction and operation of the cleanup actions. The specifics and details of these monitoring activities, locations, number and type of analytes, frequency, duration, and contingency plans are described in the Compliance Groundwater Monitoring Plan in Exhibit F, for the site. Schedule for this activity is contained in Exhibit E, of the Consent Decree.

Use of Permanent Solutions to the Maximum Extent Practicable per WAC 173-340-360 (4), (5), (7), and (8).

Excavation of accessible TPH soil hot spots to the extent practicable, capping or excavation of lead and arsenic impacted surface soils, product recovery, groundwater treatment and reuse are permanent treatment technologies that will effectively improve groundwater quality permanently and in a timely manner.

Provide for a Reasonable Restoration Time Frame per WAC 173-340-360 (6).

Natural attenuation with active excavation of accessible subsurface TPH hot spots (e.g., source control), lead and arsenic in the surface soils will provide for a reasonable restoration time frame of 5 years for the site groundwater that is protective of the surface water and its ecosystem (primary concern) and adjacent properties (secondary concern).

In view of subsurface TPH soil hot spots that generate dissolved petroleum hydrocarbons in the groundwater above cleanup standards, Ecology believes that natural attenuation alone will not be sufficient to provide a reasonable restoration time frame for this site.

The projected 5 years restoration time frame is reasonable, and will allow for a meaningful statistical evaluation of compliance monitoring data and constitutes that time after the active Preferred Options have been implemented. For the Shoreline Manifold Area, restoration time begins after free product is removed from the water table, excavation of accessible TPH soil hot spots, followed by Groundwater Monitoring Program, and Contingency Plan review and implementation, if necessary. If Contingency implementation for the Shoreline Manifold is needed for the TPH in the subsurface soil based on the results of the groundwater compliance monitoring or other performance standards, Contingency Plan shall begin after the successful relocation to above ground of the current under ground petroleum pipelines. Restoration time begins immediately after contingency implementation activity.

Where contingency plan implementation is not necessary, restoration time for the site is 5 years and the restoration clock begins 30 days after implementation of the Preferred Corrective Option for the site. This is the time required to reduce residual TPH in the subsurface to reasonable levels and groundwater quality below state standards and to collect meaningful statistical data to evaluate groundwater compliance monitoring data. Other specific time lines are outlined in Exhibit E, Schedule, and are detailed in the attached Compliance Groundwater Monitoring Program, Exhibit F, for the Equilon Site.

Consider Public Concerns per WAC 173-340-600.

The public is given the opportunity to comment during a 30-day public comment period upon completion of remedial milestones in the cleanup process. Some of these milestones include: The RI/FS, CAP, Agreed Order/Consent Decree, and Remedial Design (RD). Ecology will consider all comments received. At the end of the comment period, Ecology will prepare a responsiveness summary listing each comment received and Ecology's response to the comment.

6.0 IMPLEMENTATION SCHEDULE

Exhibit E, of the Consent Decree contains outline of the schedule for the remedial design and implementation activities. The Consent Decree will be entered in court, and will become effective once signed by all parties involved. As outlined in the schedule, specifics on detailed analysis may be needed to complete the remedial design. Ecology has review and approval authority for these documents and the public have an opportunity to participate in each milestone through the 30-day public comment period.

7. REFERENCES

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EPA ROD, 1996, Shipyard Sediment for Harbor Island.

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EPA A Guide for Corrective Action Plan Review, How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Site, 510-B-95-007, May 1995.

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Contaminant Fate and Transport Modeling, Harbor Island Tank Farms (ARCO,
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Program: Evaluation of Potential Contaminant Sources. Prepared for USEPA, Region X
- Office of Puget Sound, Seattle, Washington, September 1988.
- Washington State Department of Ecology (Ecology). 1997. “Interim Interpretive and Policy
Statement, Cleanup of Total Petroleum Hydrocarbons (TPH)”, Publication No. ECY97-
600, January 16, 1997.

FIGURES

EXHIBIT C
CONSENT DECREE
ACCESS AND OPERATING PROCEDURES
FOR EQUILON SEATTLE SALES TERMINAL

1. All personnel who enter the Site pursuant to the Consent Decree (hereinafter “personnel”) shall notify the Terminal Manager or the designated representative prior to entering and upon leaving the Site.
2. Automobiles of all personnel shall be operated and parked in areas designated by the Terminal Manager or the designated representative. Driveways or plant roads shall be kept clear to eliminate interference with normal operations and provide access for emergency equipment.
3. Smoking by personnel is absolutely prohibited on Equilon property, except in certain locations that have been approved for this purpose. Personnel entering the Site shall not bring upon Equilon property “strike anywhere” matches or cigarette lighters having exposed flint-operating mechanisms.
4. The possession, sale, or consumption of alcoholic beverages and/or drugs on Equilon property is prohibited.
5. Personnel shall immediately advise the Terminal Manager or the designated representative of all accidents involving personnel occurring on Equilon property.
6. Personnel shall comply with all instructions from the Terminal Manager or the designated representative pertaining to safety apparel and equipment, such as hard hats, goggles, gloves and breathing apparatus.
7. Personnel shall comply with all instructions provided by the Terminal Manager or the designated representative regarding health and safety risks or conditions, and with all conditions on Work Permits.
8. In lieu of requiring the Washington State Department of Ecology to provide home telephone numbers for Ecology personnel to Equilon, Ecology shall maintain a list of such telephone numbers and shall notify the next of kin of such personnel in the event of any incident requiring such notification.

EXHIBIT D
RESTRICTIVE COVENANT

EQUILON

2555 13th Avenue SW, Seattle, Washington

This Declaration of Restrictive Covenant is made pursuant to RCW 70.105D.030(l)(f) and (g) and WAC 173-340-440 by the Equilon Enterprises LLC and Texaco Refining and Marketing Inc., [EQUILON] its successors and assigns.

Remedial action (hereafter "Remedial Action") is to be conducted on the Property that is the subject of this Restrictive Covenant. The Remedial Action is described in the Final Cleanup Action Plan, CAP, Equilon Seattle Sales Terminal. This document is an exhibit to the Consent Decree entered in State of Washington, Department of Ecology vs. Equilon Enterprises LLC, King County Case No.

This Restrictive Covenant is required because residual concentrations of lead and arsenic may remain beneath a capped impermeable material, or excavated. If excavated, this restrictive covenant will be amended at a later date, and because residual concentrations of dissolved total petroleum hydrocarbons and its constituents (e.g. benzene), that exceed the Surface Water Quality and other cleanup standards for groundwater established under WAC 173-340-720 may remain after Remedial Action is completed, and because total petroleum hydrocarbon impacted soils are left in the subsurface at the Property.

The undersigned, EQUILON, is the fee owner of real property (hereafter "Property") in the County of King, State of Washington, that is subject to this Restrictive Covenant. The Property is legally described in Attachment A of this Restrictive Covenant and made a part hereof by reference.

EQUILON, makes the following declaration as to limitations, restrictions, and uses to which the Property may be put and specifies that such declarations shall constitute covenants to run with the land, as provided by law and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property (hereafter "Owner").

Section 1.

- a. The Property shall be used only for traditional industrial uses, as described in RCW 70.105D.020(23) and defined in and allowed under the City of Seattle's zoning regulations codified in the City of Seattle as of the date of this Restrictive Covenant.
- b. No groundwater may be taken for any use from the Property that is inconsistent with the Remedial Action implementation.

Section 2.

a. As of the date the Consent Decree was entered, a portion of the Property contains total petroleum hydrocarbons in the soil, dissolved total petroleum hydrocarbons in the groundwater, some floating product on the water table, lead and arsenic on the surface soils.

b. Specifically, elevated soil concentrations of residual petroleum hydrocarbons and dissolved residual of petroleum hydrocarbons and its constituents are present on the east site of the warehouse (former UST location) by the main terminal and near tank 31538, and tank 31470; and beneath the Shoreline Manifold Area next to Elliott Bay. Also, elevated concentrations of lead and arsenic above Harbor Island surface soil action levels of 1000 mg/kg and 32.6 mg/kg respectively are present in portions of the tank farm of the main terminal area. These locations are shown in the enclosed map (Attachment B). The Owner shall not alter, modify, or remove the existing structure(s) in any manner that may result in the release or exposure to the environment of the contaminated soils, groundwater, vapors or create a new exposure pathway without prior written approval from Ecology, which approval will not be unreasonably withheld.

c. Any activity on the property that may result in the release or exposure to the environment of the contaminated soils, vapors and contaminated groundwater in a manner that is inconsistent with the Remedial Action implementation, or create a new pathway that endangers the public health and the environment, is prohibited without written approval from Ecology, which approval shall not be unreasonably withheld. Site workers conducting construction activities within these areas will follow the Health and Safety Plans to be developed under WAC 173-340-810. Also they will be instructed on precautionary actions to avoid direct contact with contaminated soils, vapors and groundwater to ensure protection of site workers.

Section 3. The Owner of the Property must give thirty (30) day advance written notice to Ecology prior to transfer of any interest in the Property. No conveyance of title, easement, lease, or other interest in the Property shall be consummated by the Owner without adequate and complete provision for continued monitoring, operation, and maintenance of the Remedial Action.

Section 4. The Owner must restrict leases to uses and activities consistent with the Restrictive Covenant and notify all lessees of the restrictions on the use of the Property.

Section 5. The Owner must notify and obtain approval from Ecology prior to any use of the Property that is inconsistent with the terms of this Restrictive Covenant. Ecology may approve any inconsistent use only after public notice and comment. Approval by Ecology pursuant to Section 5 shall not be unreasonably withheld.

Section 6. The Owner shall allow authorized representatives of Ecology the right to enter the Property at reasonable times for the purpose of evaluating the Remedial Action; to take samples, to inspect Remedial Actions conducted at the Property, and to inspect records that are related to the Remedial Action. Ecology will provide EQUILON advanced notice of its entry

onto the Site when feasible. Ecology shall adhere to Access and Operating Procedures attached as Exhibit C, and applicable Health and Safety Plans to be developed.

Section 7. The Owner of the Property reserves the right under WAC 173-340-440 to record an instrument that provides that this Restrictive Covenant shall no longer limit use of the Property or be of any further force or effect. However, such an instrument may be recorded only if Ecology, after public notice and opportunity for comment, concurs, which concurrence shall not be unreasonably withheld.

DATED: _____

Equilon Enterprises LLC

By _____
Its _____

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

On this ____ day of October, 1998, before me personally appeared _____, to me known to be the _____ of _____, the corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that was authorized to execute the said instrument, and that the seal affixed, if any, is the corporate seal of said corporation.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year first above written.

(Signature)

(Please print name legibly)

NOTARY PUBLIC in and for the State of
Washington, residing at

My commission expires: _____.

EQUILON HARBOR ISLAND REMEDIAL DESIGN (RD)
CONSENT DECREE SCHEDULE
EXIHIBIT E
September 28. 1998

Written Notification to Ecology with name and qualifications of RD/RA coordinating contractor	Within 90days of Ecology's written approval of RD/RA Coordinating Contractor
Draft Remedial Design (RD) Report	Within 45 days of receipt of Ecology's Written Approval on Draft RD Report
Final RD Report	Within 120 days after written approval of Final RD Report, or the next dry season
Begin excavation of accessible TPH soil hot spots	Within 60 days after written approval of Final RD Report
Complete free product removal from the Shoreline Manifold	Within 45 days of completing Preferred Corrective Action at the inland accessible areas
Begin confirmation, performance and compliance monitoring inland areas of the site	Within 45 days of completing Preferred Corrective Action at the Shoreline
Begin confirmation, performance & compliance monitoring at shoreline	Within 30 days of making contingency plan determination.
Implement contingency plans	Within 5 years of implementing Preferred Corrective Action/ Contingency Plan Action on site.
Complete restoration of site groundwater	After completion of the first year of groundwater compliance monitoring.
Ecology will recommend to EPA to de-list EQUILON from the Federal NPL list	After completion of 5 years of groundwater compliance requirement.
Ecology will review de-listing of EQUILON from MTCA Confirmed	
Within 10 days after entry of this Consent Decree	

COMPLIANCE MONITORING PLAN
EQUILON SEATTLE SALES TERMINAL
SEATTLE, WASHINGTON

Submitted to

Washington State Department of Ecology

Submitted by

Equilon Enterprises LLC

October 12, 1998

Prepared by

EMCON

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Project 41236-001.001(2)

CONTENTS

LIST OF TABLES AND ILLUSTRATIONS	iv
1 INTRODUCTION	1-1
1.1 Overview of Site Hydrogeology	1-2
1.2 Summary of Cleanup Actions	1-2
1.3 Monitoring Objectives and Rationale	1-3
1.4 Monitoring Types, Locations, and Schedule	1-6
2 PROTECTION MONITORING	2-1
3 PERFORMANCE MONITORING	3-1
3.1 Performance Criteria	3-1
3.2 Monitoring and Schedule	3-3
4 CONFIRMATIONAL AND SENTRY MONITORING	4-1
4.1 Product	4-1
4.2 Groundwater	4-2
5 DATA EVALUATION	5-1
5.1 Data Validation	5-1
5.2 Data Evaluation	5-1
6 CRITERIA FOR MEETING PERFORMANCE AND COMPLIANCE STANDARDS	6-1
6.1 Performance Monitoring	6-1
6.2 Confirmational Monitoring	6-2
7 REPORTING	7-1
8 CONTINGENCY PLAN	8-1
LIMITATIONS	
REFERENCES	

CONTENTS (Continued)

TABLES

FIGURES

APPENDIX A COMPLIANCE SAMPLING AND ANALYSIS PLAN

TABLES AND ILLUSTRATIONS

Tables

- 1-1 Groundwater Cleanup Levels
- 1-2 Compliance Monitoring Wells
- 1-3 Compliance Monitoring Analytical Parameters

Figures

- 1-1 Monitoring Well Locations
- 6-1 Performance Monitoring Flow Chart
- 6-2 Product Confirmational Monitoring Flow Chart
- 6-3 Groundwater Confirmational Monitoring Flow Chart
- 6-4 Five-Year Data Review Flow Chart

1 INTRODUCTION

The purpose of this compliance monitoring plan is to provide procedures to be followed to confirm that cleanup requirements have been achieved at the Equilon Seattle Sales Terminal on Harbor Island in Seattle, Washington. This compliance monitoring plan was prepared consistent with requirements of the Consent Decree between Equilon Enterprises LLC and the Washington State Department of Ecology (Ecology). This plan was also prepared in accordance with the Model Toxics Control Act regulation (WAC 173-340-410, -720, and -820).

This plan has been organized into seven sections as described below:

- **Introduction.** Overviews of the site hydrogeology, cleanup actions, monitoring objectives and rationale, types of monitoring, monitoring locations, and monitoring schedule are provided in this section.
- **Protection Monitoring.** This section discusses criteria for protection monitoring under WAC 173-340-400.
- **Performance Monitoring.** This section discusses performance criteria for product recovery and natural attenuation, product monitoring procedures, sampling and analysis, and schedules for performance monitoring of product and groundwater.
- **Confirmational Monitoring.** This section discusses compliance criteria, monitoring, sampling and analysis, and schedules for confirmational monitoring of groundwater and product.
- **Data Evaluation.** Data validation and evaluation procedures are discussed in this section.
- **Criteria for Meeting Performance and Compliance Standards.** This section discusses criteria to be used to determine if performance and compliance standards have been met. Changes in frequency of monitoring and changes in monitoring locations are also discussed.
- **Reporting.** This section discusses the types and frequency of reports to be submitted to Ecology.

- **Contingency Plan.** This section discusses the steps that will be implemented in the event the proposed cleanup actions are not effective.

1.1 Overview of Site Hydrogeology

Soil underlying the site consists of man-emplaced grade and dredge fill overlying native estuarine deposits (EMCON, 1997). The uppermost grade fill unit consists of coarse-grained fill varying from less than 1 to approximately 2 feet thick. The dredge fill unit originated from estuarine deposits near the site; therefore, delineation of the contact between the two units is difficult. The dredge fill appears to vary from approximately 8 to 20 feet thick at the site. It consists of fine- to medium-grained sand, with some gravel. Native estuarine deposits underlie the dredge fill at depths of approximately 9 to 20 feet. These deposits are composed primarily of fine- to medium-grained sand with thin silt interbeds.

Groundwater occurs as a thin lens of fresh water overlying brackish water at depth. The grade fill is permeable and was unsaturated during the remedial investigation. The water table occurs within the dredge fill 4 to 8 feet below the ground surface. Groundwater within the dredge fill unit occurs under unconfined conditions. The North Tank Farm and Main Terminal areas generally are unaffected by tides; at the Shoreline Manifold Area, groundwater quality and elevations within this unit are affected by surface water tidal fluctuations. The native estuarine deposits are fully saturated and unconfined. Water quality and water elevations within this unit are influenced by surrounding surface water bodies and associated tidal fluctuations. Groundwater within the shallower monitoring zone at the site is estimated to flow radially both to the north and to the south from a potentiometric high located within the Main Tank Farm area.

1.2 Summary of Cleanup Actions

Cleanup actions at the site include source removal and recycling/off-site disposal, monitoring, natural attenuation, and institutional controls. The specific cleanup actions are listed below:

- Continued active and passive product recovery at the Shoreline Manifold Area
- Aggressive passive product recovery at the North Tank Farm
- Groundwater treatment before disposal
- Excavation of accessible total petroleum hydrocarbons (TPH) subsurface soil hot spots above 10,000 milligrams per kilogram (mg/kg) to the extent practicable at the Shoreline Manifold Area

- Excavation of accessible TPH subsurface hot spots above 20,000 mg/kg to the extent practicable adjacent to Tank 31636 in the Main Tank Farm, and east of the warehouse
- Excavation or capping of lead-impacted surface soil above 1,000 mg/kg near the oil/water separator
- Excavation or capping of lead- and arsenic-impacted surface soil above 1,000 mg/kg lead and 32.6 mg/kg arsenic in the Main Tank Farm
- Natural attenuation of residual TPH in subsurface soil
- Product Monitoring
- Groundwater monitoring in point of compliance and property wells
- Institutional controls including a deed restriction
- Contingency plans

1.3 Monitoring Objectives and Rationale

The proposed cleanup actions at the site, as previously discussed in Section 1.2 of this plan, include product recovery, excavation of TPH soil hot spots, excavation or capping of lead- and arsenic-impacted surface soil, product monitoring, and groundwater monitoring. Cleanup areas (areas above cleanup action levels) were identified based on the soil and groundwater chemistry data collected during the remedial investigation (EMCON, 1996).

Types of monitoring, monitoring locations, and types of analyses were selected to monitor the effectiveness of the cleanup actions to meet the soil, product, and groundwater cleanup standards for the site. A brief discussion of site soil and groundwater chemistry data as it relates to monitoring well selection are presented in Sections 1.3.1 and 1.3.2.

1.3.1 Soil

TPH, arsenic, and lead concentrations were above levels requiring action at five locations at the site.

1. **TPH at the Shoreline Manifold Area.** Soil TPH concentrations were above the cleanup action levels (10,000 mg/kg) at the Shoreline Manifold Area.

2. **TPH at the North End of the Main Tank Farm.** Soil TPH concentrations were above the cleanup action levels (20,000 mg/kg inland) adjacent to Tank 31636 at the north end of the Main Tank Farm.
3. **TPH at the East Side of the Warehouse in the Main Terminal.** Soil TPH concentrations were above the cleanup action levels (20,000 mg/kg inland) on the east side of the warehouse.
4. **Arsenic and Lead in the Main Tank Farm.** Surface soil arsenic and lead were above the cleanup levels (32.6 and 1,000 mg/kg, respectively) in unpaved soil in the Main Tank Farm.
5. **Lead at the Oil/Water Separator in the Main Terminal.** Surface soil lead was above the cleanup level (1,000 mg/kg) in unpaved soil adjacent to the oil/water separator.

1.3.2 Groundwater

Groundwater will be monitored for benzene, toluene, ethylbenzene, TPH-G, TPH-D, TPH-O, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), lead, and arsenic in specific areas of the site prior to and during the cleanup action. The selected analysis and monitoring locations correspond to the five soil cleanup actions areas identified in Section 1.3.1, areas of product recovery, and the water quality chemistry data for the site.

Areas Below Cleanup Levels

IHSs were not detected above the groundwater cleanup levels (Table 1-1) more than once in shallow monitoring wells MW-05, MW-102, MW-105, MW-106, MW-107, MW-109, MW-110, MW-112, TES-MW-1, and MW-201; and MW-213 and MW-214. These wells are located at the downgradient side of the North Tank Farm, at the northeast and northwest corners of the Main Tank Farm, across most of the Main Terminal, and at the Shoreline Manifold Area.

Wells Not Included in Compliance Monitoring Program. Monitoring wells MW-106, MW-107, MW-109, and MW-110 will not be included in the compliance monitoring program because of historical IHS detections below the cleanup levels.

Wells Included in Compliance Monitoring Program. Monitoring wells MW-05, MW-102, MW-105, MW-112, TES-MW-1, and MW-201 were also below cleanup levels. These wells will be included in the program due to their location adjacent to areas with soil cleanup actions or to provide a property boundary sentry well network. The fact that the water quality is already below cleanup levels before hot spot cleanup shows that the

proposed cleanup is conservative. Monitoring in these wells will be focused on the IHSs (BTEX, TPH) to provide water quality data for baseline data and trend analysis. These wells will not be monitored for natural attenuation parameters since cleanup levels have been already met in these wells.

MW-213 and MW-214 are two conditional point of compliance wells located at the Shoreline Manifold Area. The two wells are located as close as possible to the area of concern and screened at the bottom of the bulkhead to monitor water quality concentrations at the groundwater/surface water interface or the quality of water entering the Bay. Data collected to date in the well have been below cleanup levels and below the laboratory detection limit, indicating that the interim actions at the Shoreline Manifold Area have been effective. MW-213 and MW-214 will be included in the compliance monitoring program and monitored for BTEX, TPH, and cPAHs.

Areas Above Cleanup Levels

BTEX and TPH Areas. Shallow monitoring wells with periodic or consistent detections of BTEX constituents or TPH above the cleanup levels include MW-101, MW-104, MW-111, TX-03, TX-04, TX-06, MW-202, and MW-203. These wells are located in or around the Main Tank Farm (MW-101, TX-03, TX-04, and TX-06), in the North Tank Farm (MW-202 and MW-203), and in two isolated locations in the Main Terminal (MW-104 and MW-111). Due to the historic detections of petroleum-hydrocarbon-related IHSs above the cleanup levels, these monitoring wells will be included in the compliance monitoring program.

Lead Areas. Dissolved lead was detected periodically above the cleanup level only in MW-104; lead will be included in the analysis of MW-104. Lead will be included in the compliance monitoring program in MW-05, MW-101, MW-104, MW-105, TX-03, TX-04, and TX-06 to monitor the surface soil cleanup action in the Main Tank Farm.

Arsenic Areas. Dissolved arsenic was detected at about two times the cleanup level in TX-06. Arsenic will be included in the compliance monitoring program in MW-05, MW-101, MW-104, MW-105, TX-03, TX-04, and TX-06 to monitor the surface soil cleanup action in the Main Tank Farm.

Areas In or Around Free Product. Shallow wells located in or around a free product plume at the Shoreline Manifold Area include MW-208, MW-210, MW-211, and MW-212. In addition, there are well points WP-1 through WP-8 to monitor product along the bulkhead. Product in these well points have been reduced to a sheen. Trace amounts of free product have also been measured in MW-204 in the North Tank Farm. Product performance and confirmational monitoring will be performed in these wells. The product performance standard is a “measurable product thickness”, and the product

cleanup standard is “no visible sheen.” After the performance standard has been met, MW-204 will be sampled for BTEX and TPH.

Off-site Wells Southeast of the Main Terminal. Benzene, toluene, ethylbenzene, and/or TPH-G were detected above the cleanup levels in two off-site wells, A-28 and SH-04, located southeast of the Main Terminal. Dissolved lead was detected in SH-04. These wells are located downgradient of an off-site free-product plume, and the detections above the cleanup levels in these two wells, therefore, represent contaminant migration toward the terminal from an off-site source. They will not be monitored as part of the Equilon compliance monitoring program but will be observed by Ecology for their potential adverse impact to the Equilon Terminal cleanup.

Background

MW-206 is located upgradient to the North Tank Farm and will serve as the site background monitoring well.

1.4 Monitoring Types, Locations, and Schedule

Types of Monitoring. Compliance monitoring will consist of product monitoring, groundwater level monitoring, and groundwater sampling.

- Product monitoring will consist of measuring product levels in areas of the site with floating product on the water table
- Groundwater level monitoring will be performed during product monitoring events and during groundwater sampling events
- Groundwater samples will be collected from compliance monitoring wells and property (sentry) wells on the Equilon site

Monitoring Locations. Figure 1-1 shows the locations of all wells in which product will be monitored, groundwater levels will be measured, and groundwater samples will be collected as part of the site compliance monitoring program. Table 1-2 provides a list of compliance monitoring wells, identifying the well location, monitoring objective, and well use. The monitoring objectives have been categorized as confirmational, performance, and sentry.

- Performance monitoring is to confirm that the cleanup action has attained performance of cleanup standards

- Confirmational monitoring is to confirm the long-term effectiveness of the cleanup action once performance and cleanup standards have been met.
- Sentry monitoring is to provide early warning of off-site contaminant migration.

Table 1-3 provides a summary of the compliance monitoring analytical parameters.

Monitoring Schedule. Groundwater sampling will begin in January 1999 and will continue for five years to January 2004. Sampling will occur quarterly for the first year. Ecology and Equilon will review the data after one year. If trends are declining, the sampling frequency and number of parameters may be reduced.

2 PROTECTION MONITORING

The objective of protection monitoring is to confirm that human health and the environment are adequately protected during all phases of the cleanup action (WAC 173-340-410(1)(a)). Protection monitoring will be addressed in the health and safety plan prepared in conjunction with the engineering design report, construction plans and specifications, and operation and maintenance plan (WAC 173-340-400).

3 PERFORMANCE MONITORING

The objective of performance monitoring is to confirm that the cleanup action has attained performance and cleanup standards (WAC 173-340-410(1)(b)). Performance monitoring will consist of product monitoring during product recovery activities and groundwater sampling to evaluate the effectiveness of natural attenuation.

3.1 Performance Criteria

The site-specific performance criteria for the respective cleanup options are:

Product Recovery. The performance criterion will be a lack of measurable product thickness in product monitoring wells.

Natural Attenuation. The performance criterion will be periodic demonstrations that natural attenuation is reducing contaminant concentrations at the site (USEPA, 1997). Natural attenuation processes include a variety of physical, chemical, or biological processes that can act to reduce the mass, toxicity, mobility, volume, or concentration of constituents in groundwater. These in-situ processes include biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, or destruction of contaminants (USEPA, 1997). Monitoring the effectiveness of natural attenuation requires the collection of constituent plume data (i.e., BTEX and TPH) and a variety of other indicators. Following is the rationale for the selection of the natural attenuation monitoring parameters (from USEPA, 1994c).

Constituent Plume Characteristics

In the absence of natural attenuation mechanisms, constituent concentrations would remain relatively constant within the plume and then decrease rapidly at the edge of the plume. If natural attenuation is occurring, constituent concentrations will decrease with distance from the source along the flow path of the plume as a result of dispersion. If other natural attenuation mechanisms are occurring, the rate at which concentrations of constituents are reduced will be accelerated.

Monitoring of constituent concentrations in the groundwater over time will give the best indication of whether natural attenuation is occurring. If natural attenuation is occurring, the contaminant plume will migrate more slowly than expected based on the average groundwater velocity. Receding plumes typically occur when the source has been eliminated. Natural attenuation may also be occurring in plumes that are

expanding, but at a slower than expected rate. For example, in sandy soils [similar to Harbor Island] with relatively low organic carbon content (about 0.1 percent), BTEX constituents are expected to migrate at one-third to two-thirds of the average groundwater speed velocity (McAllister, 1994). Higher organic carbon content would further retard constituent migration. If constituents are migrating more slowly than expected based on groundwater flow rates and retardation factors, then other natural attenuation mechanisms (primarily biodegradation) are likely reducing constituent concentrations. For stable plumes, the rate at which contaminants are being added to the system at the source is equal to the rate of attenuation. A plume may be stable for a long period of time before it begins to recede, and in some cases, if the source is not eliminated, the plume may not recede.

Occurrence of biodegradation might also be deduced by comparison of the relative migration of individual constituents. The relative migration rates of BTEX constituents, based on the chemical properties, are expected to be in the following order:

benzene > toluene, o-xylene > ethylbenzene, m-xylene, p-xylene

If the actual migration rates do not follow this pattern, biodegradation may be responsible.

Dissolved Oxygen Indicators

The rate of biodegradation will depend, in part, on the supply of oxygen to the contaminated area. At levels of dissolved oxygen (D.O.) below 1 to 2 mg/L in the groundwater, aerobic biodegradation rates are very slow. If background D.O. levels (upgradient of the contaminant source) equal or exceed 1 to 2 mg/L, the flow of groundwater will supply D.O. to the contaminated area, and aerobic degradation is possible.

Where aerobic biodegradation is occurring, an inverse relationship between D.O. concentration and constituent concentrations can be expected (i.e., D.O. levels increase as constituent levels decrease). Thus, if D.O. is significantly below background within the plume, aerobic biodegradation is probably occurring at the perimeter of the plume.

Geochemical Indicators

Certain geochemical characteristics can also serve as indicators that natural attenuation, particularly biodegradation, is occurring. Aerobic biodegradation of petroleum products produces carbon dioxide and organic acids, both of which tend to cause a region of lower pH and increased alkalinity within the constituent plume.

Anaerobic biodegradation may result in different geochemical changes, such as increased pH. Under anaerobic conditions, biodegradation of aromatic hydrocarbons typically causes reduction of Fe^{3+} (insoluble) to Fe^{2+} (soluble), because iron is commonly used as an electron acceptor under anaerobic conditions. Thus, soluble iron concentrations in the groundwater tend to increase immediately downgradient of a petroleum source as the D.O. is depleted, and conditions change to become anaerobic (i.e., reduced). The concentration of methane increases, another indication that anaerobic biodegradation is occurring.

Oxidation/Reduction Potential

The oxidation/reduction (redox) potential of groundwater is a measure of electron activity and is an indicator of the relative tendency of a solution to accept or transfer electrons. Because redox reactions in groundwater are biologically mediated, the rates of biodegradation both influence and depend on redox potential. Many biological processes operate only within a prescribed range of redox conditions. Redox potential also can be used as an indicator of certain geochemical activities (e.g., reduction of sulfate, nitrate, or iron). The redox potential of groundwater generally ranges from 800 millivolts to about -400 millivolts... The lower the redox potential, the more reducing and anaerobic the environment.

Measurement of redox potential of groundwater also allows for approximate delineation of the extent of the contaminant plume. Redox potential values taken from within the contaminant plume will be lower than background (upgradient) redox values and values from outside the plume. This is due in part to the anaerobic conditions that typically exist within the core of the dissolved hydrocarbon plume.

Based on this discussion (USEPA, 1994c), groundwater samples collected for natural attenuation evaluation will be analyzed for plume characterization parameters (BTEX, TPH-G, TPH-D, and TPH-O), dissolved oxygen, geochemical indicators (alkalinity, carbon dioxide, total iron (from which ferric iron [Fe³⁺] can be calculated), ferrous iron (Fe²⁺), hardness, methane, pH, and sulfate), and oxidation/reduction potential.

3.2 Monitoring and Schedule

Product Recovery. Monitoring wells MW-204, MW-208, MW-210, MW-211, and MW-212, and well points WP-1 through WP-8 will be monitored for the presence of floating product and for potential indicators of product such as odor and sheen. Floating product is defined as a measurable thickness of product (greater than or equal to 0.01 feet thick). Sheen is defined as a visible display of iridescent colors on equipment or water removed from a monitoring well.

An oil-water interface probe will be used to measure product thickness and depth to groundwater. The probe and the water surface in the well will be observed for sheen. If measurable floating product is present, a peristaltic pump or disposable polyethylene bailer will be used to skim floating product from the well.

Product monitoring will be conducted at an interval long enough to allow product to flow into wells in product plumes but no less frequently than once a month. The frequency of product monitoring will depend on the amount and type of product removed from the monitoring wells, the season, and the type of product recovery activity. Product monitoring has historically occurred every two to four weeks, and it is anticipated that this frequency will likely continue.

Natural Attenuation. Groundwater samples will be collected from six monitoring wells at the north end of the Main Tank Farm and in the North Tank Farm for this evaluation. Wells TES-MW-1 and MW-201 will represent groundwater quality upgradient and downgradient, respectively, of a plume of TPH-G and BTEX. Monitoring wells MW-101, TX-03, MW-202, and MW-203 will represent wells in the plume.

Ongoing monitoring will be conducted to confirm the effectiveness of natural attenuation and to estimate the rate. Starting in January 1999, monitoring for natural attenuation will be conducted quarterly for the first year and annually thereafter (USEPA, 1994c).

4 CONFIRMATIONAL AND SENTRY MONITORING

The objective of confirmational monitoring is to confirm the long-term effectiveness of the cleanup action once performance and cleanup standards have been met (WAC 173-340-410(1)(c)). Confirmational monitoring will consist of product monitoring and groundwater sampling. In addition, sentry monitoring wells located at the property boundary will be monitored to provide early warning of off-site contaminant migration.

4.1 Product

4.1.1 Compliance Criteria

The compliance criterion for product will be a lack of visible sheen on the water surface in product monitoring wells.

4.1.2 Monitoring and Schedule

Monitoring Wells. Monitoring wells MW-204, MW-208, MW-210, MW-211, and MW-212, and well points WP-1 through WP-8 will be monitored for the presence of floating product and for potential indicators of product such as odor and sheen. Floating product is defined as a measurable thickness of product (greater than or equal to 0.01 feet thick). Sheen is defined as a visible display of iridescent colors on equipment or water removed from a monitoring well.

An oil-water interface probe will be used to measure product thickness and depth to groundwater. The probe and the water surface in the well will be observed for sheen. If measurable floating product is present, a peristaltic pump or disposable polyethylene bailer will be used to skim floating product from the well.

Schedule. Confirmation product monitoring will be conducted once per month for a period of one year after cessation of product recovery activities. The schedule will be reevaluated at that time as discussed in Section 5.2.1.

4.2 Groundwater

4.2.1 Compliance Levels

Groundwater cleanup levels on Harbor Island are based on protection of aquatic organisms and humans ingesting such organisms (Lovely Consulting, Inc., and EMCON, 1997). Accordingly, these cleanup levels are applicable at the groundwater/surface water interface. Table 1-1 presents the groundwater cleanup levels.

4.2.2 Sampling, Analysis, and Schedule

Sample Collection. Groundwater samples will be collected from background monitoring well MW-206, confirmational monitoring wells MW-213 and MW-214, and sentry monitoring wells MW-05, MW-101, MW-102, MW-104, MW-105, MW-107, MW-111, MW-112, MW-201, MW-202, MW-203, TX-03, TX-04, and TX-06 using low flow sampling techniques. After the performance standard has been met, MW-204 will be added to the list of wells to be sampled. Each well will be purged at a low flow rate using the peristaltic pump fitted with disposable polyethylene tubing. Purging will continue until field parameters have stabilized. Groundwater samples will then be collected from the discharge line of the peristaltic pump. A round of groundwater levels will be measured in all available network wells and piezometers before each sampling event.

Sample Analysis. Groundwater samples collected from all wells during confirmational and sentry monitoring will be submitted to a laboratory for analysis of the site petroleum-related IHSs (BTEX, TPH-G, TPH-D, and TPH-O). Additionally, samples collected from wells MW-05, MW-101, MW-104, MW-105, TX-03, TX-04, and TX-06 will be analyzed for total and dissolved arsenic and lead to monitor the surface soil cleanup action in the Main Tank Farm. The samples collected from MW-213 and MW-214 will also be submitted for analysis of cPAHs, which were periodically detected in shallow groundwater at the Shoreline Manifold Area.

Sampling and Analysis Procedures. Detailed procedures for sampling, sampling handling, residuals management, well abandonment, sample analysis, and quality assurance are presented in Appendix A.

Schedule. Confirmational and sentry monitoring will begin in January 1999 and will continue for five years after completion of the cleanup (estimated to be January 2004 based on construction schedules). Sampling will occur quarterly for the first year. Ecology and Equilon will review the data after one year. If trends are declining, the sampling frequency and number of parameters may be reduced.

4.2.3 Well Abandonment

Monitoring wells MW-106 and MW-207 will be abandoned because they are redundant and because no constituents have been detected in these wells above the groundwater cleanup levels. MW-106 is located in the same area as MW-107, MW-108, MW-109, and a series of piezometers. MW-207 is located off site near MW-206.

5 DATA EVALUATION

5.1 Data Validation

All chemistry data will be validated according to United States Environmental Protection Agency (USEPA) data validation guidelines (USEPA, 1994a and 1994b). Data validation will include evaluation of holding times, method blank results, surrogate recovery results, field and laboratory duplicate results, completeness, detection limits, laboratory control sample results, and chain-of-custody forms. A detailed description of the data validation procedures is provided in the sampling and analysis plan (Appendix A). After the data has been validated, it will be entered into the project database with any assigned data qualifiers.

5.2 Data Evaluation

5.2.1 Practical Quantitation Limits

Practical Quantitation Limits (PQLs) will be established for each analyzed constituent to determine whether any are above the corresponding cleanup level. Per WAC 173-340-707(2), if the PQL for any constituent is above the corresponding cleanup level, the cleanup level will be considered to be attained if the constituent is undetected at the PQL or detected below the PQL. The PQL will be determined by multiplying the lowest method detection limit (MDL) obtained by the laboratory for Terminal groundwater samples by a factor of ten (Ecology, 1993). It is anticipated that PQLs will be used as cleanup levels only for the cPAHs.

5.2.2 Product Monitoring Data

Product monitoring data will be reviewed as it is generated to determine the need for product recovery system alterations or to determine changes in product monitoring frequency. Groundwater and product level data will be entered in spreadsheets.

5.2.3 Groundwater Chemistry Data Review

Natural Attenuation Monitoring Data. Natural attenuation monitoring data will be reviewed to see if the data are providing the information needed to evaluate natural attenuation at the site. If the data are not sufficient for the evaluation, Equilon may propose to Ecology adding parameters (Wiedemeier and others, 1995) to the natural attenuation analyte list.

Confirmational and Sentry Monitoring Data. Groundwater chemistry data will be reviewed after it is validated. The data will be compared to the groundwater cleanup levels. If a sample result is above a groundwater cleanup level and also above the historic high concentration in that well, the well will be resampled to verify the result. Resampling will occur within one month of receiving the laboratory data. Groundwater elevation data will be entered into the project database for use in the five year review.

5.2.4 One Year Site Review

Groundwater elevation and chemistry data will be evaluated after the first year of sampling (in 2000). Natural attenuation monitoring well data will be evaluated as discussed in USEPA (1994c; see Section 3.2 above) and Wiedemeier and others (1995). Spatial and temporal changes in plume characterization parameters, dissolved oxygen, geochemical indicators, and oxidation/reduction potential will be evaluated to determine the effectiveness and rate of natural attenuation at the site.

Groundwater TPH and BTEX data will be evaluated using time-trend plots and data comparison to cleanup levels. Time-trend plots will be prepared for each constituent detected above the PQL; trends will be identified by visual observation. The time-trend plots will be used to evaluate long-term trends in the compliance wells and to put the comparisons to cleanup levels in context. A groundwater contour map will be prepared to verify that the groundwater flow directions at the Terminal have not significantly changed.

Ecology and Equilon will review the evaluation. After the first year review, if the sentry wells at the property boundary exceed cleanup standards, Ecology, Equilon, and the adjacent property owner will evaluate groundwater conditions prior to considering contingency plans. If trends are declining, the sampling frequency and number of parameters may be reduced.

5.2.5 Five Year Site Review

Groundwater elevation and chemistry data will be evaluated after five years of sampling (in 2004). Groundwater contour maps will be prepared to verify that the groundwater flow directions at the Terminal have not significantly changed.

Natural Attenuation Monitoring Data. Natural attenuation monitoring well data will be evaluated as described in Section 5.2.4. The evaluation will be documented for presentation in the five-year review report.

Sentry Well Data. Groundwater TPH and BTEX data will be evaluated using time-trend plots and data comparison to cleanup levels. Time-trend plots will be prepared for each constituent detected above the PQL; trends will be identified by visual observation.

Confirmational Well Data. Groundwater TPH, BTEX, and cPAH data will be evaluated using time-trend plots, data comparison to cleanup levels, and, if appropriate, statistical analysis. Time-trend plots will be prepared for each constituent detected above the PQL; trends will be identified by visual observation. The time-trend plots will be used to evaluate long-term trends in the compliance wells and to put the comparisons to cleanup levels, and statistical analyses if performed, in context. If none of the results for an analyte are above the cleanup level, the data for that analyte will not be analyzed using statistics. If at least one result for an analyte is above the cleanup level, statistical analysis per WAC 173-340-720(8) and Ecology (1992, 1993, and 1995) will be conducted.

6 CRITERIA FOR MEETING PERFORMANCE AND COMPLIANCE STANDARDS

6.1 Performance Monitoring

Changes to the product monitoring schedule and wells will be made based on product monitoring data review. Changes may be made in the frequency of product monitoring to maximize product removal or system efficiency, depending on the amount and type of product removed from the monitoring wells, the season, and the type of product recovery activity. Other changes in performance monitoring will be made as follows (Figure 6-1):

- Additional product recovery activities and monitoring will be initiated immediately if a product sheen emanating from the shoreline manifold area is observed on the Elliott Bay water surface.
- An additional well or well point will be installed and monitored if floating product is found for the first time in a downgradient or crossgradient well. The need for additional product recovery activities will also be reviewed.
- Performance monitoring will continue as long as floating product is found in the area being monitored.
- Performance monitoring will end and confirmational monitoring will begin when floating product has not been found in any well in the area being monitored for a period of six months.

6.2 Confirmational Monitoring

6.2.1 Product

Product confirmational monitoring will continue until one of the follow occurs (Figure 6-2):

- Product recovery activities and performance monitoring will resume immediately if a product sheen emanating from the shoreline manifold area is observed on the Elliott Bay water surface
- Product recovery activities and performance monitoring will resume if measurable floating product is found in any well in an area being monitored
- Confirmational monitoring will end and the area considered without floating product when no sheen has not been found in any well in the area being monitored for a period of one year

6.2.2 Groundwater

Changes to the groundwater monitoring program will be based on groundwater quality data review. The review of groundwater quality data will be focused at evaluating groundwater quality trends and not a single event or exceedance in a single well. Changes in sampling will be made as follows (Figure 6-3):

- A well will be resampled if the analyte in the well is above the cleanup level and historic high concentrations

Groundwater quality data will be tabulated and trend plots prepared as part of the one-year site review and five-year site review. If the chemistry results are all below cleanup levels for four consecutive quarters, then Equilon will petition Ecology for site delisting review. Statistical analysis of the data will be performed if there are analytical results above cleanup levels. Alternatively, if the cleanup standards are met for 95 percent of the wells for four consecutive quarters, Equilon will petition Ecology for site delisting review. In addition to reviewing chemistry data for the indicator hazardous substances, natural attenuation parameters will also be evaluated to determine the effectiveness of natural attenuation at the site. The contingency plan (summarized in Section 8 of this Plan) will be initiated if an increasing trend is identified in the five-year review as follows (Figure 6-4):

- The contingency plan will be initiated if there is an increasing trend in the sentry well groundwater quality data and the data exceeds the cleanup level.

- The contingency plan will be initiated if any analyte is consistently above the cleanup level or statistically above the cleanup level with an increasing trend and with no evidence of natural attenuation.

7 REPORTING

Compliance monitoring data will be submitted to Ecology throughout the monitoring program. Ecology will also be notified immediately if product sheen emanating from the shoreline manifold area is observed on the Elliott Bay water surface. Data will be submitted in the following reports:

- **Quarterly Data Reports.** Laboratory data reports will be submitted to Ecology after each round of laboratory data has been received.
- **Annual Data Reports.** An annual data report will be prepared. The data report will include a data validation memo, updated groundwater chemistry tables (including any well resampling results), and product recovery data for the previous year. Any changes in the product recovery system will also be discussed.
- **Five-year Review Report.** A report will be submitted to Ecology summarizing the five-year review of the compliance monitoring data. The report will include an updated groundwater elevation table, a representative groundwater contour map, time-trend plots for analytes detected above the PQL, a comparison of the data to cleanup levels, and a discussion of natural attenuation.

8 CONTINGENCY PLAN

A contingency plan is a cleanup technology that serves as a “backup” remediation technology in the event that the preferred option fails or proves ineffective in a timely manner (five years after implementation of the preferred option). A contingency plan will be triggered and implemented within 30 days of meeting any of the following criteria:

- The results of the groundwater monitoring program indicate elevated contaminant concentrations over the specified restoration time frame of five years after implementing the preferred corrective options
- Contaminants are identified in point of compliance wells located outside of the original plume boundary, indicating renewed contaminant migration
- Contaminant migration is not decreasing at a sufficient rate to ensure that the primary and secondary concerns identified for the site are being met

The following actions will be initiated if the above criteria are triggered:

- Identify the source(s) causing the criteria to be triggered. For example, at the Shoreline Manifold Area, an increasing trend could indicate a new release. The highest priority in the compliance plan would be to identify and control the source.
- Remove the source (e.g., impacted soil) or implement appropriate treatment (e.g., adding oxygen releasing compounds), as needed, to the extent practicable. For example, additional hot-spot soil at the Shoreline Manifold Area will be excavated to the extent practicable when the underground pipelines are relocated above ground. Sources will be removed as long as removal does not impact the integrity of existing structures or create a greater environmental hazard.
- If residual product is identified beyond the capture zone of the existing product recovery network, the network will be evaluated and expanded to ensure removal of free product from the water table.
- If the results (increasing trend in surface water quality in point of compliance wells and a significant new product release at the Shoreline Manifold Area) indicate there has been potential environmental impacts to aquatic organisms in

Elliott Bay, then sediment and bioassay sampling will be implemented in accordance with the procedures outlined in the State of Washington Sediment Management Standards.

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

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TABLES

FIGURES

APPENDIX A
COMPLIANCE SAMPLING AND ANALYSIS PLAN

Table 1-1

**Groundwater Cleanup Levels
Equilon Seattle Sales Terminal
Seattle, Washington**

Constituent	Cleanup Level (mg/L)
Benzene	0.071
Benzo(a)anthracene	0.000031
Benzo(a)pyrene	0.000031
Benzo(b)fluoranthene	0.000031
Benzo(k)fluoranthene	0.000031
Chrysene	0.000031
Ethylbenzene	0.43
Indeno(1,2,3-cd)pyrene	0.000031
Lead	0.0058
TPH-G	1
TPH-D	10
TPH-O	10
Toluene	5.0