12034 134th Court Northeast
Suite 102
Redmond, WA 98052
425-372-1600 TEL
425-372-1650 FAX

Stantec Consulting Corporation
12034 134th Court NE, Suite 102
Redmond, WA 98052
Tel: (425) 372-1600
Fax: (425) 372-1650

November 6, 2009

Mr. Jerome B. Cruz, Ph.D.
Washington State Department of Ecology
Toxics Cleanup Program, Northwest Regional Office
3190 - 160th SE Bellevue, WA 98008

RE: **Interim Action Work Plan, ConocoPhillips Renton Terminal**
2423 Lind Avenue SW, Renton, WA 98057
ConocoPhillips Facility No. 3485 (RM&R 3485)
Ecology Site No. 2070 (Agreed Order No. pending)
Stantec Project No. 212302026

Dear Mr. Cruz:

INTRODUCTION

On behalf of ConocoPhillips Company (ConocoPhillips), Stantec Consulting Corporation (Stantec) is pleased to submit this Interim Action Work Plan (Work Plan) to the Washington State Department of Ecology (Ecology) in response to the requirements of a draft Agreed Order between Ecology, ConocoPhillips, and ExxonMobil to address environmental impacts at the subject site (the Site). This Work Plan is submitted to fulfill the requirements listed in Section VII of the draft Agreed Order, which states:

> "...ConocoPhillips will continue its operation of dual phase vacuum extraction and ground water treatment system. Operation of the existing remedial systems will take place pursuant to the Work Plans attached as Exhibit E to this Order. Operation of the existing remedial systems as an interim action will continue until Ecology's approval of the Final Interim Action Work Plan (as noted in the Scope of Work and Schedule). Upon Ecology's approval, the Final Interim Action Work Plan will supersede the Work Plans (Exhibit E)."

Pursuant to the language in the draft Agreed Order (quoted above), Stantec understands that Ecology will review and comment on this Work Plan and a similar work plan from ExxonMobil and that the final work plans will be incorporated into Exhibit E in the final Agreed Order. Ecology also requested a State Environmental Policy Act (SEPA) checklist be submitted to support implementation of this Work Plan. A copy of the SEPA checklist is included in Appendix A.

This Work Plan was originally submitted to Eoclogy on June 19, 2009. Ecology provided comments on the original version in an email to ConocoPhillips dated September 19, 2009. This Work Plan is modified from the original version to include additional text and/or other information in response to Ecology's comments.

PURPOSE AND ORGANIZATION

The purpose of this Work Plan is to provide sufficient information and data to Ecology regarding the design and performance of ConocoPhillips' dual phase extraction and groundwater treatment system at the Site. Historical performance data for the ConocoPhillips' remediation system (the System) is included in the original notice of construction, subsequent status reports, and work plans for System modifications. Recent System performance data are included in operation and maintenance (O&M) reports that are submitted to Ecology on a quarterly basis.

The following sections of this Work Plan summarize the process by which the interim remedial technology was selected, and describe historical reports that include design and/or construction specifications, additional construction or modifications, and/or performance data for the System. Copies of these reports are included as appendices to this Work Plan. In the interests of brevity, analytical reports attached to the previous reports are not included in this Work Plan, but can be viewed in the copies that are already in Ecology's files.

SELECTION OF INTERIM REMEDIAL ACTION

Stantec reviewed previous reports from 2003 to present regarding the short-term and long-term response to the release from tank #2 at the Site, and was unable to locate a document(s) that describe how the existing remediation system was selected. However, Stantec's review provided the following information:

A rapid and focused response by ConocoPhillips was performed in response to the gasoline release at tank #2. The response was sequential in nature, and included removing the remaining product from tank #2 and minimizing additional release(s), recovery of liquid-phase hydrocarbons (LPH) from soil, groundwater and surface water, assessing the extent of environmental impacts at on-site and off-Site locations, installing groundwater and LPH recovery wells, installing additional equipment to recover vapor-phase hydrocarbons from vadose zone soil, and performing groundwater monitoring.

Based on all work performed to-date by ConocoPhillips, the existing remediation system appears to have been effective in addressing the environmental impacts of the unleaded gasoline release at tank #2, although some system modifications and upgrades may be warranted based on the age and performance of individual components. The overall effectiveness of the existing remediation system is demonstrated in part by the total volume of petroleum hydrocarbons recovered to-date, which was calculated to be 12,318 gallons based on Stantec's calculations in the second quarter of 2009.

REPORT SUMMARY

Submission of Notice of Construction Application, Environmental Remediation System, ConocoPhillips Bulk Petroleum Terminal, 2423 Lind Avenue SW, Renton, King County, Washington (Landau Associates, 1/30/03).
This report is a notice of construction for the System as it was originally designed. It includes permit application to the Puget Sound Clean Air Agency, worst case scenario emissions calculations, drawings and specifications, and State Environmental Policy Act (SEPA) checklist. A copy of this report is included in Appendix B.

Release Notification Report, ConocoPhillips Renton Terminal, Renton, Washington (Landau Associates, 2/11/03)
This report describes initial response and remediation efforts performed in response to a reported release of 14,800 gallons of supreme unleaded gasoline from an aboveground storage tank (Tank 2) at the Site. Installation of product recovery wells (vertical and horizontal), vapor recovery lines, total fluids recovery, and groundwater monitoring wells are described. Product recovery efforts and groundwater assessment activities are also described. Future planned activities described in the report include installation of a dual phase vacuum extraction system. The total estimated volume of product recovered as of January 22, 2003 was reported to be 3,013 gallons. A copy of this report is included in Appendix C.

Semiannual Status Report, ConocoPhillips Renton Terminal, Renton, Washington (Landau Associates, 10/25/04)
This report describes recovery of LPH and dissolved petroleum concentrations in groundwater performed to-date, and the then current configuration of the System. It describes the initial operation and activation date for the System, the results of groundwater and LPH measurements and sampling, and system vapor sampling. A system evaluation is performed in the Conclusions section of the report that evaluated the effectiveness of remedial efforts performed to-date based on the following criteria:

- Control of the LPH to reduce migration to the storm water retention point and decrease LPH thickness in the vicinity of the release;
- Control of dissolved-phase gasoline and benzene to limit off-Site migration and co-mingling with a pre-existing dissolved concentrations in the vicinity of the loading rack that were attributed to a previous release by ExxonMobil; and,
- Discharge of treated vapors and water in compliance with permit criteria for these activities.

Based on the data evaluation results, Landau concluded that the System appeared to be effective in controlling and reducing LPH, controlling the extent of the dissolved-phase gasoline and benzene, and operated in general accordance with the air and water discharge permits. Total estimated volume of gasoline recovered was reported to be 11,013 gallons. A copy of this report is included in Appendix D.

Work Plan for System Modifications and Improvements, ConocoPhillips Facility # 3485, (Renton Terminal), 2423 Lind Avenue, Renton, Washington (Secor, 8/19/05)

This work plan describes planned activities designed to increase recovery rates for LPH and/or dissolved-phase petroleum constituents by increasing groundwater recovery and System operating time. Proposed activities included deepening recovery wells, and upgrading and/or modifying the System, including replacing the compressor, installing a new flow meter, performing maintenance on the down-hole pumps, installing a wireless auto-dialer, and rerouting a liquid natural gas line. A copy of this report is included in Appendix E.

ConocoPhillips Operations and Maintenance Report, ConocoPhillips 2423 Lind Avenue, Renton, Washington (Stantec, 1/15/09)
This operations and maintenance (O&M) report describes O&M activities associated with the System that were performed in the fourth quarter of 2008. The report includes a section describing effectiveness of the System in its current configuration, and reports that the total estimated volume of gasoline recovered is 12,807 gallons since the initial release on November 13, 2002. This represents an increase of 883 gallons over the previous 12 months based on the 11,924 gallons reported in the fourth quarter 2007 O&M report. The report also contains concentration versus time graphs for System influent water and vapor. Based on the data in the concentration versus time graphs, the report concludes that the System remains effective at recovering petroleum concentrations from the subsurface. A copy of this report is included in Appendix F.

Compliance Monitoring Plan, ConocoPhillips Renton Terminal, 2423 Lind Avenue, Renton, Washington (Stantec, 10/15/09)
An updated compliance monitoring plan that includes a sampling and analysis plan and a site-specific health and safety plan is included in Appendix G.

CONCLUSIONS

The System currently operated by ConocoPhillips in response to the November 13, 2002 release appears to be effective at remediating LPH and dissolved gasoline and benzene concentrations associated with the November 2002 gasoline release at the Site based on data and conclusions in the reports described above. The System was modified by Stantec (formerly Secor) in 2005 subsequent to its original design and construction, and its current configuration and operating parameters appear to be suitable and effective as an interim remedial action. Stantec will continue to operate the System in its current configuration as directed by ConocoPhillips and Ecology.

LIMITATIONS AND CERTIFICATIONS

This work plan was prepared in accordance with the scope of work outlined in Stantec's contract with ConocoPhillips and with generally accepted professional engineering and environmental consulting practices existing at the time this work plan was prepared and applicable to the location of the site. It was prepared for the exclusive use of ConocoPhillips for the express purpose stated above. Any re-use of this work plan for a different purpose or by others not identified above shall be at the user's sole risk without liability to Stantec. To the extent that this work plan is based on information provided to

Stantec by third parties, Stantec may have made efforts to verify this third party information, but Stantec cannot guarantee the completeness or accuracy of this information. The opinions expressed and data collected are based on the conditions of the site existing at the time of the field investigations. No other warranties, expressed or implied are made by Stantec.

Stantec appreciates the opportunity to continue servicing your environmental needs. If you have any questions on this work plan or the project in general, please contact the undersigned at (425) 372-1600.

Sincerely,

Stantec Consulting Corporation

Rick Fetterly, P.E. Senior Project Manager	Jeffrey S. Thompson, L.G., L.E.G. Principal Geologist

ATTACHMENTS

Appendix A:	SEPA Checklist
Appendix B:	Submission of Notice of Construction Application, Environmental Remediation System (Landau Associates, 1/30/03).
Appendix C:	Release Notification Report, ConocoPhillips Renton Terminal, Renton, Washington (Landau Associates, 2/11/03)
Appendix D:	Semiannual Status Report, ConocoPhillips Renton Terminal, Renton, Washington (Landau Associates, 10/25/04)
Appendix E:	Work Plan for System Modifications and Improvements, ConocoPhillips Facility # 3485, (Renton Terminal), 2423 Lind Avenue, Renton, Washington (Secor, 8/19/05)
Appendix F:	ConocoPhillips Operations and Maintenance Report, ConocoPhillips 2423 Lind Avenue, Renton, Washington (Stantec, 1/15/09)
Appendix G:	Compliance Monitoring Plan, ConocoPhillips Renton Terminal, 2423 Lind Avenue, Renton, Washington (Stantec, 10/15/09)

APPENDIX A

SEPA CHECKLIST

WAC 197-11-960 Environmental checklist.

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. BACKGROUND

1. Name of proposed project, if applicable: **ConocoPhillips Renton Terminal**

2. Name of applicant: **Stantec Consulting Corporation on behalf of ConocoPhillips**
3. Address and phone number of applicant and contact person:

   Rick Fetterly, Stantec Consulting, 7730 SW Mohawk Street,
   Tualatin, OR 97062, (503) 612-2505

4. Date checklist prepared: **6/12/09**
5. Agency requesting checklist: **Washington State Department of Ecology (WSDOE)**
6. Proposed timing or schedule (including phasing, if applicable):

   Immediately

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

   Future additions or expansion are possible depending on the exent of the release.

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

A Release Notification Report was submitted to WSDOE on Feb. 11, 2003. Semi-Annual Groundwater Monitoring Reports, which include O&M/performance data for the existing remediation system (the System) are also submitte to WSDOE.

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

An Agreed Order is currently being negotiated between WSDOE, ConocoPhillips and ExxonMobil that includes the scope, schedule and deliverable srequired to attain site closure.

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

Existing permits for System operation include PSCAA Air Permit No. 9648 and King County Discharge Permit No. 4057-02. The operating parameters and/or compliance criteria for those permits may change based on activities performed persuant to the Agreed Order.

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

The exisiting site remediation system (The System) at the Site includes dual phase extraction (DPE) and groundwater extraction (GWET) technolgies. The DPE system recovers gasoline vapors which are treated with vapor-phase carbon. The groundwater extraction system recovers petroleum-impacted groundwater which is treated via air stripping and liquid-phase carbon.

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

The Site address is 2423 Lind Avenue SW, Renton, WA, 98055. A figure showing the Site location and surrounding area is attached.

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY

B. ENVIRONMENTAL ELEMENTS

1. **Earth**

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

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

Site is flat except for manmade features. Slope is zero percent.

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

Site lithology generally consists of 8-10 feet of gravelly sand fill overlying native silts.

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

As the Site is mostly flat, there are no slope stability issues at the Site, nor have other types of soil instability been observed.

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

N/A

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

No

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

Future modifications to the existing System are not expected to create additional impervious surfaces.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

N/A

a. **Air**

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

The existing System produces hydrocarbon emissions during recovery of vapor from hydrocarbon-impacted soil and groundwater. Emissions are treated prior to discharge in accordance with the existing PSCAA permit.

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

No

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

Currently, hydrocarbon vapors extracted from the treatment system are treated with vapor phase carbon. The treatment system is permitted under Puget Sound Clean Air Agency (PSCAA) permit No. 9648.

3. **Water**

a. Surface:

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

Wetland areas are located to the southeast and west of the site. Tributaries of the Black River are located approximately 500 feet to the west.

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

Based on review of available sattelite maps, the wetland area to the southeast appears to be more than 200 feet from the nearest existing recovery well. However, Future modifications or enhancements to the remediation system may place recovery well closer to the southeast wetland area.

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

N/A

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

No

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

Based on information obtained from the King County, WA floodplain maps, the western portion of the Site, which contains the terminal office and parking areas is in a 100-year floodplain. However, the tank farm and Stantec-operated remediation System are both outside of the 100-year floodplain.

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

No

b. Ground:

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

Petroleum-impacted groundwater has historically been extracted, treated and discharged to the sanitary sewer. The average historic flow rate is approximately 1 gallon per minute.

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

N/A

c. Water runoff (including stormwater):

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

N/A

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

Waste materials extracted by The System could potentially enter ground or surface waters, however, The System is checked by Stantec personnel semi-weekly and is equipped with safety and environmental controls that make such a potential release highly unlikely.

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

N/A

4. **Plants**

a. Check or circle types of vegetation found on the site: **N/A**

———— deciduous tree: alder, maple, aspen, other
———— evergreen tree: fir, cedar, pine, other
———— shrubs
———— grass
———— pasture
———— crop or grain
———— wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
———— water plants: water lily, eelgrass, milfoil, other
———— other types of vegetation

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

None

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

None known

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

None

5. **Animals**

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

birds: hawk, heron, eagle, songbirds, other: **Crows**
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other:

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

Unknown

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

Unknown

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

N/A

6. **Energy and natural resources**

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

Currently the site uses electricity to power the vapor extraction blower, air stripper blower and the compressor that powers the pneumatic groundwater extraction pumps.

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

No

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

N/A

7. **Environmental health**

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

Potential environmental health hazards resulting from System operation include fire, explosion and spillage of petroleum related wastes, however, the System is checked by Stantec personnel semi-weekly and is equipped with safety and environmental controls intended to minimize such hazards. All vapor and water discharges from the system are treated and within the limits of the aforementioned permits.

1) Describe special emergency services that might be required.

None Anticipated

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

N/A

b. **Noise**

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

The Site is an active bulk petroleum distribution facility. Noises include inbound and outbound tractor trailer traffic and machinery that transfers product frothe storage tanks to the loading area. None of these noises have historically affected system operation.

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

Current operation of pumps and blowers produces noise less than or equal to noise produced by routine Site traffic and equipment.

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

N/A

8. **Land and shoreline use**

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

The Site is a bulk petroleum distribution facility located in an industrial area. An Olympic Pipeline Pumping Station is located immediately to the north of the Site.

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

Unknown

c. Describe any structures on the site.

The site contains 7 above ground storage tanks, with associated underground piping, and an equipment control/office.

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

No

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

Industrial

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

Industrial

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

N/A

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

No

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

None

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

None

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

N/A

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY

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

N/A

9. Housing

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

None

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

None

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

N/A

10. Aesthetics

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

Approximately 10 feet; N/A

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

N/A

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

N/A

11. Light and glare

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

N/A

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

No

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

N/A

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

N/A

12. **Recreation**

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

None known

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

No

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

N/A

13. **Historic and cultural preservation**

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

No

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

None known

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

N/A

14. **Transportation**

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

Lind Avenue SW and SW 27th Street

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

Unknown

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

N/A

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

No

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

No

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

N/A

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

N/A

15. **Public services**

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

No

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

N/A

16. **Utilities**

a. Circle utilities currently available at the site: [✓ electricity] natural gas, [✓ water, refuse service, telephone, sanitary sewer], septic system, other.

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

Electricity is currently provided by Puget Sound Energy.
Sanitary sewer service is provided by King County.

C. SIGNATURE

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

Signature: Nick Geary

Date Submitted: 6-17-09

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions) **Not Applicable - All past, present and proposed actions are project actions.**

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

APPENDIX B

SUBMISSION OF NOTICE OF CONSTRUCTION APPLICATION ENVIRONMENTAL REMEDIATION SYSTEM (LANDAU ASSOCIATES, 1/30/03)

LANDAU
ASSOCIATES

January 30, 2003

Mr. Kwame Agyei
Puget Sound Clean Air Agency
110 Union Street
Suite 500
Seattle, Washington 98101-2038

RE: **SUBMISSION OF NOTICE OF CONSTRUCTION APPLICATION**
ENVIRONMENTAL REMEDIATION SYSTEM
CONOCOPHILLIPS BULK PETROLEUM TERMINAL
2423 LIND AVENUE SW
RENTON, KING COUNTY, WASHINGTON

Dear Mr. Agyei,

In accordance with our telephone conversation on January 23, 2003, Landau Associates is submitting the enclosed Notice of Construction (NoC) application to the Puget Sound Clean Air Agency (PSCAA) on behalf of ConocoPhillips Petroleum Company (ConocoPhillips). As we discussed, it is the intent of ConocoPhillips to install a remedial action system at the above referenced site to reduce subsurface contamination caused by the release of petroleum products to the subsurface. The remediation system will include a dual-phase vacuum extraction (DPVE) element that will collect free phase gasoline, vapors, and groundwater impacted by gasoline from the subsurface. Vapors collected by the DPVE system will be treated with a thermal oxidizer unit prior to discharge. Please find enclosed the referenced NoC application form as well as the following attachments:

- Attachment A – Operation and Maintenance Overview
- Attachment B – Worst Case Emissions Calculations
- Attachment C – System Drawings and Specifications
- Attachment D – SEPA Checklist

We are also enclosing a check in the amount of $700 made out to PSCAA to be applied to the Application and Engineering Review Fees.

As we discussed in our conversation on January 23, the DPVE system is being implemented to address a recent gasoline release at the site and we are attempting to initiate its operation as soon as possible in accordance with a request made by Mr. Richard Walker of the Department of Ecology's Spill Response Division. If you require any additional information regarding the urgency of this request, please contact Mr. Walker by telephone at (425) 649-7116. Given our current schedule to install the DPVE system at the site as early as the week beginning February 2, 2003, we would like to request that public notification requirements run concurrently with the review process for the enclosed NoC application, thereby allowing ConocoPhillips to operate the remediation system with PSCAA approval and prior to the completion of the public notification period. ConocoPhillips understands that granting permission to operate the remediation system prior to the completion of the public notification process may require alterations to the operating system as a result of the public comments received.

If you have any questions regarding the information provided herein, please contact me at (425) 329-0246. ConocoPhillips and Landau Associates appreciate your consideration of our application.

Sincerely,
LANDAU ASSOCIATES, INC.
By:
Martin Powers
Martin Powers, P.E.
Project Manager

Attachments: Notice of Construction
Operation and Maintenance Overview
Worst Case Emissions Calculations
System Drawings and Specifications
SEPA Checklist

Cc: Tim Johnson - ConocoPhillips

PUGET SOUND CLEAN AIR AGENCY
110 Union Street Suite 500 Seattle, WA 98101-2038
Telephone: (206) 689-4052 Fax (206) 343-7522 <www.pscleanair.org>

Clean Air Agency

NOTICE OF CONSTRUCTION AND APPLICATION FOR APPROVAL

SOIL & GROUNDWATER REMEDIATION | FORM SGR

AGENCY USE ONLY: DATE RECEIVED__________ REG NO.__________ NOC NO.__________

TYPE OF BUSINESS (CHECK) ☐ NEW ☒ EXISTING	STATUS OF EQUIPMENT (CHECK) ☒ NEW ☐ EXISTING ☐ ALTERED ☐ RELOCATION	Applicant ConocoPhillips Petroleum Co. Mr. Tim Johnson
Company (or Owner Name) ConocoPhillips Petroleum Co.		Applicant Address 3977 Leary Way NW Seattle, WA 98107
Company (or Owner) Mailing Address 3977 Leary Way NW Seattle, WA 98107		Installation Address 2423 Lind Ave. SW Renton, WA 98055

PROCESS EQUIPMENT

DESCRIPTION: Industrial blower used to extract total fluids (vapor, water and gasoline product) from recovery wells

* NO. OF UNITS: 1 MAKE AND MODEL Sutorbilt 4M Legend P

CONNECTED TO: Influent - Recovery Wells ; Effluent - Thermal Oxidizer

CONTROL EQUIPMENT (Must Meet 90% Destruction Efficiency):

_____ Vapor Carbon Vessels (Two in Series)
_____ Catalytic Oxidizer
X Thermal Oxidizer
_____ Internal Combustion Engine
_____ Other (Specify)__________

Enclose a narrative that addresses procedures for continued proper operation and maintenance of selected control equipment (i.e., monitoring carbon bed exhaust for breakthrough, monitoring temperature of thermal oxidizer, etc.).

Basic Equipment Cost (Estimate)	Control Equipment Cost (Estimate)	Planned Start Date for Construction	Planned Start Date for Operation
		January 31, 2003	February 5, 2003

* GAS STREAM CHARACTERISTICS OF CONTROL EQUIPMENT

	Temperature (°F)	Static Pressure (psig)	Flow Rate (acfm)
INLET	500	2.0	250
OUTLET	1400	5.0	250

* See Attachment A

* AIR CONTAMINANT EMISSION WORST CASE ESTIMATE (Attach separate sheet with calculations) **

POLLUTANT	UNCONTROLLED LB/DAY	UNCONTROLLED LB/YEAR	UNCONTROLLED LB/LIFETIME	CONTROL EFFICIENCY	CONTROLLED LBS/LIFETIME
Benzene	74	27,000	13,500	99	1,350
Toluene	87	32,000	16,000	99	1,600
Ethylbenzene	101	37,000	18,500	99	1,850
Xylenes	97	36,000	18,000	99	1,800
TOTAL PETROLEUM HYDROCARBONS	910	332,000	116,000	99	11,600

AMOUNT OF SOIL TO BE REMEDIATED: 6,000 yd³
FLOW RATE (gpm): 10
ESTIMATED DURATION OF PROJECT: 6 mos.

Days of Operation (Circle): [✓ S] [✓ M] [✓ T] [✓ W] [✓ T] [✓ F] [✓ S]
Daily Hours of Operation Continuous
From ________ am to ________ pm

EXHAUST STACK PARAMETERS

Stack Height Above Ground (ft)	Stack Internal Diameter at Exit (ft)	CFM Exhausted	Velocity (ft/sec)
10	1.3	250	32

FLOW DIAGRAM & PLOT PLAN

FLOW DIAGRAM INSTRUCTIONS
(a) FLOW DIAGRAM MAY BE SCHEMATIC. ALL EQUIPMENT SHOULD BE SHOWN WITH EXISTING EQUIPMENT SO INDICATED.
(b) SHOW FLOW DIAGRAM OF PROCESS
(c) INDICATE ALL POINTS IN PROCESS WHERE GASEOUS OR PARTICULATE POLLUTANTS ARE EMITTED.
(d) FLOW CHART CAN BE ATTACHED SEPARATELY IF NECESSARY. (DRAWINGS MAY BE SUBMITTED INSTEAD, IF DESIRED)
(e) ATTACH A PLOT PLAN SHOWING NEAREST PUBLIC ACCESS

***

CERTIFICATION

I, THE UNDERSIGNED, DO HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS APPLICATION AND THE ACCOMPANYING FORMS, PLANS, AND SUPPLEMENTAL DATA DESCRIBED HEREIN IS, TO THE BEST OF MY KNOWLEDGE, ACCURATE AND COMPLETE.

SIGNATURE
DATE 1/30/03

TYPE OR PRINT NAME Tim Johnson
TITLE Site Manager
PHONE 206-706-2341

Prepared by (Signature and Title)

* See Attachment B

Form No. 50-152 (9/99)

*** See Attachment C

ATTACHMENT A

Operation & Maintenance Overview

ATTACHMENT A
OPERATION AND MAINTENANCE OVERVIEW
PROPOSED TOTAL FLUID EXTRACTION SYSTEM
CONOCOPHILLIPS RENTON BULK STORAGE TERMINAL
RENTON, WASHINGTON

Initial System Startup

Initial system startup operations will be considered to be the 7-day period following activation of the system. During the initial system startup operation, it is anticipated that a significant amount of "dilution" air will be required to maintain a thermal oxidation temperature of less than 1400 ° Fahrenheit (the upper limit for thermal oxidizer operation). The temperature and LEL limits are preset in the programmable logic controller that operates the remedial system, however maintenance personnel will continually monitor the system operation to ensure that the failsafes are effectively monitored and dilution air is capable of maintaining safe equipment operation. Also during the initial system startup period, vapor samples will be collected from the influent (untreated) and effluent (treated) vapor sampling ports on the thermal oxidizer unit and the total vacuum and flow from the extraction wells will be monitored and recorded.

Ongoing Operation and Maintenance of System

Following the initial system startup period (7 days) ongoing operation and maintenance of the system will continue throughout the operating time for the system. Ongoing operation and maintenance will include the monitoring of the thermal oxidizer operating temperature and LEL levels, as well as daily recording of vapor flowrates and vacuum induced at the extraction wellheads. Weekly vapor samples will be collected from the influent vapor sampling port on the thermal oxidizer and bi-monthly (twice per month) vapor samples will be collected from the effluent vapor sampling port on the thermal oxidizer.

ATTACHMENT B

Worst Case Emissions Calculation

ATTACHMENT B
WORST CASE EMISSION ESTIMATION CALCULATIONS
PROPOSED TOTAL FLUIDS EXTRACTION SYSTEM
CONOCOPHILLIPS RENTON BULK STORAGE TERMINAL
RENTON, WA

Basis Equation
ER = Q X C X MW X 1.58 X 10-7
Where:

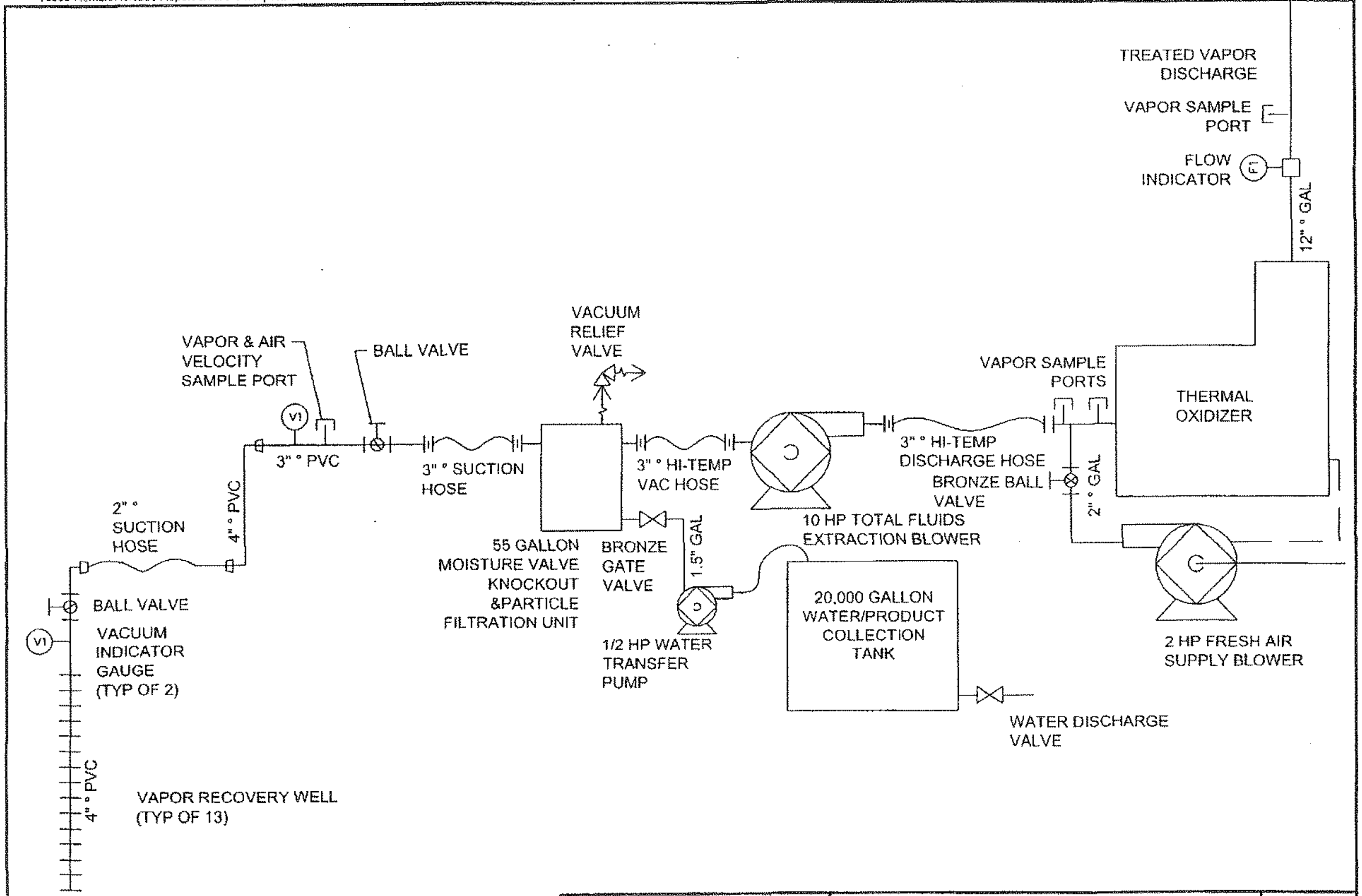
ER = Emission Rate in lbs/day
Q = Flowrate in cubic feet per minute
C = Concentration of Contaminant in ppmv
MW = Molecular Weight of Constituent
1.58 X 10-7 = Conversion Factor

Constituent	Molecular Weight Estimate	Maximum Concentration Expected, ppmv	Potential Untreated Emission Rate, lbs/hr
Benzene	78	1000	3.08
Toluene	92	1000	3.64
Ethylbenzene	106	1000	4.19
Xylenes	102	1000	4.03
TPH - Gas	96	10000	37.94

ATTACHMENT C

System Drawings & Specifications

Tosco-Renton/Release Report & Air Permit | T:\706\002\012\Release Rpt & Air Permit\FigC-1.dwg (A) "Figure C-1" 1/28/2003



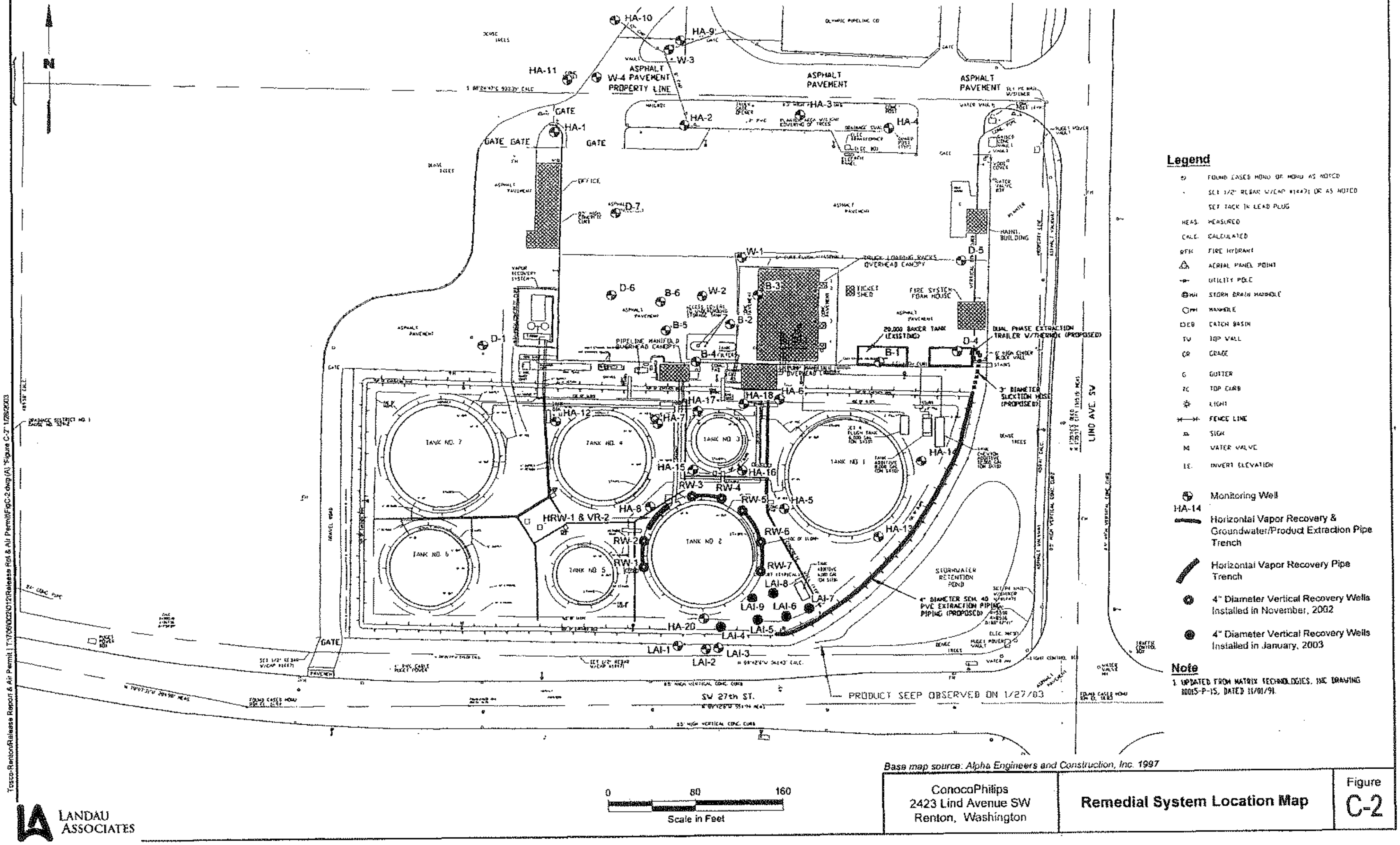
Landau Associates

ConocoPhilips
2423 Lind Avenue SW
Renton, Washington

Basic Process and Instrumentation Diagram Total Fluids Extraction System

Figure
C-1

Tosco-Renton/Release Report & Air Permit | T:\706\002\012\Release Rpt & Air Permit\FigC-2.dwg (A) "Figure C-2" 1/28/2003



Base map source: Alpha Engineers and Construction, Inc. 1997

LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Remedial System Location Map

Figure
C-2

H2 Oil Recovery Equipment, Inc.

P.O. Box 9028 • Bend, OR 97708

(541) 382-7070 • Fax (541) 382-2242

COPY

Date:	Tuesday, January 28, 2003
To:	Landau Associates Martin Powers Phone: 425-778-0907 Fax: 425-778-6409
From:	H2 Oil Recovery Equipment Inc Joe Rounds Phone: 541-382-7070 Fax: 541-382-2242
Pages:	17

Subject: Renton Oxidizer System

Martin,

Following is the quote and information for the Conoco oxidizer system. I have included the air flow rates for different vacuum levels for the blower on the trailer. For total air flow you need to add the fresh air blower to the SVE blower. The operating temperature for the thermal oxidizer is 1450 degrees F. Let me know if you have any questions. Also, Tim Johnson asked me to send him the quote too.

Regards,

Joe

Joe Rounds
H2 Oil Recovery Equipment, Inc.
h2oilrecovery.com
Email: h2oil@coinet.com

H2 Oil Recovery Equipment, Inc.
P.O. Box 9028 • Bend, OR 97708
(541) 382-7070 • Fax (541) 382-2243

Tuesday, January 28, 2003

Tim Johnson
ConocoPhillips
3977 Leary Way NW
Seattle, WA 98107

Rework Oxidizer System
H2 Ref # 230121BJR

Dear Tim:

H2 Oil Recovery Equipment, Inc. is pleased to offer pricing on the following remediation equipment and services based on information received.

A(1) Rework Thermal Oxidizer System -

To include:

- New 55 gallon cyclonic type moisture separator with 4" inlet and outlet fittings, constructed of carbon steel, removable lid, external and internal industrial grade chemically resistant powder coating, 4 base mounting tabs, internal 100 micron particle filter, manual brass dilution valve, manual brass drain valve, (2) electric explosion proof switches for pump on and pump off
- Vapor stream high temperature safety shut off valve
- Install moisture separator
- Install safety valve
- Change oil and grease vapor extraction blower
- Control panel wiring changes for proper operation
- Testing of system for proper operation

Price:	$ 6,583.00

B(1) Delivery & Startup of System -

To include:

- Mob and demob of personnel to jobsite in Renton, WA
- (24) hours of onsite labor for startup assistance

Price:	$ 2,790.00

Page #2
230121BJR
ConocoPhillips

C(1) Pickup of trailer mounted system in Spokane, WA

Price:	$ 868.00

Notes:

1) This quote is subject to H2 Oil's standard warranty-disclaimer.

2) Shipment of equipment 1 to 2 weeks after receipt of order.

3) Rework pricing is based on using the fittings from the old moisture separator.

4) Pricing for delivery and startup does not include any parts. Field supplies will be billed at cost plus 5%.

Prices do not include any applicable sales tax, electrical service equipment, or installation, unless specifically noted.

Terms: Shipping is FOB at Buyer's expense, H2 Oil Recovery Equipment, Inc., Bend, Oregon. Buyer bears risk of loss during shipping. Seller shall notify Buyer of shipment. Payment terms are Net 30 days from date of shipment. Payment by check in US funds payable to H2 Oil Recovery Equipment, Inc., unless otherwise agreed. Service charges will be computed at 1.5% per month (18% per year) on amounts past due. Products are deemed accepted on the third business day following date of delivery. Acceptance cannot be revoked.

Seller reserves all remedies available under the Uniform Commercial Code as codified under the revised statutes for the State of Oregon in effect at the time of this agreement or as subsequently amended. Buyer waives any right to the remedy of "cover" and all claims for injury to person or property arising out of the manufacture, production, sale or use of the product(s). Buyer authorizes, at Seller's option, as liquidated damages and not a penalty, a sum equal to a minimum of 50% of purchase contract price in the event of Buyer's breach or repudiation of the contract. Buyer's remedy for Seller's breach is limited to return of the product(s) for the price paid, at Seller's option, repair or replacement of any non conforming product(s).

Any action for breach of contract must be brought within one year after the claim accrues.

Venue for any dispute regarding this agreement in any way is exclusively in the courts for Deschutes County, Oregon and governed by Oregon law. The prevailing party in any such dispute shall recover from the other its reasonable attorney fees, whether incurred at arbitration, trial or on appeal.

Buyer confirms this is a firm offer to purchase the attached product(s) under the terms stated above.

Buyer's confirmation of purchase order, acceptance of terms and H2 Oil's standard warranty-disclaimer.

Total Purchase Price: ____________________

Purchase Order Number: __________________

Shipping Date: _________________________

By: _________________________________

Printed Name: _________________________

Title: ________________________________

Date: ________________________________

Company: ____________________________

Regards,

Joe Rounds
H2 Oil Recovery Equipment, Inc.
h2oilrecovery.com
email: h2oil@coinet.com

Date: 1/27/2003 PROJECT:

GD Sutorbilt

Application:
Customer Name:
Comments:

Application Engineer:
Sales Order Number:

GAS MIXTURE: Air(100%)
MACHINE SELECTION: 4M-LegendP
SERVICE: Dry Vacuum

CORRECTED VALUES	ORIGINAL UNITS
Inlet Set #1	
Barometer	14.696 PSIA
Inlet Pres.	-6.000 In.Hg(G)
Inlet Temp.	68.00 F
Blower Speed	2,630 RPM
% of Max. Speed	73.1 %
Dis. Pres.	0.300 PSIG
Rel. Humid.	36.0 %
Delta Pressure	6.611 In.Hg(G)

MEASURED VALUES	PLOT UNITS
Inlet Set #1	
Inlet Flow	207.85 SCFM
Blower Power **	4.8 HP
Efficiency	69.8 %
Discharge Temp.	114.4 F
Estimated Noise	83.4 dBA
Actual Disch. Flow	222.1 CFM

** Drive losses not included

GAS PARAMETERS	ENGLISH UNITS	METRIC UNITS
Inlet Set #1		
Molecular Weight	28.88 lbm/lbmol	28.88 kg/kgmol
R Value	53.51 ft.lbf/lbm.R	0.29 kJ/kg.K
Density	0.060 lbm/ft^3	0.959 kg/m^3
Sp. Heat @ Const. P	0.241 BTU/lbm.R	1.008 kJ/kg.K
Ratio of Sp. Heats	1.40	1.40
Saturated Vapor Pres.	1.4466 PSIA	0.0997 Bars(A)
Partial Pres. of Gas	11.6262 PSIA	0.8016 Bars(A)
Partial Pres. of Vapor	0.1220 PSIA	0.0084 Bars(A)

Date: 1/27/2003 PROJECT:

Sutorbilt

Application:
Customer Name:
Comments:

Application Engineer:
Sales Order Number:

GAS MIXTURE: Air(100%)
MACHINE SELECTION: 4M-LegendP
SERVICE: Dry Vacuum

CORRECTED VALUES	ORIGINAL UNITS
Inlet Set #1	
Barometer	14.696 PSIA
Inlet Pres.	-8.000 In.Hg(G) ←
Inlet Temp.	68.00 F
Blower Speed	2,630 RPM
% of Max. Speed	73.1 %
Dis. Pres.	0.300 PSIG
Rel. Humid.	36.0 %
Delta Pressure	8.611 In.Hg(G)

MEASURED VALUES	PLOT UNITS
Inlet Set #1	
Inlet Flow	183.66 SCFM ←
Blower Power **	6.2 HP
Efficiency	66.5 %
Discharge Temp.	134.7 F
Estimated Noise	83.9 dBA
Actual Disch. Flow	203.4 CFM

** Drive losses not included

GAS PARAMETERS	ENGLISH UNITS	METRIC UNITS
Inlet Set #1		
Molecular Weight	28.88 lbm/lbmol	28.88 kg/kgmol
R Value	53.51 ft.lbf/lbm.R	0.29 kJ/kg.K
Density	0.055 lbm/ft^3	0.878 kg/m^3
Sp. Heat @ Const. P	0.241 BTU/lbm.R	1.009 kJ/kg.K
Ratio of Sp. Heats	1.40	1.40
Saturated Vapor Pres.	2.5170 PSIA	0.1735 Bars(A)
Partial Pres. of Gas	10.6435 PSIA	0.7338 Bars(A)
Partial Pres. of Vapor	0.1220 PSIA	0.0084 Bars(A)

Date: 1/27/2003 PROJECT:

Sutorbilt

```
Application:
Customer Name:
Comments:


Application Engineer:
Sales Order Number:

GAS MIXTURE: Air(100%)
MACHINE SELECTION: 4M-LegendP
SERVICE: Dry Vacuum

CORRECTED VALUES    ORIGINAL UNITS
Inlet Set #1
 Barometer           14.696 PSIA
 Inlet Pres.        -10.000 In.Hg(G)
 Inlet Temp.          68.00 F
 Blower Speed         2,630 RPM
 % of Max. Speed       73.1 %
 Dis. Pres.           0.300 PSIG
 Rel. Humid.           36.0 %
 Delta Pressure      10.611 In.Hg(G)


MEASURED VALUES           PLOT UNITS
Inlet Set #1
 Inlet Flow               160.56 SCFM
 Blower Power **             7.6 HP
 Efficiency                 61.8 %
 Discharge Temp.           160.0 F
 Estimated Noise            84.4 dBA

 Actual Disch. Flow        185.6 CFM

** Drive losses not included

GAS PARAMETERS                  ENGLISH UNITS              METRIC UNITS
Inlet Set #1
 Molecular Weight             28.88 lbm/lbmol          28.88 kg/kgmol
 R Value                      53.51 ft.lbf/lbm.R        0.29 kJ/kg.K
 Density                      0.050 lbm/ft^3           0.798 kg/m^3
 Sp. Heat @ Const. P          0.241 BTU/lbm.R          1.010 kJ/kg.K
 Ratio of Sp. Heats            1.40                     1.40
 Saturated Vapor Pres.       4.7338 PSIA              0.3264 Bars(A)
 Partial Pres. of Gas        9.6609 PSIA              0.6661 Bars(A)
 Partial Pres. of Vapor      0.1220 PSIA              0.0084 Bars(A)
```

Date: 1/27/2003 PROJECT:

GD Sutorbilt

Application:
Customer Name:
Comments:

Application Engineer:
Sales Order Number:

GAS MIXTURE: Air(100%)
MACHINE SELECTION: 4M-LegendP
SERVICE: Dry Vacuum

CORRECTED VALUES	**ORIGINAL UNITS**
Inlet Set #1	
Barometer	14.696 PSIA
Inlet Pres.	-12.000 In.Hg(G) ←
Inlet Temp.	68.00 F
Blower Speed	2,630 RPM
% of Max. Speed	73.1 %
Dis. Pres.	0.300 PSIG
Rel. Humid.	36.0 %
Delta Pressure	12.611 In.Hg(G)

MEASURED VALUES	**PLOT UNITS**
Inlet Set #1	
Inlet Flow	136.39 SCFM ←
Blower Power **	9.0 HP
Efficiency	56.8 %
Discharge Temp.	191.9 F
Estimated Noise	84.9 dBA
Actual Disch. Flow	168.5 CFM

** Drive losses not included

GAS PARAMETERS	**ENGLISH UNITS**	**METRIC UNITS**
Inlet Set #1		
Molecular Weight	28.88 lbm/lbmol	28.88 kg/kgmol
R Value	53.51 ft.lbf/lbm.R	0.29 kJ/kg.K
Density	0.045 lbm/ft^3	0.717 kg/m^3
Sp. Heat @ Const. P	0.242 BTU/lbm.R	1.010 kJ/kg.K
Ratio of Sp. Heats	1.40	1.40
Saturated Vapor Pres.	9.7324 PSIA	0.6710 Bars(A)
Partial Pres. of Gas	8.6783 PSIA	0.5983 Bars(A)
Partial Pres. of Vapor	0.1220 PSIA	0.0084 Bars(A)

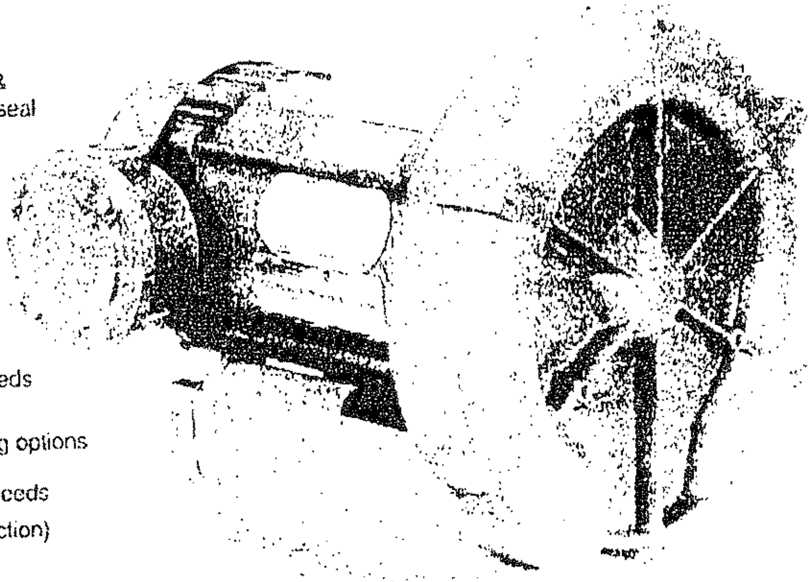
Date: 1/27/2003 PROJECT:

GD Sutorbilt

```
Application:
Customer Name:
Comments:


Application Engineer:
Sales Order Number:

GAS MIXTURE: Air(100%)
MACHINE SELECTION: 4M-LegendP
SERVICE: Dry Vacuum

CORRECTED VALUES   ORIGINAL UNITS
Inlet Set #1
 Barometer           14.696 PSIA
 Inlet Pres.        -13.000 In.Hg(G)  ←
 Inlet Temp.          68.00 F
 Blower Speed         2,630 RPM
 % of Max. Speed       73.1 %
 Dis. Pres.           0.300 PSIG
 Rel. Humid.           36.0 %
 Delta Pressure      13.611 In.Hg(G)


MEASURED VALUES          PLOT UNITS
Inlet Set #1
 Inlet Flow              127.62 SCFM  ←
 Blower Power **            9.8 HP
 Efficiency                54.3 %
 Discharge Temp.          211.4 F
 Estimated Noise           85.1 dBA

 Actual Disch. Flow       160.1 CFM

** Drive losses not included

GAS PARAMETERS                 ENGLISH UNITS          METRIC UNITS
Inlet Set #1
 Molecular Weight           28.88 lbm/lbmol        28.88 kg/kgmol
 R Value                    53.51 ft.lbf/lbm.R      0.29 kJ/kg.K
 Density                    0.042 lbm/ft^3         0.677 kg/m^3
 Sp. Heat @ Const. P        0.242 BTU/lbm.R        1.011 kJ/kg.K
 Ratio of Sp. Heats          1.40                   1.40
 Saturated Vapor Pres.    14.5253 PSIA            1.0015 Bars(A)
 Partial Pres. of Gas      8.1870 PSIA            0.5645 Bars(A)
 Partial Pres. of Vapor    0.1220 PSIA            0.0084 Bars(A)
```

AMETEK® Rotron® Industrial Products

EN 505M & CP 505M
Sealed Regenerative Blower w/Explosion-Proof Motor



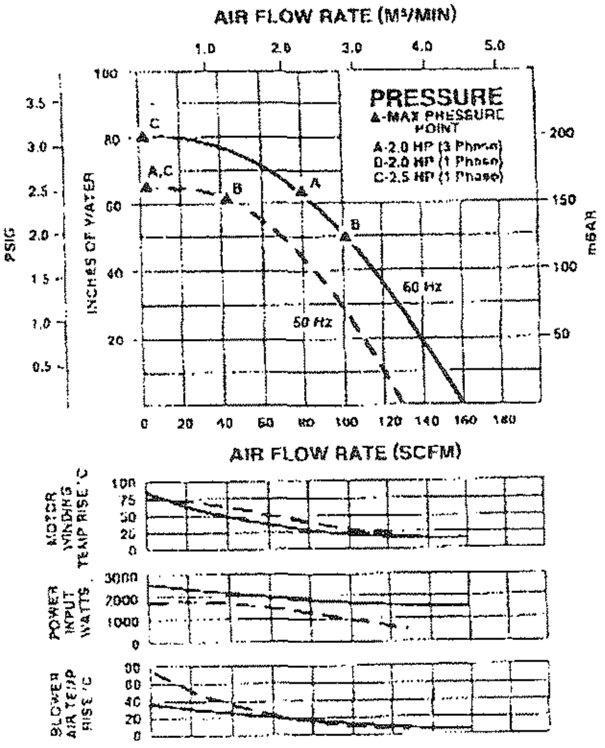
FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 160 SCFM
- Maximum pressure: 62 IWG
- Maximum vacuum: 60 IWG
- Standard motor: 2.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

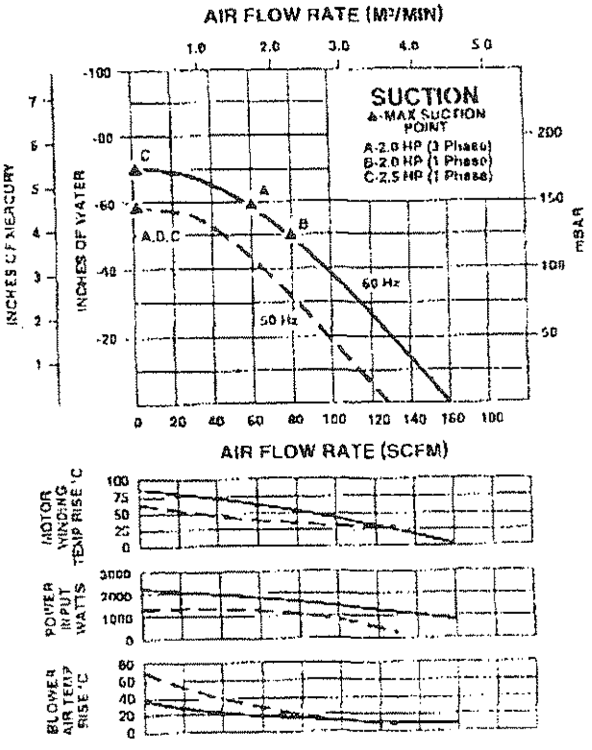
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

BLOWER PERFORMANCE AT STANDARD CONDITIONS

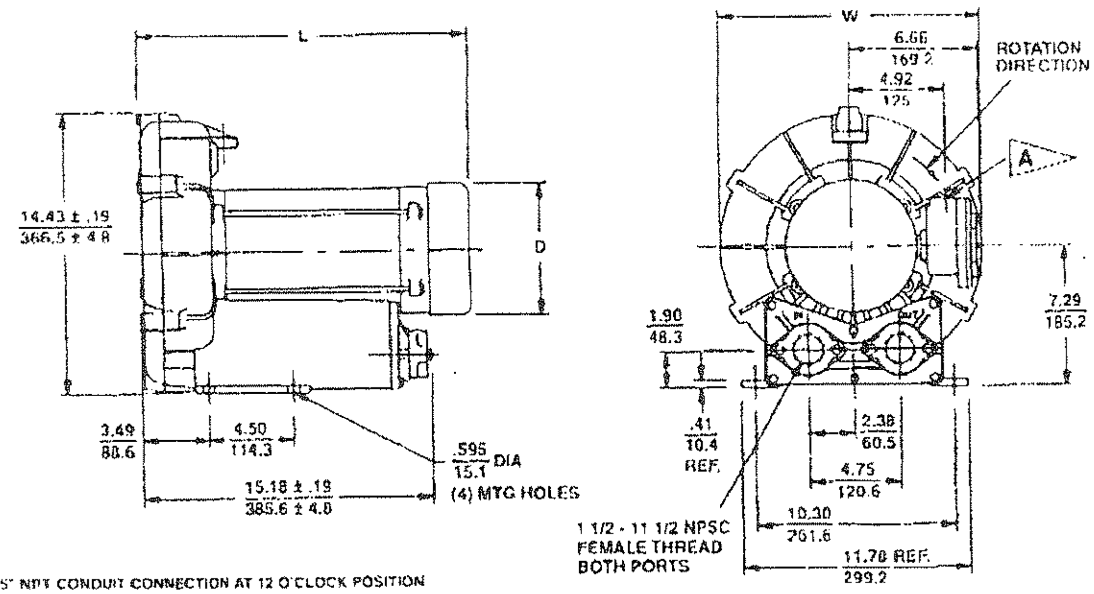




AMETEK® Rotron® Industrial Products

EN 505M & CP 505M
Sealed Regenerative Blower w/Explosion-Proof Motor

Scale CAD drawing available upon request.



A 0.75" NPT CONDUIT CONNECTION AT 12 O'CLOCK POSITION

DIMENSIONS: IN. / MM
TOLERANCES: .XX ± .08 / 2.0
.XXX ± .030 / .800
(UNLESS OTHERWISE NOTED)

MODEL	L (IN) ± .30	L (MM) ± 8	D (IN)	D(MM)	W(IN)	W(MM) ± 5 MM
EN/CP505AX72ML	16.0	405	6.84	173	13.53	344
EN/CP505AX58ML	17.21	437	6.84	173	13.53	344
EN/CP505CJ5ML	18.57	472	7.32	186	13.53	344

SPECIFICATIONS

MODEL	EN505AX58ML		EN505AX72ML		EN505CJ5ML	CP505FS58MLR	CP505FS72MLR
Part No.	038177		038178		038445	080655	038962
Motor Enclosure – Shaft Material	Explosion-proof – CS		Explosion-proof – CS		Explosion-proof – CS	Chem XP – SS	Chem XP – SS
Horsepower	2.0		2.0		2.5	Same as EN505AX58ML – 038177 except add Chemical Processing (CP) features from catalog inside front cover	Same as EN505AX72ML – 038178 except add Chemical Processing (CP) features from catalog inside front cover
Phase – Frequency [1]	Single - 60 Hz		Three - 60 Hz		Single - 60 Hz		
Voltage [1]	115	230	230	460	230		
Motor Nameplate Amps	17.2	8.6	5.8	2.9	15.5		
Max. Blower Amps [3]	22.0	11.0	6.2	3.1	14.0		
Inrush Amps	112	56	56	28	86		
Starter Size	1	0	0	0	1		
Service Factor	1.0		1.0		1.0		
Thermal Protection [2]	Class B - Pilot Duty		Class B - Pilot Duty		Class B - Pilot Duty		
XP Motor Class – Group	I-D		I-D		I-D, II-F&G		
Shipping Weight	95 lb (43 kg)		87 lb (40 kg)		103 lb (228 kg)		

[1] Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

[2] Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

[3] Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

Specifications subject to change without notice. Please consult your Local Field Sales Engineer for specification updates.

Rev. 2/01

H2 Oil Recovery Equipment, Inc.
P.O. Box 9028 • Bend, OR 97708
(541) 382-7070 • Fax (541) 382-2242

THERMAL OXIDIZER TECHNICAL SPECIFICATIONS

1.0 EXPERIENCE AND DESIGN STANDARD:

H2 Oil Recovery Equipment, Inc. has been manufacturing thermal oxidizers for more than five years. The general construction of the thermal oxidizer is substantial and durable with the intent of producing a piece of equipment that will operate for many years under severe oudoor weather conditions with minimal maintenance.

2.0 PROCESS GENERAL:

The thermal oxidizer utilizes a gas burner system to heat the inlet vapor stream causing the inlet vapors to convert into CO2 and H2O. The design temperature is 1400 deg. (f). The thermal oxidizer includes, but is not limited to -

A - Inlet process stream train
B - Burner system
C - UL controls

3.0 CONSTRUCTION GENERAL:

Stack height	120"
Length of skid	168"
Width of unit skid	42.5"
Weight of unit	2500 lbs
Shell/stack material of construction	3/16" carbon steel
Paint	Silicone alkyd
Insulation	Ceramic
Steel skid with fork lift pockets	1/4" steel
Burner BTUH rating	1.5 million per hour
Main fuel train	1" Piping/1.5 MBTUH
Type of fuel	Natural gas or propane
Maximum fuel pressure	5 psi
Minimum fuel pressure	2 psi

3.10 BURNER SYSTEM:

The burner system conforms to NFPA 86 regulations. The burner system utilizes either natural gas or propane as the primary fuel source. The burner system includes -

- A - Pilot ignited burner
- B - Gas piping train
  - 1) Automatic gas control valve
  - 2) Safety shut-off valves
  - 3) Gas high pressure switch
  - 4) Gas low pressure switch
  - 5) Pressure gauges
  - 6) Pressure regulators
  - 7) Pilot flame solenoid shut-off valve
  - 8) Manual gas supply shut-off valves
  - 9) Gas line filter

3.20 INLET VAPOR STREAM PIPING:

- A - Automatic vapor stream shut-off valve
- B - Automatic vapor stream by-pass valve
- C - Flame arrestor

4.0 ELECTRICAL:

The electrical control panel is UL listed and is a Nema 4 rated enclosure. The control circuit is 120 VAC single phase. The control panel will bear a *Underwriters Laboratories Inc.* marking label for a classified enclosed flame control panel. The control circuit includes, but is not limited to-

- A - Nema 4 construction
- B - Status indicating lights
  - 1) Power on
  - 2) Power failure
  - 3) Moisture separator high water shutdown
  - 4) Flame loss shutdown
  - 5) Purge
  - 6) Limits complete
  - 7) Systems operating
  - 8) Burner high temperature shutdown

9) Catalyst high temperature shutdown

C - Fan draft switch
D - Digital temperature indicators
E - Flame failure safeguard
F - Over temperature protection
G - Thermocouples
H - Safety interlock switches
I - Ignition transformer
J - UV flame detector
K - Flame arrestor high temperature shutdown

5.0 TESTING:

The thermal oxidizer shall be functionally tested by the manufacturer prior to shipment and these tests shall include, but is not limited to -

A - Start-up and operation at design temperature
B - Burner high temperature shutdown
C - Gas low pressure shutdown
D - Gas high pressure shutdown
E - Sensor for high water shutdown in moisture separator
F - Flame loss shutdown
G - UV flame detector voltage test
H - UV flame detector operation test
I - Draft air loss shutdown

H2 Oil Recovery Equipment, Inc.
(541) 382-7070 Fax (541) 382-2242
P.O. Box 9028 Bend, OR 97708

THERMAL OXIDIZER

BTUH REQUIRED TO HEAT AIR FROM 100(F) TO 1400(F)

UNASSISTED BY VAPOR STREAM BTU CONTENT

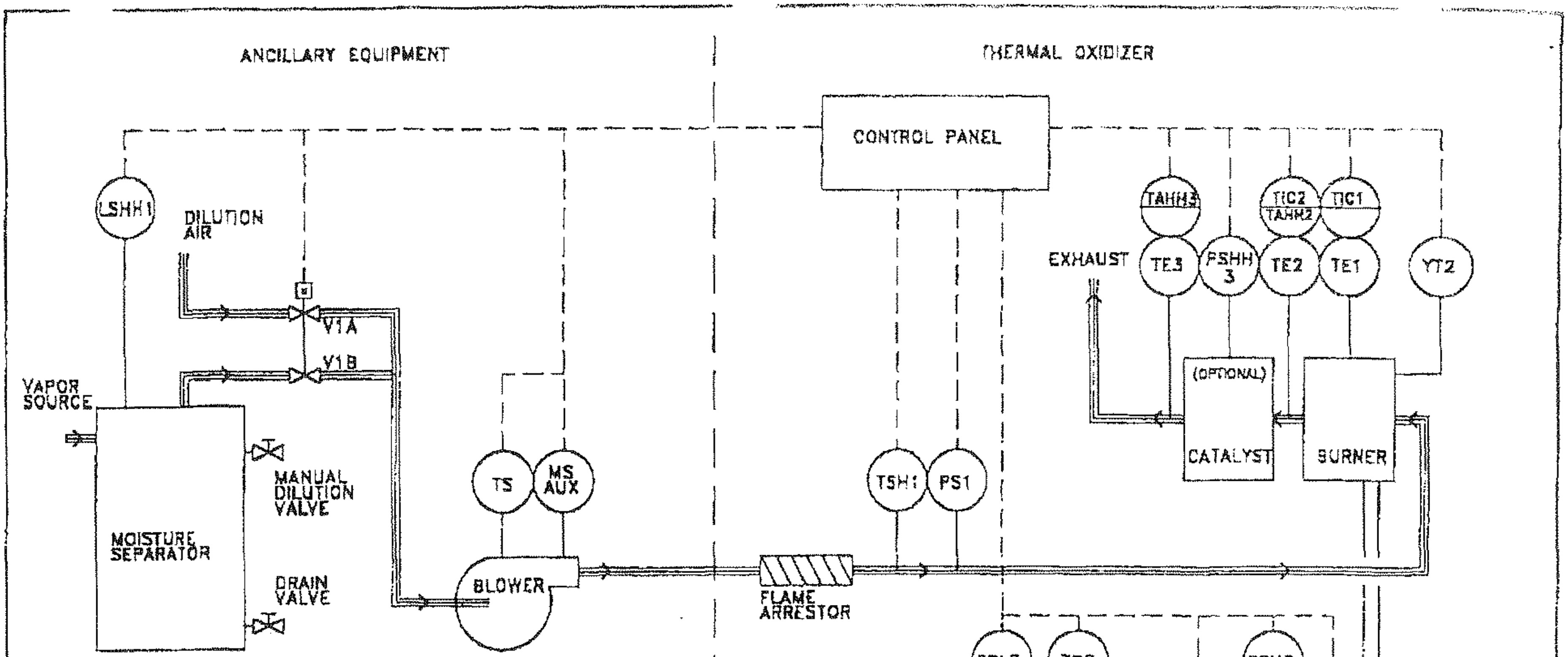
FLOW	BTUH	TNG/MO	GLPG/MO	**NG COST	***LPG COST
100	175000	1260	1380	$ 630.00	$ 1,380.00
200	350000	2520	2762	$ 1,260.00	$ 2,762.00
300	526000	3744	4139	$ 1,872.00	$ 4,139.00
400	702000	5040	5524	$ 2,520.00	$ 5,524.00
500	877000	6264	6905	$ 3,132.00	$ 6,905.00
600	1050000	7560	8262	$ 3,780.00	$ 8,262.00
700	1228000	8856	9678	$ 4,428.00	$ 9,678.00
800	1404000	10080	11016	$ 5,040.00	$ 11,016.00
900	1579000	11376	12432	$ 5,688.00	$ 12,432.00
1000	1755000	12600	13770	$ 6,300.00	$ 13,770.00

ASSISTED BY VAPOR STREAM BTU CONTENT
APPROXIMATELY 40% LEL

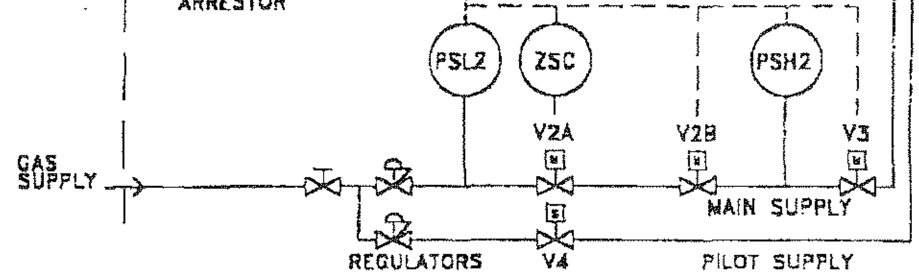
FLOW	*BTUH	TNG/MO	GLPG/MO	**NG COST	***LPG COST
100	33750	243	264	$ 121.00	$ 265.00
200	67500	486	531	$ 243.00	$ 531.00
300	101250	729	796	$ 364.00	$ 796.00
400	135000	972	1062	$ 486.00	$ 1,062.00
500	168750	1215	1327	$ 607.00	$ 1,327.00
600	202500	1458	1593	$ 729.00	$ 1,593.00
700	236250	1701	1859	$ 850.00	$ 1,859.00
800	270000	1944	2124	$ 972.00	$ 2,124.00
900	303750	2187	2390	$ 1,093.00	$ 2,390.00
1000	337500	2430	2657	$ 1,215.00	$ 2,657.00

* Based upon a minimum burner turndown temperature of 350(f)
** Based on $.50/therm on natural gas
*** Based on $1.00/gal. for LPG (propane)
TNG/MO - Therms of natural gas per month
GLPG/MO - Gallons of LPG (propane) per month

1/20/99
manecal/therm ox BTUH- 100-1400



LSHH1	MOISTURE SEPARATOR HIGH LEVEL
TS	BLOWER INTERNAL HIGH TEMP. SWITCH
TSH1	VAPOR STREAM HIGH TEMP. SWITCH
PS1	DRAFT AIR PRESSURE SWITCH
TE1	BURNER THERMOCOUPLE
TE2	BURNER HIGH TEMP. THERMOCOUPLE
TE3	CATALYST TEMPERATURE THERMOCOUPLE
TIC1	PROCESS TEMP. CONTROLLER
TIC2/TAHH2	OPERATING LIMIT/ BURNER HIGH TEMP.
TAHH3	CATALYST HIGH TEMP. LIMIT
V1A	ELECTRIC DILUTION VALVE
V1B	VAPOR STREAM VALVE
MS AUX	BLOWER AUXILARY CONTACT (RUNNING)
PSL2	LOW GAS PRESSURE SWITCH
PSH2	HIGH GAS PRESSURE SWITCH
V2A/B	GAS SHUTOFF VALVES
V3	GAS MODULATING VALVE
V4	PILOT SOLENOID VALVE
YT2	FLAME DETECTOR
ZSC	PROOF OF CLOSURE
PSHH3	CATALYST HIGH DIFFERENTIAL PRESSURE



INTERLOCKS AND LIMITS

A)		POWER LOSS SHUTDOWN
B)	LSHH1	MOISTURE SEPARATOR HIGH LEVEL
C)	MS AUX	PROOF OF BLOWER OPERATION
D)	TSH1	VAPOR STREAM HIGH TEMP.
E)	PS1	PROOF OF DRAFT AIR
F)	TAHH2	BURNER HIGH TEMP.
G)	TAHH3	CATALYST HIGH TEMP.
H)	PSL2	LOW GAS SWITCH
I)	PSH2	HIGH PRESSURE GAS SWITCH
J)	ZSC	PROOF OF CLOSURE (GAS SUPPLY)
K)	PSHH3	CATALYST HIGH DIFFERENTIAL PRESS.

LEGEND

1ST LETTER	2ND LETTER	3RD/4TH LETTER	GENERAL
A=ANALYTICAL	A=ALARM	A=ALARM	HOA=HAND/OFF/AUTO
F=FLOW	C=CONTROLLER	C=CONTROLLER	R=RELAY
K=TIME	D=DIFFERENTIAL	H=HIGH	T=TIMER
L=LEVEL	E=ELEMENT	L=LOW	MS=MOTOR STARTER
P=PRESSURE	I=INDICATING	S=SWITCH	MCR=MASTER CONTROL RELAY
T=TEMPERATURE	Q=TOTALIZING	T=TRANSMITTER	SVE=SOIL VAPOR EXTRACTION
W=WEIGHT	R=RECORDER	V=VALVE	AS=AIR SPARGE
Z=POSITION	S=SWITCH		OL=MOTOR OVERLOAD RELAY
	T=TRANSMITTER		MTR TS=MOTOR WINDING TEMP.
	Z=ACTUATOR		LEL=LOWER EXPLOSIVE LIMIT
			PWR=POWER
			BRN=BURNER
			CAT=CATALYST

POWER / CONTROL WIRING

PROCESS PIPING

PANEL MOUNTED ⊖

FIELD MOUNTED ○

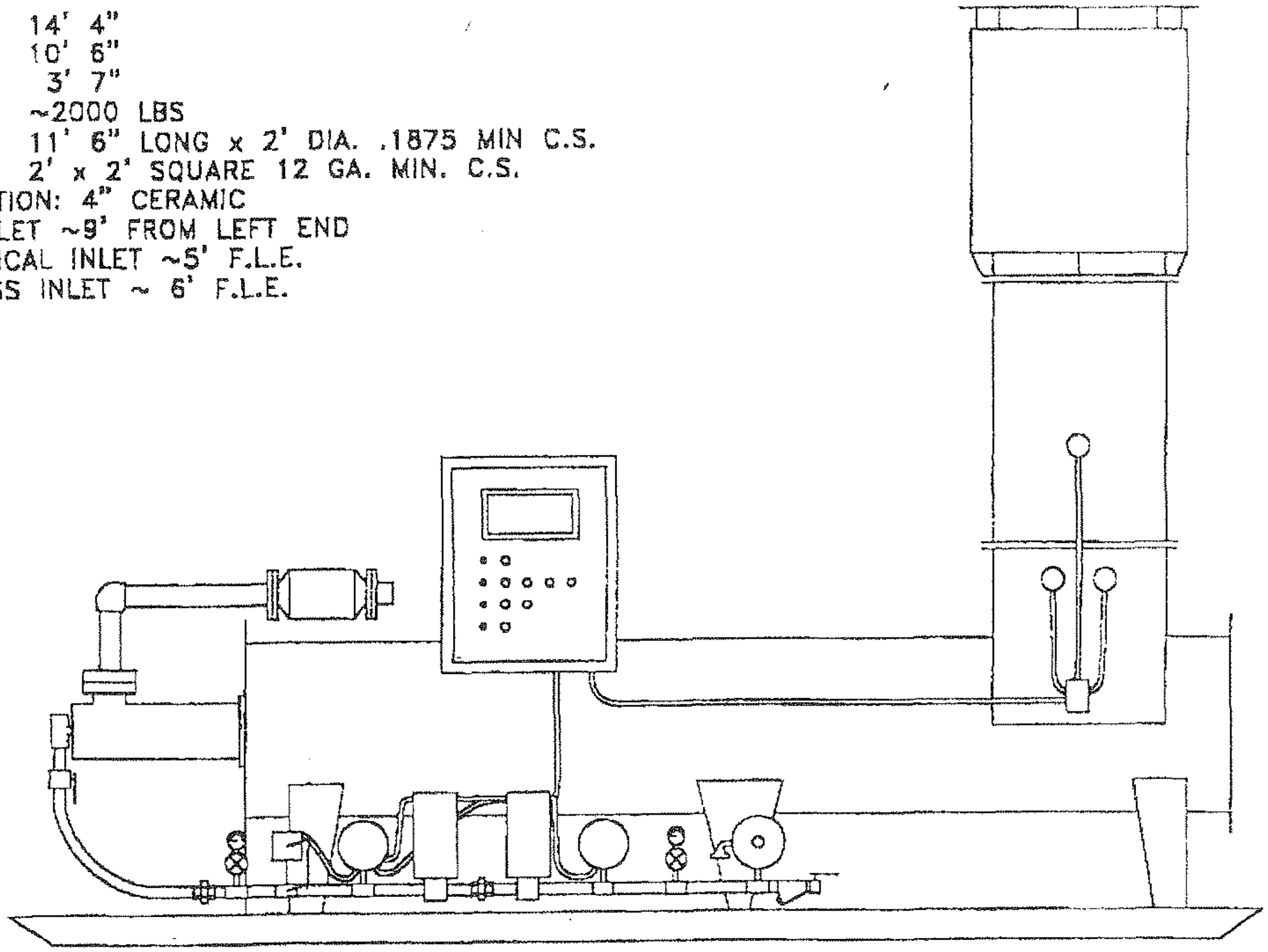
H2 OIL RECOVERY EQUIPMENT

Gas Thermal Oxidizer P&ID

DRAWN BY	SLP	SCALE	NONE	DRAWING NO.
CHK'D		DATE	3-97	A1017C
CAD		APP'D		

SPECIFICATIONS

LENGTH 14' 4"
HIEGHT 10' 6"
WIDTH 3' 7"
WEIGHT ~2000 LBS
SHELL 11' 6" LONG x 2' DIA. .1875 MIN C.S.
STACK 2' x 2' SQUARE 12 GA. MIN. C.S.
INSULATION: 4" CERAMIC
GAS INLET ~9' FROM LEFT END
ELECTRICAL INLET ~5' F.L.E.
PROCESS INLET ~ 6' F.L.E.



H2 OIL RECOVERY EQUIPMENT

100-400 CFM THERMAL OXIDIZER

DRAWN BY	GS	SCALE	NONE	DRAWING NO.
CHK'D	GS	DATE	3/94	
CAD	CW.I	APP'D		A1001

ATTACHMENT D

SEPA Checklist

WAC 197-11-960 Environmental checklist.

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. BACKGROUND

1. Name of proposed project, if applicable: **ConocoPhillips Petroleum Co., Renton Terminal**

2. Name of applicant: **Landau Associates on behalf of ConocoPhillips**
3. Address and phone number of applicant and contact person: **Martin Powers, Landau Associates, 130 2nd Avenue South, Edmonds, Washington 98020, (425) 329-0246**

4. Date checklist prepared: **1/24/03**
5. Agency requesting checklist: **Puget Sound Clean Air Agency**
6. Proposed timing or schedule (including phasing, if applicable): **Immediately**

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. **Future additions/expansion is possible depending on the extent of the release**

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. **Release Notification Report will be submitted to DOE**

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.
Do Not Know

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

Puget Sound Clean Air Agency – Air Discharge

City of Renton – Electrical

Renton Fire Department – Propane Tank Placement/Plumbing

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

A total fluids vacuum blower will be used to implement a dual phase vacuum extraction (DPVE) system to recover gasoline, water, and gasoline vapors from the subsurface. The gasoline will be recycled offsite; the groundwater will be treated by air stripping and discharged to the sanitary sewer; and the gasoline vapors will be incinerated in a mobile thermal oxidizer.

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

2423 Lind Avenue SW, Renton, WA,
Northwestern corner of intersection of 24th Street and Lind Avenue (See Attached Map)

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY

B. ENVIRONMENTAL ELEMENTS

1. **Earth**

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

b. What is the steepest slope on the site (approximate percent slope)? N/A

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

8-10 feet of gravelly sand fill overlaying silt

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

Unknown

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

N/A

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

No

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

Project will not alter impervious surface area

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

N/A

a. **Air**

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

Potential hydrocarbon vapors from liquid storage tanks

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

No

c. Proposed measures to reduce or control emissions or other impacts to air, if any: **Operation of a thermal oxidizer unit to control hydrocarbon vapors**

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY

3. **Water**

a. Surface:

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

Wetlands abut the site to the southeast and west. Tributaries to the Black River are located approximately 500 feet to the west.

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

No

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

N/A

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

No

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

Unknown

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

No

b. Ground:

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

Groundwater will be withdrawn, treated, and discharged to the sanitary sewer. Flow rate will likely be less than 10 gallons per minute.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the

number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

N/A

c. Water runoff (including stormwater):

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

N/A

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

No

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

N/A

4. **Plants**

a. Check or circle types of vegetation found on the site: **N/A**

———— deciduous tree: alder, maple, aspen, other

———— evergreen tree: fir, cedar, pine, other

———— shrubs

———— grass

———— pasture

———— crop or grain

———— wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other

———— water plants: water lily, eelgrass, milfoil, other

———— other types of vegetation

b. What kind and amount of vegetation will be removed or altered? **None**

Unknown

c. List threatened or endangered species known to be on or near the site. **None known**

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: **None**

5. **Animals**

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

birds: hawk, heron, eagle, songbirds, other: **Crows**
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other:

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

Unknown

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

Unknown

d. Proposed measures to preserve or enhance wildlife, if any: **N/A**

6. **Energy and natural resources**

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

Electric – to power blower and pumps; Propane for supplemental fuel for thermal oxidizer

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

No

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

7. **Environmental health**

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

No

1) Describe special emergency services that might be required.

N/A

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

N/A

b. **Noise**

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

N/A

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

Operation of pumps, blower and thermal oxidizer unit; Noise level from equipment expected to be less than 10 decibels at property line

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

None necessary

8. **Land and shoreline use**

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

Site is a bulk fuel terminal in an industrial area

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

Unknown

c. Describe any structures on the site.

7 aboveground storage tanks with associated underground piping and support facility buildings

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

No

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

Industrial

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

Industrial

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

N/A

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

No

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

None

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

None

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

N/A

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

N/A

9. Housing

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

N/A

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

N/A

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

N/A

10. Aesthetics

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

10 feet

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

N/A

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

N/A

11. Light and glare

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

N/A

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

No

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

None

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

N/A

12. **Recreation**

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

None known

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

No

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

N/A

13. **Historic and cultural preservation**

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

No

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

None known

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

N/A

14. **Transportation**

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

Lind Avenue SW and SW 27th Street

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

Unknown

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

N/A

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

No

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

No

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

N/A

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

N/A

15. **Public services**

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

No

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

N/A

16. **Utilities**

a. Circle utilities currently available at the site: [✓ electricity], natural gas, [✓ water], [✓ refuse service], [✓ telephone], [✓ sanitary sewer], septic system, other.

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

PG&E – Electricity
King County – Sanitary Sewer

C. SIGNATURE

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

Signature: ....

Date Submitted: ....

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

APPENDIX C

RELEASE NOTIFICATION REPORT
(LANDAU ASSOCIATES, 2/11/03)

ConocoPhillips
3977 Leary Way NW
Seattle, WA 98107

February 11, 2003

Washington State Department of Ecology
NW Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452
Attention: Toxics Cleanup Program

Re: **Release Notification Report**
Renton Terminal
Renton, WA

Dear Toxics Cleanup Program:

This letter transmits the Release Notification Report, as prepared by Landau Associates on behalf of ConocoPhillips, for the above-referenced bulk fuel distribution terminal. The report documents the discovery of a gasoline release from an above-ground storage tank as well as initial response efforts and subsequent remedial actions conducted to address this release. The report also describes plans for additional cleanup activities underway or planned for near future.

Please contact me at 206-706- 2341 should you have questions regarding this information.

Sincerely,

Tim Johnson
Site Manager
Risk Management and Remediation

Attachment

Cc: Dick Walker, Ecology NW Region
Andrew Holbrook
Bill Collins

Release Notification Report
ConocoPhillips Renton Terminal
Renton, Washington

February 11, 2003

Prepared for

ConocoPhillips Company
Renton, Washington

LANDAU
ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

PURPOSE

Landau Associates has responded to a report of a petroleum product release by the ConocoPhillips Company (ConocoPhillips; formerly Tosco Corporation) at the bulk fuel distribution terminal operated by ConocoPhillips in Renton, Washington (the site). The site is located at 2423 Lind Avenue Southwest in Renton, Washington (Figure 1). The estimated volume of product released, as determined by inventory records, was 14,800 gallons. The petroleum release was reported to the Washington State Department of Ecology (Ecology) on November 14, 2002. The purpose of this report is to notify Ecology of the details of the assessment and remedial action items completed and/or in progress in response to the release, and to outline current plans for additional assessment and remedial action activities. ConocoPhillips and Landau Associates coordinated the initial response to the release beginning on November 13, 2002. On January 17, 2003, free product was observed floating on the surface water of a nearby stormwater retention pond located near the southeastern corner of the terminal tank farm which prompted additional release response actions.

BACKGROUND

The site is a bulk petroleum fuel distribution terminal surrounded by industrial properties, public streets, and undeveloped areas (Figure 2). The petroleum products are delivered to the facility through the Olympic Pipeline, stored in aboveground tanks, and pumped to distribution tanker trucks via pipelines and a loading rack. There are currently seven large aboveground storage tanks at the site, which store leaded and unleaded gasoline, kerosene, diesel fuel, and ethanol. Each tank is surrounded by concrete walls and the entire tank area is surrounded by an earthen containment berm which provides secondary spill containment. Surface drainage in the tank area is provided by a series of gate valves in the concrete containment walls, which direct flow to a sump in the western portion of the tank area. The release notification provided to Ecology on November 14, 2002 was related to a super unleaded gasoline release from the bulk storage tank designated as Tank 2.

A previous release at the site was discovered in 1986 when petroleum-contaminated soil was encountered in the vicinity of the truck loading area. The responsible party for the release was determined to be Mobil Oil Company (currently ExxonMobil). A subsurface investigation was conducted, which revealed that contaminated groundwater and soil were present throughout the tanker truck loading area and extended south into the tank area. In addition, liquid phase hydrocarbon (LPH) floating on the groundwater table was measured up to 5.48 ft thick as recently as June 2002. In response to a consent order by Ecology (Order No. DE 87-N301), a product recovery system was constructed and began operation in November 1987. Previous consultants documented that 57,000 gallons of product were removed by the product recovery system between December 1987 and November 1993. The product recovery system was not in operation at the time this report was prepared.

RELEASE DISCOVERY AND RESPONSE

On November 13, 2002, Landau Associates was notified by ConocoPhillips of an inventory loss of super unleaded gasoline from Tank 2. The volume of the product release was estimated by ConocoPhillips to be 14,800 gallons and the exact cause has yet to be determined, although it is suspected that there was a breach in the tank floor. Based on the initial assessment activities conducted by Landau Associates, ConocoPhillips personnel reported the release to Ecology on November 14, 2002 and Landau Associates began coordinating to conduct interim action liquid phase hydrocarbon (LPH) recovery efforts and to assess the extent of impact at the site. Landau Associates personnel installed 24 postholes around the perimeter of Tank 2 to determine if LPH was present, and monitored existing wells (HA-6, -7, -8, -12, -13, -14) to determine if LPH was present. The maximum product thickness measured on November 13, 2002 was 0.25 inches in a posthole located northwest of Tank 2 and no LPH was observed in postholes located to the south, southeast, and southwest of Tank 2. The depth to water ranged from approximately 6 to 9 ft below ground surface in the existing monitoring wells. On November 14, 2002 no measurable product was observed in any of the postholes installed on the previous day. In addition to gauging for the presence of LPH, Landau Associates personnel monitored the concentration of volatile organic compounds (VOCs) in the postholes using a photoionization detector (PID). Based on the PID readings it appeared that elevated concentrations of VOCs were present in postholes located to the west, north, and northeast of Tank 2. No elevated VOC readings were observed in postholes located southeast, south, or southwest of Tank 2. Since the release discovery, ConocoPhillips pumped the remaining product in Tank 2 to other tanks and tanker trucks and Tank 2 remains empty at this time as the condition of the tank floor is assessed.

RECOVERY WELL INSTALLATION AND PRODUCT RECOVERY

On November 16, 2002, Landau Associates oversaw the installation of a horizontal total fluids recovery well (HRW-1), seven vertical total fluids recovery wells (RW-1, RW-2, RW-3, RW-4, RW-5, RW-6, and RW-7), and four horizontal vapor recovery lines (VR-1, VR-2, VR-3, and VR-4) located along the north, east and west of Tank 2 (Figure 2). No wells were installed to the south of Tank 2 because the PID readings in the postholes installed to the south of Tank 2 did not indicate the presence of VOCs, no LPH was observed in the postholes installed south of Tank 2, and because information regarding groundwater flow direction provided by the consultant (Kleinfelder Associates) working on a previous Mobil Oil Company product release, indicated that the groundwater flow direction at the site was to the north/northeast.

Each of the vertical recovery wells was constructed with 5 to 6 ft of screened interval, with approximately 1 to 3 ft of screen above the groundwater table to allow for the collection of floating LPH from the wells. Each screened interval was wrapped in a filter sock during installation. The vertical recovery wells were installed in a trench completed by Cowlitz Clean Sweep (a ConocoPhillips subcontractor) under the direction of Landau Associates personnel. Each vertical recovery well was installed to a total depth of approximately 8-9 ft below ground surface (BGS). Following the installation of the vertical recovery wells, the trenches were backfilled with gravel and excavated soil. The wells may also be utilized for vapor or groundwater recovery, as needed. Since November 20, 2002 groundwater and LPH were measured in the vertical recovery wells on a daily basis. Typically, measurements collected at the beginning of each day are considered representative of equilibrated conditions as product recovery operations were terminated nightly between 11:00 p.m. and 12:00 a.m. and the pumps were re-started the following morning. Maximum LPH thicknesses observed in the recovery wells during morning gauging events ranged as follows:

Well I.D.	Maximum Observed LPH Thickness, ft.	Date Observed
RW-1	1.20	11/22/02
RW-2	2.78	01/06/03
RW-3	1.28	11/22/02
RW-4	>2.65*	11/21/02
RW-5	0.10	11/21/02
RW-6	>2.05*	11/20/02
RW-7	>2.51*	11/21/02

Note: * = No water was detected in well.

Recovery of LPH was initiated in the product recovery wells on November 17, 2002 utilizing diaphragm pumps. The water and recovered product has been discharged into a Baker tank onsite. The Baker tank is equipped with an overflow weir to allow for the segregation of product and water, and storage of the majority of the product in a separate chamber within the tank. As of January 20, 2003, following a period when none of the original seven vertical wells had been pumped for at least 48 hours, LPH thicknesses were measured as follows:

Well I.D.	Observed LPH Thickness, ft.
RW-1	0.35
RW-2	1.59
RW-3	0.16
RW-4	0.30
RW-5	0.05
RW-6	0.63
RW-7	0.53

Groundwater elevation and LPH thickness data gathered from November 20, 2002 to January 22, 2003 is summarized in Table 1.

On January 17, 2003, LPH was discovered floating on the water surface of a stormwater retention pond located to the southeast of Tank 2. ConocoPhillips personnel contacted the Renton Fire Department and Ecology upon observing the LPH on the surface water on January 17, 2003. The Renton Fire Department conducted the initial response to the report of the LPH. Landau Associates, Emerald Petroleum Services, and ConocoPhillips personnel assisted the fire department in setting up a diaphragm pump to recover water and LPH collecting in the retention pond. In addition, Emerald Petroleum Services personnel set up a network of Venturi style blowers near the southern bank of the retention pond to abate vapor concentrations. Following the response actions conducted on the evening of January 17, 2003, ConocoPhillips, Landau Associates, and Emerald Petroleum Services personnel returned to the retention pond area on January 18, 2003 and completed the following activities:

- Further assessed the source of LPH flowing to the retention pond by hand digging small test pits on the western portion of the ditch leading to the retention pond.
- Installed a sandbag dam at the eastern end of the ditch leading to the retention pond to decrease the potential for LPH to continue to flow to the retention pond.
- Dug a deeper collection sump on the western side of the sandbag dam to increase the amount of fluids that could be recovered by the diaphragm pump.

On January 20 and 21, 2003, Landau Associates personnel oversaw the installation of six additional vertical total fluids recovery wells (LAI-4, 5, 6, 7, 8, and 9) to the south-southeast of Tank 2. The six vertical total fluids recovery wells were installed by Cascade Drilling using hollow-stem auger drilling methods and a limited access drill rig. Diaphragm pumps were used to recover product and water from the new wells beginning on January 20, 2003. Well construction logs for LAI-4 through LAI-9 are included in Appendix A.

PRODUCT VOLUME REMOVAL

The water and recovered product from the Tank 2 area is discharged into two Baker tanks located onsite. As of January 17, 2003 the volume of recovered LPH measured in the Baker tank was approximately 3,000 gallons. The LPH was removed for disposal using a vacuum truck supplied by Emerald Petroleum Services and was disposed at the Ferndale Refinery located near Anacortes, Washington. In addition to the LPH, Emerald Petroleum Services removed approximately 13,000 gallons of water from the Baker tank as of January 22, 2003. Bills of lading are provided by Emerald Petroleum Services are included in Appendix C. In addition to the water disposed by Emerald Petroleum Services, approximately 16,500 gallons of water has been drained from the Baker tank by ConocoPhillips personnel and discharged to an underground vault near the loading rack for ultimate treatment by the existing water treatment system and discharge to the sanitary sewer under the limitations of King County Wastewater Discharge Authorization No. 261-02. ConocoPhillips operates the water treatment system under an industrial watewater permit and the system is not associated with a groundwater treatment system operated at the site by Kleinfelder on behalf of ExxonMobil. Prior to the commencement of discharge of water from the Baker tank to the industrial wastewater treatment system, a permit variance was received from King County to discharge up to 5,000 gallons per day under the existing authorization. On December 30, 2002, Landau Associates personnel collected a grab sample (BK-1) of the water in the Baker tank to characterize the water for discharge. The grab sample was analyzed for gasoline range total petroleum hydrocarbons (TPH-G) using NWTPH-Gx method and benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8021B. The analytical results for BK-1 are presented in Table 2. The analytical results indicate that the water sample contained a TPH-G concentration of 342 milligrams per liter (mg/L). Assuming that BK-1 is representative of all of the water discharged from the Baker tank as of January 22, 2003 (29,500 gallons) and assuming that the specific gravity of gasoline is 0.75, a total of 3,013 gallons (13 gallons dissolved phase and 3,000 gallons LPH) of gasoline were removed and disposed of as of January 22, 2003. The analytical report for BK-1 is included in Appendix D.

GROUNDWATER ASSESSMENT

On November 23 and 24, 2002, Landau Associates conducted a baseline groundwater sampling event at the site following the release from Tank 2. Prior to November 2002, groundwater sampling and monitoring events were most recently conducted on June 4-6, 2002 by Kleinfelder Associates as part of an ongoing remedial effort being conducted to address a historical release that has created a floating layer of LPH in the vicinity of the loading rack at the site (Kleinfelder Associates 2002). Immediately following the November 24, 2002 sampling event, Landau Associates personnel oversaw the installation of five 2-inch diameter monitoring wells (HA-15, 16, 17, 18, and 20) using hand auger methods. The five monitoring wells were installed to further delineate LPH and baseline groundwater conditions at the site. LPH was subsequently detected in HAI-16 and HAI-20, and diaphragm pumps were used to recover LPH from these wells. Due to the detection of a significant thickness (>3 ft) of LPH in HA-20, three additional 4-inch diameter monitoring/recovery wells were installed on January 3, 2003, to the southwest (LAI-1), south (LAI-2), and southeast (LAI-3) of HA-20 to attempt to further delineate LPH near Tank 2. As of January 22, 2003, LPH was not detected in LAI-1, 2, or 3. Well logs for HA-15, 16, 17, and 20, and LAI-1, 2, and 3 are included in Appendix A.

GROUNDWATER ELEVATIONS

On November 23 and 24, 2002, LPH was detected in two (B-3 and W-4) of 37 wells measured and ranged from 0.01 ft in W-4 to 2.63 ft in B-3. The depth to groundwater ranged from 5.71 ft below the top of casing (BTOC) in HA-1 to 10.81 ft BTOC in B-3. Groundwater elevation and LPH data collected on November 23 and 24, 2002 are included in Table 1. The groundwater elevation data are also presented on Figure 3, along with groundwater potentiometric contours. The November 23 and 24, 2002 data indicate an overall groundwater flow direction to the northeast from the tank farm area. There are local variations in the groundwater flow direction, which may be caused by groundwater recharge areas in the vicinity. As of the date this report was prepared, a site wide groundwater gauging event (including wells installed since November 14, 2002) has not been completed to prepare an updated groundwater potentiometric map.

GROUNDWATER ANALYTICAL RESULTS

On November 25 and 26, 2002, after purging a minimum of three casing volumes from each of the monitoring wells which did not exhibit LPH, groundwater samples were collected using a peristaltic pump with dedicated polyethylene tubing. Groundwater samples were collected in laboratory-supplied sample containers and stored in a sample cooler for analysis of BTEX using EPA Method 8021B, TPH-G using NWTPH-Gx Method, and diesel-range total petroleum hydrocarbons (TPH-D) using NWTPH-Dx Method. A duplicate sample was collected from HA-5 and designated as HA-5-021122. A duplicate sample was also collected from B-6 and designated as B-17. The duplicate samples were analyzed for BTEX, TPH-G and TPH-D for quality assurance/quality control purposes. In addition to the groundwater samples, LPH samples were collected from wells B-3, RW-1, RW-4, and RW-7 for hydrocarbon identification analysis using Method NWTPH-HCID. The sample containers were packed in ice in the sample coolers and sent to North Creek Analytical (NCA) in Bothell, Washington by courier with a completed chain-of-custody form enclosed in the cooler.

The analytical results from the November 25 and 26, 2002 groundwater monitoring event are listed in Table 2. The dissolved phase TPH-G and benzene concentrations are shown in a table included in Figure 2. The purpose of the groundwater sampling was to evaluate the impact of the release reported in November 2002 as compared to prior conditions (June 2002) and to allow future evaluation of the effectiveness of the product recovery system in reducing the LPH and the dissolved-phase hydrocarbon concentrations at the site.

Analytical results from the November 2002 groundwater sampling event indicate that TPH-G concentrations in the tank area ranged from below detection limit in HA-13 to 25,600 micrograms per liter (ug/L) in HA-6. Benzene concentrations in the tank area ranged from 0.957 ug/L in HA-12 to 811 ug/L in HA-7. In the majority of the wells, these results indicate a decrease in concentrations when compared with the results of the previous groundwater sampling event in June 2002. The November 2002 analytical results appear to indicate a distinction in groundwater impacts from Tank 2 and the historical Mobil Oil Company release at the site. Laboratory groundwater analytical data reports are provided in Appendix C.

Groundwater samples were collected from a select group of eight monitoring wells (HA-5, HA-7, HA-8, HA-15, HA-18, LAI-1, LAI-2, and LAI-3) on January 14 and 15, 2003 and were analyzed for BTEX and TPH-G. The analytical results from the January 14-15, 2003 sampling event are included in Table 2.

FUTURE PLANNED ACTIVITIES

A dual phase vacuum extraction (DPVE) component will be added to the current system to remove LPH and impacted groundwater, intercept the groundwater and LPH prior to the liquids seeping into the retention pond, and volatilize LPH floating on the groundwater table. The liquids recovered will be transferred to a Baker tank for phase separation and disposal and the recovered vapors will be routed to a thermal oxidizer for treatment prior to atmospheric discharge. It is planned that the remedial system will continue to be operated, monitored, and maintained for some time in the future. Appropriate remedial target levels can be established following additional data collection and analysis.

In addition to the remedial activities, the following assessment activities are currently underway:

- On January 29 and 30, 2003, Landau Associates oversaw Cascade Drilling in the installation of seven additional monitoring wells (LAI-10 through LAI-16) to the southwest of Tank 2 (LAI-10, 11, and 12), to the west of Tank 2 (LAI-13, 14, and 15), and southeast of Tank 2 and south of Southwest 27th Street (LAI-16) to further assess potential impacts. These wells will be included in future groundwater gauging and sampling events.

- On January 28, 2003, Landau Associates began monitoring and recording VOC concentrations present near the stormwater retention pond and in the storm sewer catchbasins located on the north side of Southwest 27th Street.
- On January 31, 2003, Landau Associates began collecting weekly groundwater samples from select wells located near Tank 2 to measure and record headspace concentrations. The additional assessment data collected will be summarized in future reports to Ecology.

USE OF THIS REPORT

This release notification report has been prepared for the exclusive use of ConocoPhillips Company for specific application to the ConocoPhillips Renton Terminal. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Martin

Martin T. Powers, P.E.
Senior Engineer

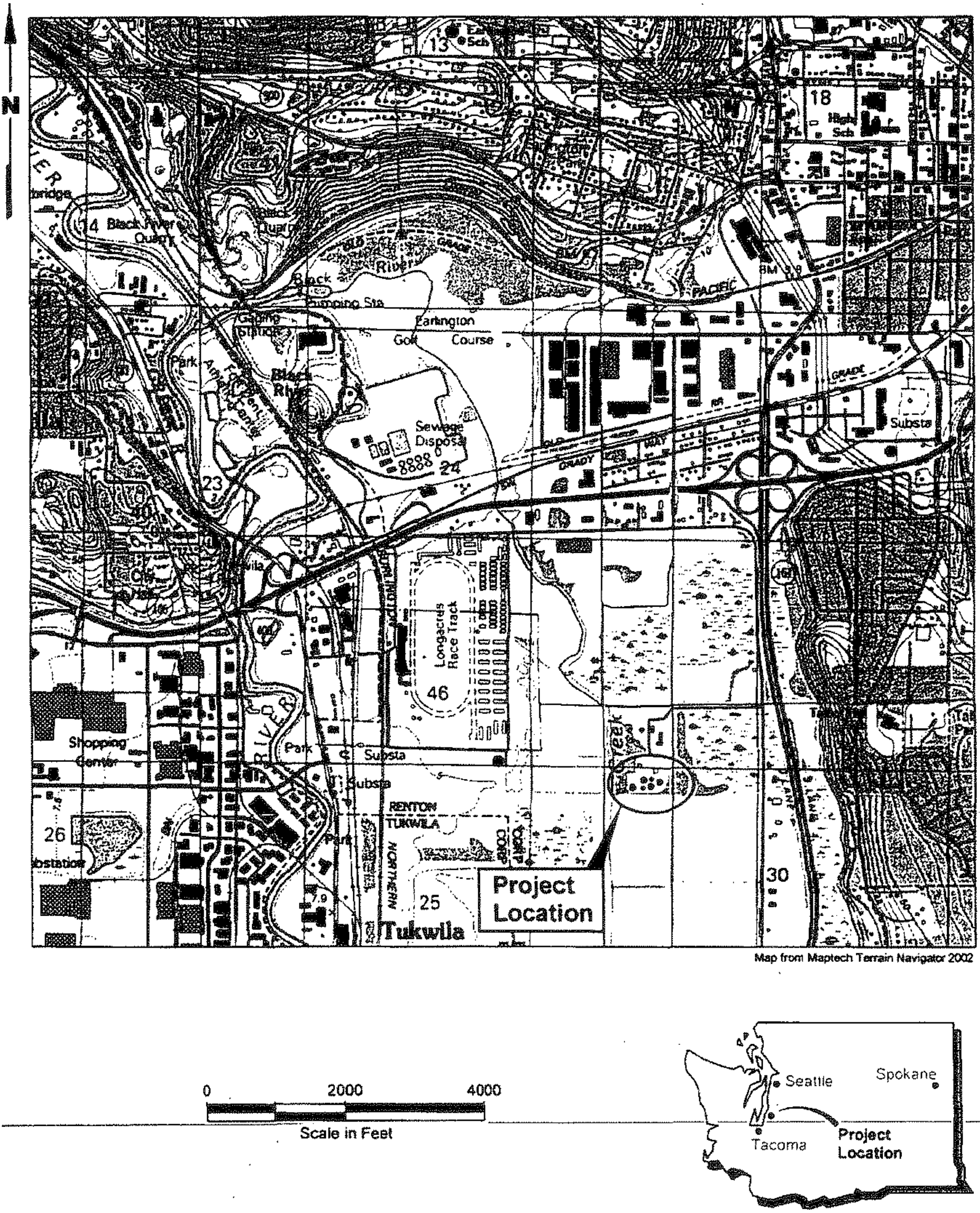
MTP/rgm

37603
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 09/29/03

REFERENCES

Remediation Technologies. 1994. *Environmental Baseline Assessment, Tosco Northwest Company, Pacific Northwest Marketing Properties, Acquired from BP Exploration and Oil, Inc., Renton Terminal.* Prepared for Tosco Northwest Company. May.

Kleinfelder. 2002. *2002 Groundwater Monitoring Report, Former Mobil Oil Renton Terminal (Site #46-080), 2423 Lind Avenue Southwest, Renton, Washington.* Prepared for Exxon Mobil Corporation. July 1.



Map from Maptech Terrain Navigator 2002

Tosco-Renton\Release Report & Air Permit | T:\706\002\012\Release Rpt & Air Permit-Final\Fig1.dwg (A) "Figure 1" 2/11/2003

LANDAU ASSOCIATES

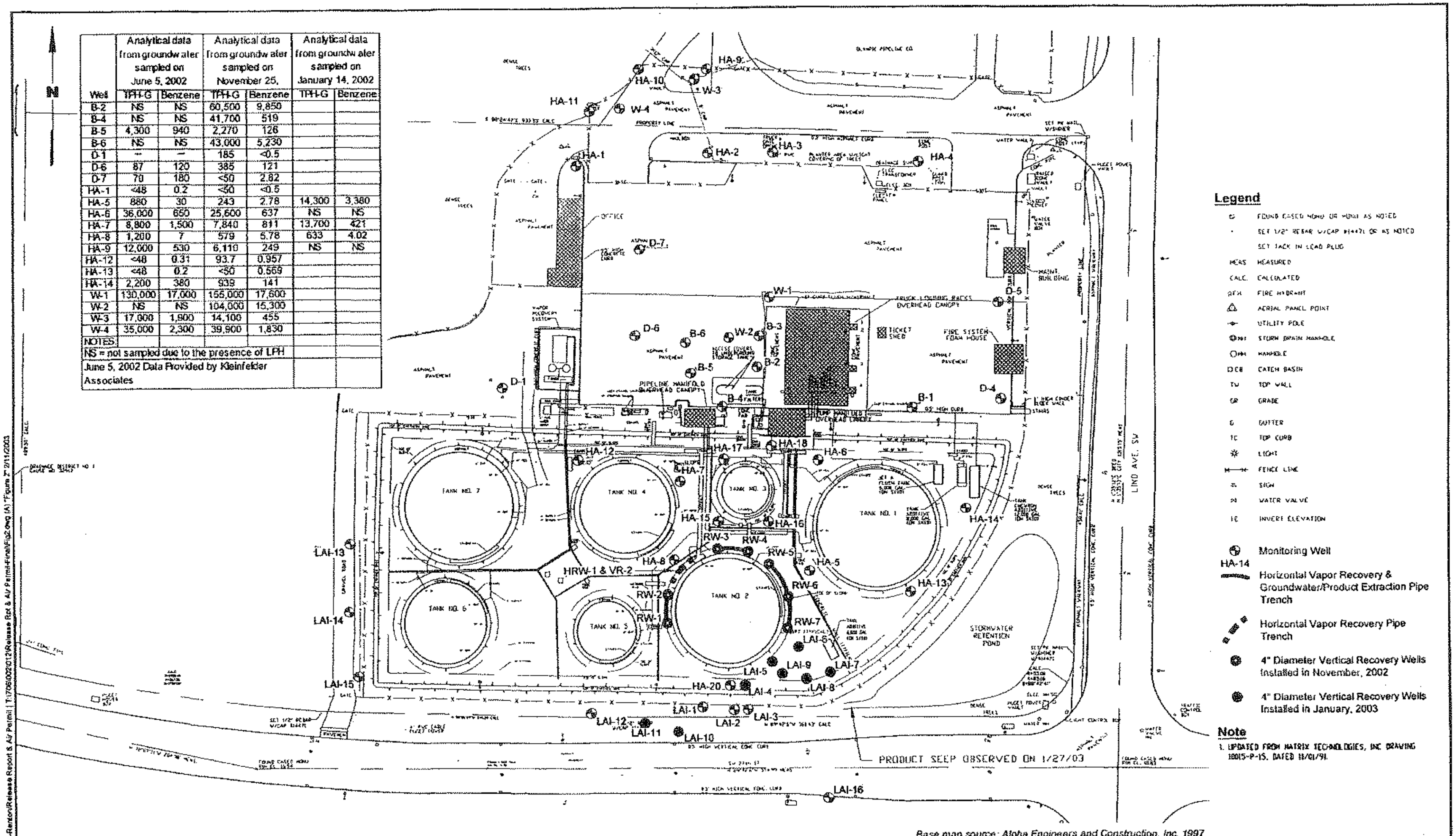
ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Vicinity Map

Figure
1

Tosco-Renton/Release Report & Air Permit | T:\706\002\012\Release Rpt & Air Permit-Final\Fig2.dwg (A) "Figure 2" 2/11/2003

Well	Analytical data from groundwater sampled on June 5, 2002		Analytical data from groundwater sampled on November 25,		Analytical data from groundwater sampled on January 14, 2002	
	TPH-G	Benzene	TPH-G	Benzene	TPH-G	Benzene
B-2	NS	NS	60,500	9,850		
B-4	NS	NS	41,700	519		
B-5	4,300	940	2,270	126		
B-6	NS	NS	43,000	5,230		
D-1	--	--	185	<0.5		
D-6	87	120	385	121		
D-7	70	180	<50	2.82		
HA-1	<48	0.2	<50	<0.5		
HA-5	880	30	243	2.78	14,300	3,380
HA-6	36,000	650	25,600	637	NS	NS
HA-7	8,800	1,500	7,840	811	13,700	421
HA-8	1,200	7	579	5.78	633	4.02
HA-9	12,000	530	6,110	249	NS	NS
HA-12	<48	0.31	93.7	0.957		
HA-13	<48	0.2	<50	0.569		
HA-14	2,200	380	939	141		
W-1	130,000	17,000	155,000	17,600		
W-2	NS	NS	104,000	15,300		
W-3	17,000	1,900	14,100	455		
W-4	35,000	2,300	39,900	1,830		
NOTES:						
NS = not sampled due to the presence of LPH						
June 5, 2002 Data Provided by Kleinfelder Associates						



Base map source: Alpha Engineers and Construction, Inc. 1997

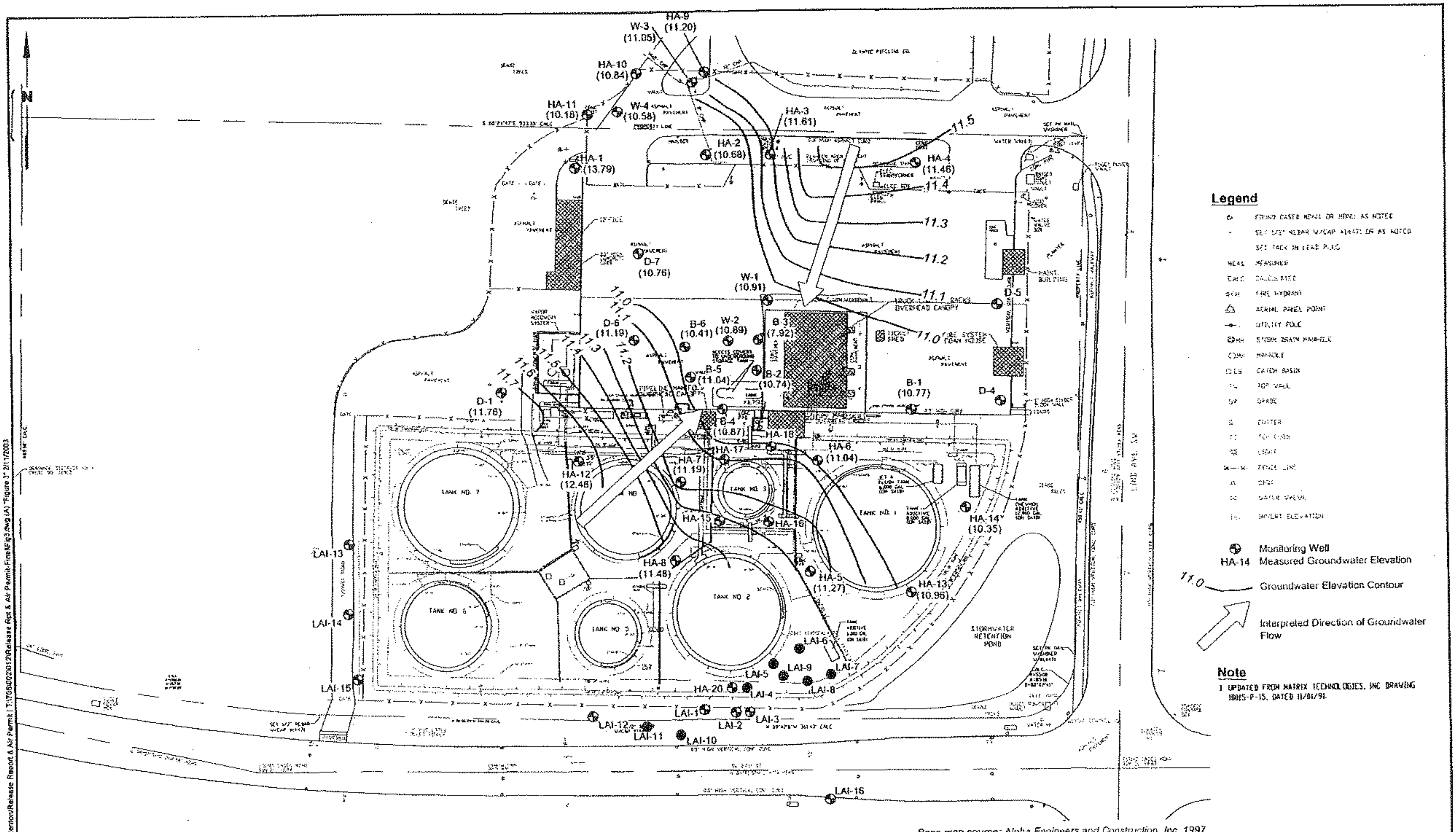
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Site Map with Analytical Data

Figure
2

Tosco-Renton/Release Report & Air Permit | T:\706\002\012\Release Rpt & Air Permit-Final\Fig3.dwg (A) "Figure 3" 2/11/2003



Base map source: Alpha Engineers and Construction, Inc. 1997

LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Potentiometric Surface Map
November 24, 2002

Figure
3

TABLE 1
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL
2423 LIND AVENUE SW
RENTON, WASHINGTON

Well Identification	Date	Top of Casing Elevation, ft (a)(b)	Depth to Free Product, ft	Elevation of Free Product, ft	Product Thickness, ft	Depth to Groundwater, ft	Groundwater Elevation, ft
B-1	11/24/02	18.62	N/A	N/A	N/A	7.85	10.77
B-2	11/24/02	18.60	N/A	N/A	N/A	7.86	10.74
B-3	11/24/02	18.73	8.18	10.55	2.63	10.81	7.92
B-4	11/24/02	18.09	N/A	N/A	N/A	7.22	10.87
B-5	11/24/02	17.97	N/A	N/A	N/A	6.93	11.04
B-6	11/24/02	17.94	N/A	N/A	N/A	7.53	10.41
D-1	11/24/02	18.03	N/A	N/A	N/A	6.27	11.76
D-2	11/24/02	19.14	NG	NG	NG	NG	NG
D-4	11/24/02	17.82	NG	NG	NG	NG	NG
D-5	11/24/02	18.12	N/A	N/A	N/A	DRY	DRY
D-6	11/24/02	17.74	N/A	N/A	N/A	6.55	11.19
D-7	11/24/02	17.69	N/A	N/A	N/A	6.93	10.76
HA-1	11/24/02	19.50	N/A	N/A	N/A	5.71	13.79
HA-2	11/24/02	18.17	N/A	N/A	N/A	7.49	10.68
HA-3	11/24/02	21.03	N/A	N/A	N/A	9.42	11.61
HA-4	11/24/02	20.24	N/A	N/A	N/A	8.78	11.46
HA-5	11/24/02	18.07	N/A	N/A	N/A	6.80	11.27
HA-6	11/24/02	18.16	N/A	N/A	N/A	7.12	11.04
HA-7	11/24/02	18.44	N/A	N/A	N/A	7.25	11.19
HA-8	11/24/02	18.88	N/A	N/A	N/A	7.40	11.48
HA-9	11/24/02	19.40	N/A	N/A	N/A	8.20	11.20
HA-10	11/24/02	19.33	N/A	N/A	N/A	8.49	10.84
HA-11	11/24/02	18.51	N/A	N/A	N/A	8.33	10.18
HA-12	11/24/02	19.91	N/A	N/A	N/A	7.43	12.48
HA-13	11/24/02	19.56	N/A	N/A	N/A	8.60	10.96
HA-14	11/24/02	20.02	N/A	N/A	N/A	9.67	10.35
R-1	11/24/02	16.94	N/A	N/A	N/A	5.90	11.04
R-2	11/24/02	17.52	N/A	N/A	N/A	6.69	10.83
W-1	11/24/02	18.86	N/A	N/A	N/A	7.95	10.91
W-2	11/24/02	18.28	N/A	N/A	N/A	7.39	10.89
W-3	11/24/02	17.10	N/A	N/A	N/A	6.05	11.05
W-4	11/24/02	18.03	7.44	10.59	0.01	7.45	10.58
RW-1	11/20/02	21.68	8.25	13.43	0.95	9.2	12.48
RW-1	11/21/02	21.68	8.25	13.43	1.15	9.4	12.28
RW-1	11/22/02	21.68	8.22	13.46	1.20	9.42	12.26
RW-1	11/24/02	21.68	8.35	13.33	1.06	9.41	12.27
RW-1	01/02/03	21.68	5.61	16.07	0.21	5.82	15.86
RW-1	01/03/03	21.68	5.51	16.17	0.21	5.72	15.96
RW-1	01/06/03	21.68	5.35	16.33	0.29	5.64	16.04
RW-1	01/07/03	21.68	5.68	16.00	0.28	5.96	15.72
RW-1	01/08/03	21.68	5.95	15.73	0.28	6.23	15.45
RW-1	01/09/03	21.68	6.03	15.65	0.29	6.32	15.36
RW-1	01/10/03	21.68	6.20	15.48	0.30	6.5	15.18
RW-1	01/13/03	21.68	6.00	15.68	0.32	6.32	15.36
RW-1	01/14/03	21.68	5.72	15.96	0.73	6.45	15.23
RW-1	01/15/03	21.68	5.99	15.69	0.19	6.18	15.50
RW-1	01/16/03	21.68	6.10	15.58	0.30	6.4	15.28
RW-1	01/17/03	21.68	6.15	15.53	0.30	6.45	15.23
RW-1	01/20/03	21.68	6.34	15.34	0.35	6.69	14.99
RW-1	01/22/03	21.68	5.60	16.08	0.29	5.89	15.79
RW-2	11/20/02	21.49	8.05	13.44	1.35	9.4	12.09
RW-2	11/21/02	21.49	8.00	13.49	1.40	9.4	12.09

TABLE 1
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL
2423 LIND AVENUE SW
RENTON, WASHINGTON

Well Identification	Date	Top of Casing Elevation, ft (a)(b)	Depth to Free Product, ft	Elevation of Free Product, ft	Product Thickness, ft	Depth to Groundwater, ft	Groundwater Elevation, ft
RW-2	11/22/02	21.49	8.00	13.49	1.41	9.41	12.08
RW-2	11/24/02	21.49	8.21	13.28	1.49	9.70	11.79
RW-2	01/02/03	21.49	6.11	15.38	2.27	8.38	13.11
RW-2	01/06/03	21.49	5.40	16.09	2.78	8.18	13.31
RW-2	01/07/03	21.49	6.41	15.08	0.54	6.95	14.54
RW-2	01/08/03	21.49	7.67	13.82	0.01	7.68	13.81
RW-2	01/09/03	21.49	8.72	12.77	0.01	8.73	12.76
RW-2	01/10/03	21.49	6.38	15.11	0.54	6.92	14.57
RW-2	01/13/03	21.49	8.42	13.07	0.10	8.52	12.97
RW-2	01/14/03	21.49	6.17	15.32	1.32	7.49	14.00
RW-2	01/15/03	21.49	5.95	15.54	0.85	6.80	14.69
RW-2	01/16/03	21.49	6.51	14.98	1.00	7.51	13.98
RW-2	01/17/03	21.49	6.40	15.09	1.12	7.52	13.97
RW-2	01/20/03	21.49	6.35	15.14	1.59	7.94	13.55
RW-2	01/22/03	21.49	5.86	15.63	2.74	8.60	12.89
RW-3	11/20/02	20.00	8.45	11.55	0.80	9.25	10.75
RW-3	11/21/02	20.00	8.27	11.73	1.20	9.47	10.53
RW-3	11/22/02	20.00	8.18	11.82	1.28	9.46	10.54
RW-3	11/24/02	20.00	7.94	12.06	1.68	9.62	10.38
RW-3	01/02/03	20.00	6.52	13.48	0.04	6.56	13.44
RW-3	01/03/03	20.00	6.38	13.62	0.23	6.61	13.39
RW-3	01/06/03	20.00	5.92	14.08	0.03	5.95	14.05
RW-3	01/07/03	20.00	5.81	14.19	0.04	5.85	14.15
RW-3	01/08/03	20.00	5.74	14.26	0.05	5.79	14.21
RW-3	01/09/03	20.00	5.78	14.22	0.05	5.83	14.17
RW-3	01/10/03	20.00	5.88	14.12	0.05	5.93	14.07
RW-3	01/13/03	20.00	6.02	13.98	0.08	6.10	13.90
RW-3	01/14/03	20.00	5.97	14.03	0.09	6.06	13.94
RW-3	01/15/03	20.00	5.87	14.13	0.12	5.99	14.01
RW-3	01/16/03	20.00	5.89	14.11	0.09	5.98	14.02
RW-3	01/17/03	20.00	5.85	14.15	0.07	5.92	14.08
RW-3	01/20/03	20.00	5.98	14.02	0.13	6.11	13.89
RW-3	01/22/03	20.00	5.91	14.09	0.09	6.00	14.00
RW-4	11/20/02	19.92	7.50	12.42	2.64	10.14	9.78
RW-4	11/21/02	19.92	7.50	12.42	2.64	10.14	9.78
RW-4	11/22/02	19.92	8.37	11.55	0.77	9.14	10.78
RW-4	11/24/02	19.92	7.57	12.35	2.52	10.09	9.83
RW-4	01/03/03	19.92	6.31	13.61	0.50	6.81	13.11
RW-4	01/06/03	19.92	6.02	13.90	0.04	6.06	13.86
RW-4	01/07/03	19.92	5.74	14.18	0.18	5.92	14.00
RW-4	01/08/03	19.92	5.67	14.25	0.14	5.81	14.11
RW-4	01/09/03	19.92	5.67	14.25	0.19	5.86	14.06
RW-4	01/10/03	19.92	5.76	14.16	0.25	6.01	13.91
RW-4	01/13/03	19.92	5.80	14.12	0.35	6.15	13.77
RW-4	01/14/03	19.92	5.85	14.07	0.29	6.14	13.78
RW-4	01/15/03	19.92	5.05	14.87	1.80	6.85	13.07
RW-4	01/16/03	19.92	5.78	14.14	0.27	6.05	13.87
RW-4	01/17/03	19.92	5.72	14.20	0.27	5.99	13.93
RW-4	01/20/03	19.92	5.84	14.08	0.30	6.14	13.78
RW-4	01/22/03	19.92	5.82	14.10	0.34	6.16	13.76
RW-5	11/20/02	20.64	8.65	11.99	0.02	8.67	11.97
RW-5	11/21/02	20.64	8.30	12.34	0.10	8.4	12.24

TABLE 1
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL
2423 LIND AVENUE SW
RENTON, WASHINGTON

Well Identification	Date	Top of Casing Elevation, ft (a)(b)	Depth to Free Product, ft	Elevation of Free Product, ft	Product Thickness, ft	Depth to Groundwater, ft	Groundwater Elevation, ft
RW-5	11/22/02	20.64	8.46	12.18	0.06	8.52	12.12
RW-5	11/24/02	20.64	8.63	12.01	0.28	8.91	11.73
RW-5	01/02/03	20.64	6.87	13.77	0.04	6.91	13.73
RW-5	01/03/03	20.64	6.77	13.87	0.03	6.8	13.84
RW-5	01/06/03	20.64	6.46	14.18	0.04	6.5	14.14
RW-5	01/07/03	20.64	6.36	14.28	0.06	6.42	14.22
RW-5	01/08/03	20.64	6.13	14.51	0.03	6.16	14.48
RW-5	01/09/03	20.64	6.25	14.39	0.03	6.28	14.36
RW-5	01/10/03	20.64	6.43	14.21	0.04	6.47	14.17
RW-5	01/13/03	20.64	6.48	14.16	0.03	6.51	14.13
RW-5	01/14/03	20.64	6.44	14.20	0.05	6.49	14.15
RW-5	01/15/03	20.64	6.37	14.27	0.04	6.41	14.23
RW-5	01/16/03	20.64	6.40	14.24	0.02	6.42	14.22
RW-5	01/17/03	20.64	6.37	14.27	0.04	6.41	14.23
RW-5	01/20/03	20.64	6.57	14.07	0.05	6.62	14.02
RW-5	01/22/03	20.64	6.60	14.04	0.08	6.68	13.96
RW-6	11/20/02	20.34	8.05	12.29	2.05	10.1	10.24
RW-6	11/21/02	20.34	8.40	11.94	0.15	8.55	11.79
RW-6	11/22/02	20.34	8.45	11.89	0.24	8.69	11.65
RW-6	11/24/02	20.34	8.65	11.69	0.33	8.98	11.36
RW-6	01/02/03	20.34	6.70	13.64	0.87	7.57	12.77
RW-6	01/07/03	20.34	6.50	13.84	0.26	6.76	13.58
RW-6	01/08/03	20.34	6.09	14.25	0.51	6.6	13.74
RW-6	01/09/03	20.34	6.28	14.06	0.38	6.66	13.68
RW-6	01/10/03	20.34	6.42	13.92	0.23	6.65	13.69
RW-6	01/13/03	20.34	8.16	12.18	0.07	8.23	12.11
RW-6	01/14/03	20.34	6.73	13.61	0.20	6.93	13.41
RW-6	01/15/03	20.34	6.30	14.04	0.60	6.90	13.44
RW-6	01/16/03	20.34	6.28	14.06	0.65	6.93	13.41
RW-6	01/17/03	20.34	6.99	13.35	-0.70	6.29	14.05
RW-6	01/20/03	20.34	6.31	14.03	0.63	6.94	13.40
RW-6	01/22/03	20.34	6.41	13.93	0.75	7.16	13.18
RW-7	11/20/02	19.95	7.65	12.30	2.46	10.11	9.84
RW-7	11/21/02	19.95	7.60	12.35	2.51	10.11	9.84
RW-7	11/22/02	19.95	8.03	11.92	1.75	9.78	10.17
RW-7	11/24/02	19.95	8.23	11.72	1.26	9.49	10.46
RW-7	01/02/03	19.95	6.44	13.51	0.40	6.84	13.11
RW-7	01/03/03	19.95	6.28	13.67	0.40	6.68	13.27
RW-7	01/06/03	19.95	5.93	14.02	0.12	6.05	13.90
RW-7	01/07/03	19.95	5.84	14.11	0.20	6.04	13.91
RW-7	01/08/03	19.95	5.66	14.29	0.20	5.86	14.09
RW-7	01/09/03	19.95	5.72	14.23	0.33	6.05	13.90
RW-7	01/10/03	19.95	5.90	14.05	0.25	6.15	13.80
RW-7	01/13/03	19.95	5.98	13.97	0.37	6.35	13.60
RW-7	01/14/03	19.95	5.97	13.98	0.27	6.24	13.71
RW-7	01/15/03	19.95	5.95	14.00	0.30	6.25	13.70
RW-7	01/16/03	19.95	5.84	14.11	0.41	6.25	13.70
RW-7	01/17/03	19.95	5.85	14.10	0.35	6.20	13.75
RW-7	01/20/03	19.95	6.02	13.93	0.53	6.55	13.40
RW-7	01/22/03	19.95	6.11	13.84	0.80	6.91	13.04
HA-16	12/05/02	19.01	7.60	11.41	0.05	7.65	11.36
HA-16	12/11/02	19.01	7.40	11.61	0.68	8.08	10.93

TABLE 1
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL
2423 LIND AVENUE SW
RENTON, WASHINGTON

Well Identification	Date	Top of Casing Elevation, ft (a)(b)	Depth to Free Product, ft	Elevation of Free Product, ft	Product Thickness, ft	Depth to Groundwater, ft	Groundwater Elevation, ft
HA-16	12/13/02	19.01	7.33	11.68	0.96	8.29	10.72
HA-16	12/17/02	19.01	6.67	12.34	1.54	8.21	10.80
HA-16	01/02/03	19.01	5.60	13.41	0.22	5.82	13.19
HA-16	01/06/03	19.01	5.08	13.93	0.02	5.1	13.91
HA-16	01/07/03	19.01	5.05	13.96	0.02	5.07	13.94
HA-16	01/08/03	19.01	4.95	14.06	0.03	4.98	14.03
HA-16	01/09/03	19.01	4.92	14.09	0.02	4.94	14.07
HA-16	01/10/03	19.01	4.94	14.07	0.02	4.96	14.05
HA-16	01/14/03	19.01	9.09	9.92	-3.97	5.12	13.89
HA-16	01/15/03	19.01	5.00	14.01	0.05	5.05	13.96
HA-16	01/16/03	19.01	4.92	14.09	0.04	4.96	14.05
HA-16	01/17/03	19.01	4.95	14.06	0.02	4.97	14.04
HA-16	01/20/03	19.01	4.98	14.03	0.04	5.02	13.99
HA-20	11/27/02	17.46	6.46	11.00	3.51	9.97	7.49
HA-20	12/05/02	17.46	6.25	11.21	3.57	9.82	7.64
HA-20	12/11/02	17.46	6.25	11.21	3.48	9.73	7.73
HA-20	12/13/02	17.46	6.12	11.34	3.55	9.67	7.79
HA-20	12/17/02	17.46	5.29	12.17	4.20	9.49	7.97
HA-20	01/03/03	17.46	3.26	14.20	4.39	7.65	9.81
HA-20	01/06/03	17.46	3.83	13.63	3.10	6.93	10.53
HA-20	01/07/03	17.46	4.45	13.01	1.16	5.61	11.85
HA-20	01/08/03	17.46	4.22	13.24	1.57	5.79	11.67
HA-20	01/09/03	17.46	3.97	13.49	3.11	7.08	10.38
HA-20	01/10/03	17.46	4.04	13.42	3.24	7.28	10.18
HA-20	01/13/03	17.46	9.75	7.71	-4.08	5.67	11.79
HA-20	01/14/03	17.46	4.15	13.31	3.47	7.62	9.84
HA-20	01/15/03	17.46	4.05	13.41	3.10	7.15	10.31
HA-20	01/16/03	17.45	4.15	13.31	2.90	7.05	10.41
HA-20	01/17/03	17.46	4.18	13.28	2.82	7.00	10.46
HA-20	01/20/03	17.46	4.15	13.31	3.09	7.24	10.22
HA-20	01/22/03	17.46	3.30	14.16	6.50	9.80	7.66

(a) Top of Casing Elevation values are not related to Mean Sea Level (MSL) elevations.

(b) All well elevation data provided for wells RW-1 through RW-7, HA-16, and HA-20 collected by Landau Associates relative to well HA-5. All other well elevation data derived from Kleinfelder Associates.

N/A = Not applicable; free product not detected.

NG = Not gauged.

NM = Not measured.

– = Data not available, well elevation unknown.

TABLE 2
GROUNDWATER ANALYTICAL DATA SUMMARY
CONOCOPHILLIPS CORPORATION RENTON TERMINAL
2423 LIND AVENUE SW
RENTON, WASHINGTON

Well Identification	Date Sampled	TPH-G (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)
B-2	5-Jun-02	NS	NS	NS	NS	NS
	24-Nov-02	60,500	9850	1780	1280	9220
B-4	5-Jun-02	NS	NS	NS	NS	NS
	24-Nov-02	41,700	519	295	2180	10500
B-5	5-Jun-02	4,300	940	23	230	560
	24-Nov-02	2,270	126	4.31	37.4	67.4
B-6	5-Jun-02	NS	NS	NS	NS	NS
	24-Nov-02	43,000	5230	5410	525	5460
D-1	5-Jun-02	--	--	--	--	—
	24-Nov-02	185	<0.5	1.12	<0.5	2.16
D-6	5-Jun-02	87	120	9.6	2.3	5.8
	24-Nov-02	385	121	10.7	1.2	5.59
D-7	5-Jun-02	70	180	6.7	.72J	8.1
	24-Nov-02	<50	2.82	0.614	<0.5	1.12
HA-1	5-Jun-02	<48	<0.2	.35J	<0.2	<0.6
	24-Nov-02	<50	<0.5	<0.5	<0.5	<1.0
HA-5	5-Jun-02	880	30	5.3	140	16
	24-Nov-02	243	2.78	1.51	<0.5	3.81
	14-Jan-03	14,300	3380	2870	43.6	151
HA-6	5-Jun-02	36,000	650	210	1700	7100
	24-Nov-02	25,600	637	181	1320	5620
HA-7	5-Jun-02	8,800	1500	73	760	1000
	24-Nov-02	7,840	811	41.1	402	580
	14-Jan-03	13,700	421	56.2	261	2,350
HA-8	5-Jun-02	1,200	6.8	4.4	31	160
	24-Nov-02	579	5.78	16.9	12.6	57.8
	14-Jan-03	633	4.02	16.5	16.3	207
HA-9	5-Jun-02	12,000	530	13	810	910
	24-Nov-02	6,110	249	3.55	349	187
HA-12	5-Jun-02	<48	0.31J	<0.2	<0.2	<0.6
	24-Nov-02	93.7	0.957	3.85	1.52	10.8
HA-13	5-Jun-02	<48	<0.2	<0.2	<0.2	<0.6
	24-Nov-02	<50	0.569	1.8	0.667	5.74
HA-14	5-Jun-02	2,200	380	16	470	32
	24-Nov-02	939	141	15.7	169	48.1
HA-15	14-Jan-03	344	3.34	0.672	<0.5	2.51
HA-17	14-Jan-03	548	10.2	<1.25	1.55	2.61
HA-18	14-Jan-03	11,400	40.3	75.9	810	2,220
W-1	5-Jun-02	130,000	17000	27000	2700	19000
	24-Nov-02	155,000	17600	24800	2950	19500
W-2	5-Jun-02	NS	NS	NS	NS	NS
	24-Nov-02	104,000	15300	15800	1960	11700
W-3	5-Jun-02	17,000	1900	45	640	2300
	24-Nov-02	14,100	455	156	463	1570
W-4	5-Jun-02	35,000	2300	32	1800	3500
	24-Nov-02	39,900	1830	38.2	2550	4220
LAI-1	15-Jan-03	4,120	728	935	22.8	120
LAI-2	15-Jan-03	72.6	2.78	2.20	1.10	9.33
LAI-3	15-Jan-03	66.6	<0.5	3.19	1.36	8.45
LAI-12 (duplicate of LAI-2)	15-Jan-03	103	3.39	3.36	1.68	15.1

NS = Not sampled.

DET = Analyte identified as present above the indicated concentration using the NWHCID analytical method.

-- = *Data not available.*

ND = Analyte not detected above the indicated concentration.

NA = Not analyzed.

TPH-G = Gasoline-range total petroleum hydrocarbons.

µg/L = micrograms per liter

APPENDIX A

Soil Boring and Well Completion Logs

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS[2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)	○	GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
			○	GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)	▥	GM	Silty gravel; gravel/sand/silt mixture(s)
			▨	GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)	░	SW	Well-graded sand; gravelly sand; little or no fines
			░	SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)	▥	SM	Silty sand; sand/silt mixture(s)
			▨	SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)		▥	ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
			▨	CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
			▨	OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)		▥	MH	Inorganic silt; micaceous or diatomaceous fine sand
			▨	CH	Inorganic clay of high plasticity; fat clay
			▨	OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL		▨	PT	Peat; humus; swamp soil with high organic content

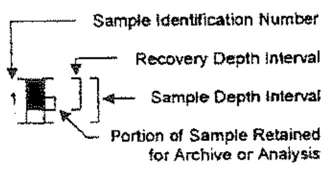
OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT	■	AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK	▨	RK	Rock (See Rock Classification)
WOOD	▨	WD	Wood, lumber, wood chips
DEBRIS	▨	DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to the symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM) for a sand or gravel indicate a soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, as outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the *Standard Test Method for Classification of Soils for Engineering Purposes*, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50%	- "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50%	- "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30%	- "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15%	- "with gravel," "with sand," "with silt," etc.
	≤ 5%	- "trace gravel," "trace sand," "trace silt," etc., or not noted.

Drilling and Sampling Key

SAMPLE NUMBER & INTERVAL



SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Other - See text if applicable

Groundwater

▽ ATD	Approximate water elevation at time of drilling (ATD) or on date noted. Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.

Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

2/10/03 \\EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ SOIL CLASS SHEET

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

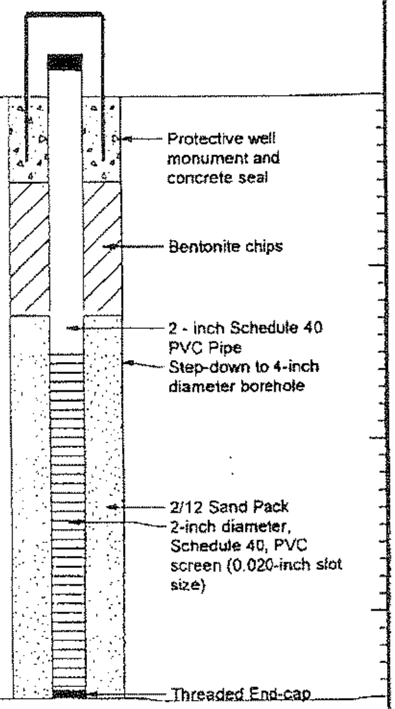
Soil Classification System and Key

Figure
A-1

HA-15

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hand Auger Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0						SM	Brown, silty, fine SAND with gravel (medium dense, moist)	
						SP	Gray, fine SAND with trace gravel (medium dense, moist)	
2						SP	Blue-gray, fine SAND with trace gravel (medium dense, moist to wet) (strong petroleum odor)	
						SP	Gray, fine SAND with trace coarse sand and gravel (medium dense, wet)	ATD ⊻

Detail



Boring Completed 11/25/02
Total Depth of Boring = 7.0 ft.

Depth (ft): 0, 2, 4, 6, 8, 10, 12, 14

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \\EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of HA-15

Figure A-2

HA-16

SAMPLE DATA / SOIL PROFILE / GROUNDWATER

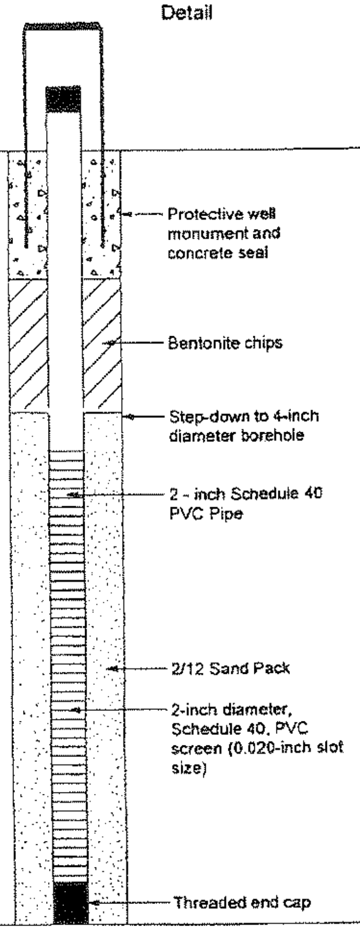
Drilling Method: Hand Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
0						SM	Brown, silty, fine SAND with gravel (medium dense, moist)	
						SP	Brown-gray, fine SAND with trace gravel (medium dense, moist to wet)	
						SP	Blue-gray, fine SAND with trace gravel (medium dense, moist to wet) (slight petroleum odor)	ATD ▽

Detail



Boring Completed 11/25/02
Total Depth of Boring = 9.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of HA-16

Figure A-3

HA-17

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

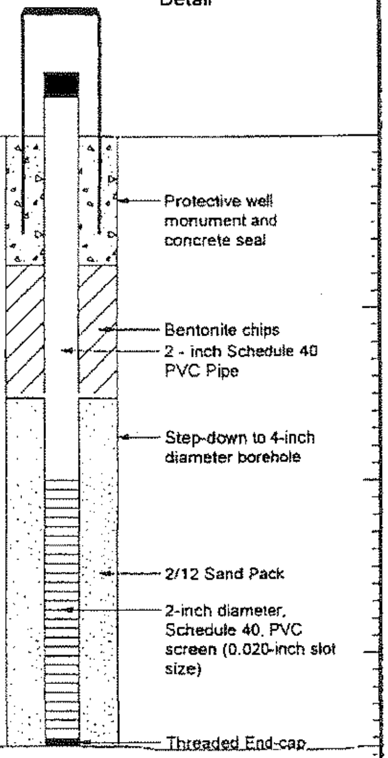
Drilling Method: Hand Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SM	Brown, silty, fine SAND with gravel (medium dense, moist)	
						SP	Blue-gray, fine SAND with trace gravel (medium dense, moist to wet)	
2								
4								ATD ▽
6								
						SP	Gray, gravelly, fine to medium SAND (medium dense, wet)	
8								
10								
12								
14								

Boring Completed 11/26/02
Total Depth of Boring = 7.1 ft.



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of HA-17

Figure
A-4

HA-18

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hand Auger

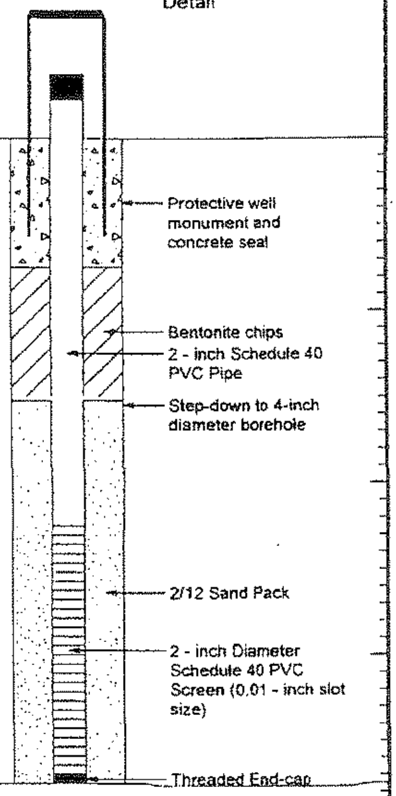
Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SM	Brown, silty, fine SAND with gravel (medium dense, moist)	
						SP	Gray, fine SAND with trace gravel and trace silt (medium dense, moist to wet) (moderate petroleum odor)	
2								
4								
							Sand wet with gasoline @ 5.0 ft (strong petroleum odor)	
6								ATD ∇

Boring Completed 11/26/02
Total Depth of Boring = 7.5 ft.

Detail



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

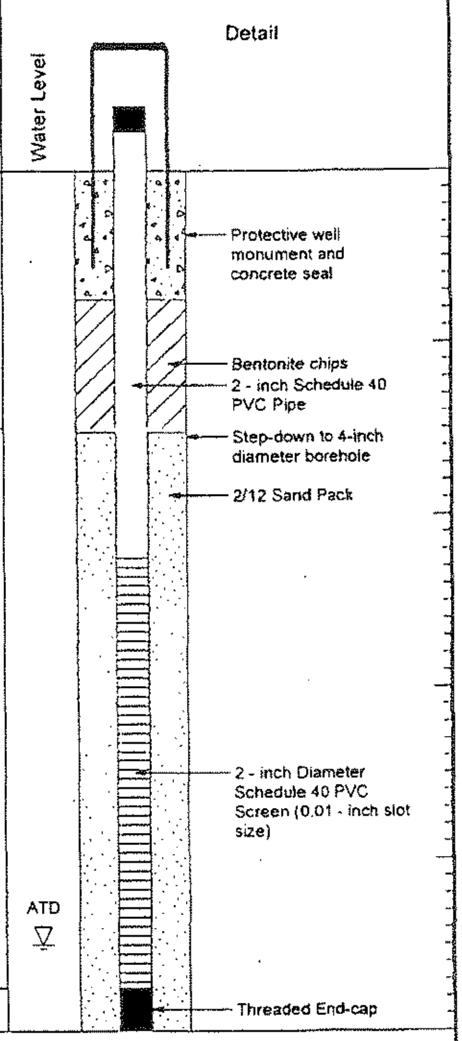
Log of HA-18

Figure
A-5

HA-20

SAMPLE DATA					SOIL PROFILE		
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hand Auger Ground Elevation (ft): Drilled By: Cascade Drilling Inc.
0						SP	Brown, fine SAND with gravel (medium dense, moist)
2							(strong gasoline odor @ 2 ft.)
						SP	Gray, fine SAND with trace gravel (medium dense, moist) (strong gasoline odor)
4							
6							Gasoline product level @ 5.7 ft Groundwater level at @ 9.0 ft
8							
						ML	Brown SILT with roots (medium stiff, moist to wet)
10							
12							
14							

GROUNDWATER



Boring Completed 11/26/02
Total Depth of Boring = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal Renton, Washington	Log of HA-20	Figure A-6

LAI-1

SAMPLE DATA

Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)
1	a2	16	10
2	a2	44	5
3	a2	22	0
4	a2	24	0

Depth (ft): 0, 2, 4, 6, 8, 10, 12, 14

SOIL PROFILE

Drilling Method: Hollow-stem Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

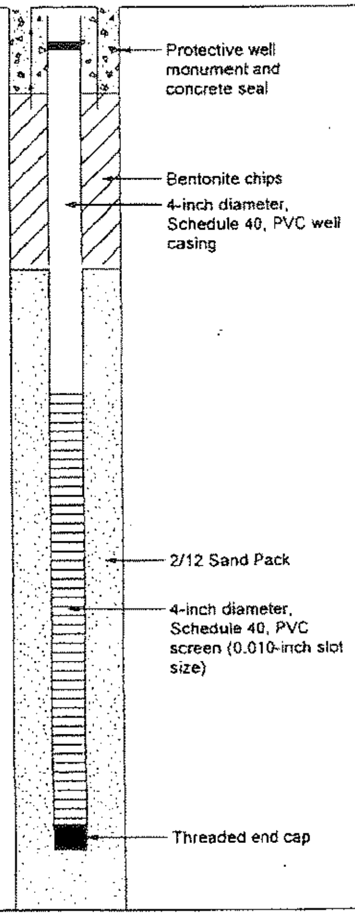
USCS Symbol	
SP/ SM	Light brown, fine to medium SAND with silt and gravel (loose, moist) (no odor, no sheen)
SP	Gray, fine to medium SAND with gravel (loose to medium dense, wet) (very slight gasoline-like odor, no sheen)
ML	Light brown, SILT with roots (stiff, moist) (no odor, no sheen)

Boring Completed 01/03/03
Total Depth of Boring = 10.5 ft.

GROUNDWATER

Water Level: ATD

Detail



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \\EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-1

Figure
A-7

LAI-2

SAMPLE DATA

Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)
1	a2	18	37.9
2	a2	35	53
3	a2	30	0.8
4	a2	50/6"	0
5	a2	26	0

Depth (ft): 0, 2, 4, 6, 8, 10, 12, 14

SOIL PROFILE

Drilling Method: Hollow-stem Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

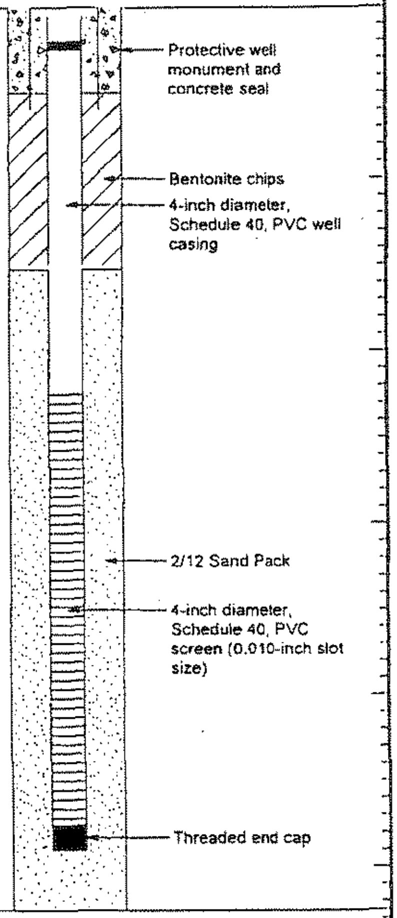
USCS Symbol	
SP/SM	Light brown, fine to medium SAND with silt and gravel (loose, moist) (no odor, no sheen)
SP	Gray, fine to coarse SAND with gravel (medium dense to very dense, wet) (no odor, no sheen)
ML	Brown, SILT with roots (very stiff, moist) (no odor, no sheen)

Boring Completed 01/03/03
Total Depth of Boring = 10.5 ft.

GROUNDWATER

Water Level: ▽ ATD

Detail



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \\EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-2

Figure A-8

LAI-3

Drilling Method: Hollow-stem Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

SAMPLE DATA

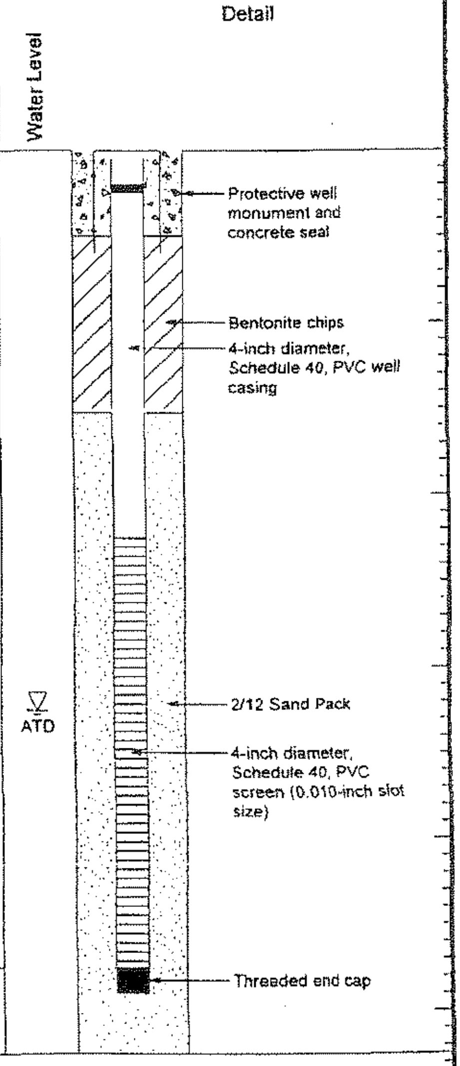
Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)
1	a2	18	9
2	a2	25	10
3	a2	26	3
4	a2	24	0
5	a2	26	0

SOIL PROFILE

USCS Symbol	
SP/ SM	Light brown, fine to medium SAND with silt and gravel (loose, moist) (no odor, no sheen)
SP	Gray, fine to medium SAND with gravel (loose, wet) (very slight gasoline-like odor, no sheen)
ML	Brown, SILT with roots (very stiff, moist) (no odor, no sheen)

Boring Completed 01/03/03
Total Depth of Boring = 10.5 ft.

GROUNDWATER



Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

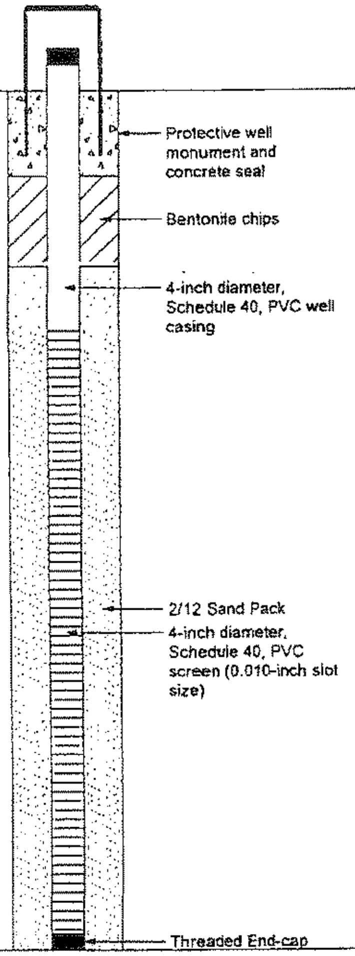
ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-3

Figure A-9

LAI-4

SAMPLE DATA					SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level	Detail
0						SP/SM	Light brown, fine to medium SAND with silt and gravel (moist) (no odor, no sheen)		
2									
4						SP	Gray, fine to medium SAND with gravel (wet) (very strong gasoline-like odor, medium sheen)		
6								ATD ▽	
8									
						ML	Brown, SILT with roots (moist) (no odor, no sheen)		
10									



Boring Completed 01/20/03
Total Depth of Boring = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LAI-5

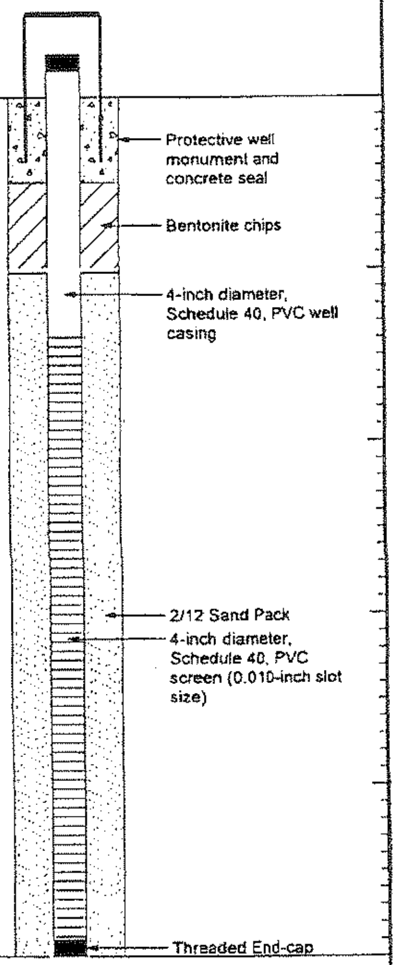
SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Hollow-stem Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SP/ SM	Light brown, fine to medium SAND with silt and gravel (moist) (no odor, no sheen)	
2								
4						SP	Gray, fine to medium SAND with gravel (wet) (very strong gasoline-like odor, medium sheen)	
6								ATD ▽
8						ML	Brown, SILT with roots (moist) (no odor, no sheen)	
10								
12								
14								



Boring Completed 01/20/03
Total Depth of Boring = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-5

Figure
A-11

LAI-6

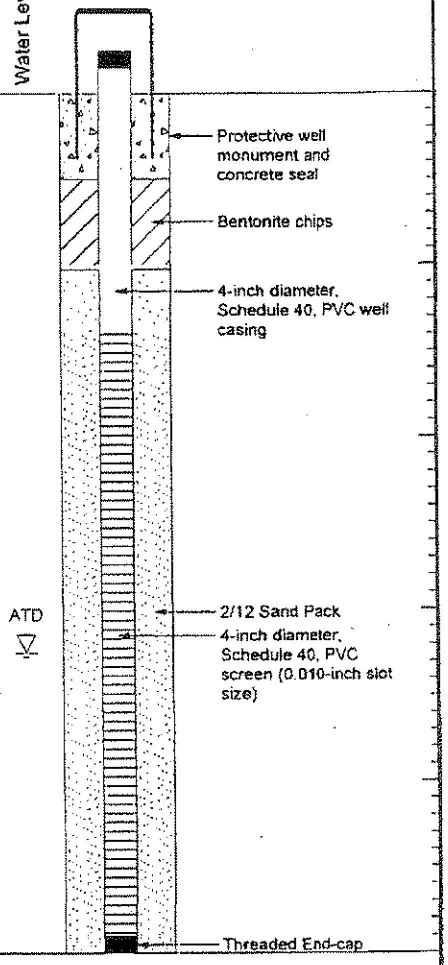
SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Hollow-stem Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description
0					SP/SM	Light brown, fine to medium SAND with silt and gravel (moist) (no odor, no sheen)
4					SP	Gray, fine to medium SAND with gravel (wet) (very strong gasoline-like odor, medium sheen)
9.5					ML	Brown, SILT with roots (moist) (no odor, no sheen)
10						



Boring Completed 01/20/03
Total Depth of Boring = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-6

Figure A-12

LAI-7

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

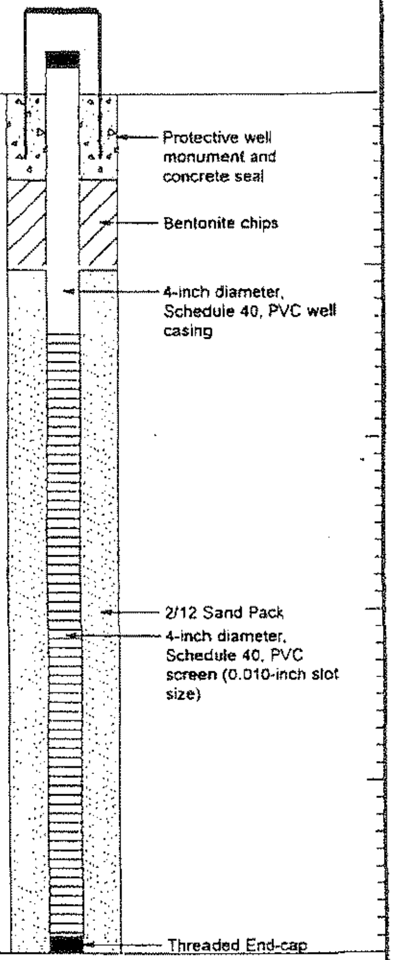
Drilling Method: Hollow-stem Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description	Water Level
0						SP/ SM	Light brown, fine to medium SAND with silt and gravel (moist) (no odor, no sheen)	
4						SP	Gray, fine to medium SAND with gravel (wet) (very strong gasoline-like odor, medium sheen)	ATD ▽
						ML	Brown, SILT with roots (moist) (no odor, no sheen)	
10								

Detail



Boring Completed 01/21/03
Total Depth of Boring = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-7

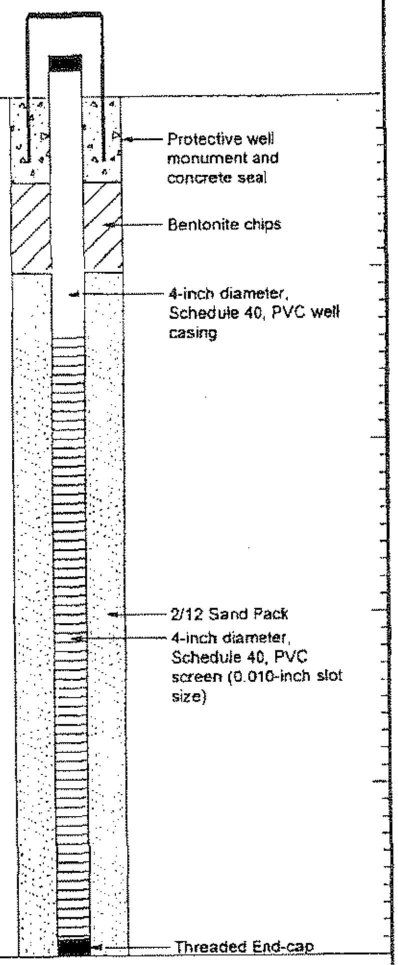
Figure
A-13

LAI-8

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0						SP/ SM	Light brown, fine to medium SAND with silt and gravel (moist) (no odor, no sheen)	
4						SP	Gray, fine to medium SAND with gravel (wet) (very strong gasoline-like odor, medium sheen)	
6								ATD ▽
						ML	Brown, SILT with roots (moist) (no odor, no sheen)	
10								

Boring Completed 01/21/03
Total Depth of Boring = 10.0 ft.

Detail



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

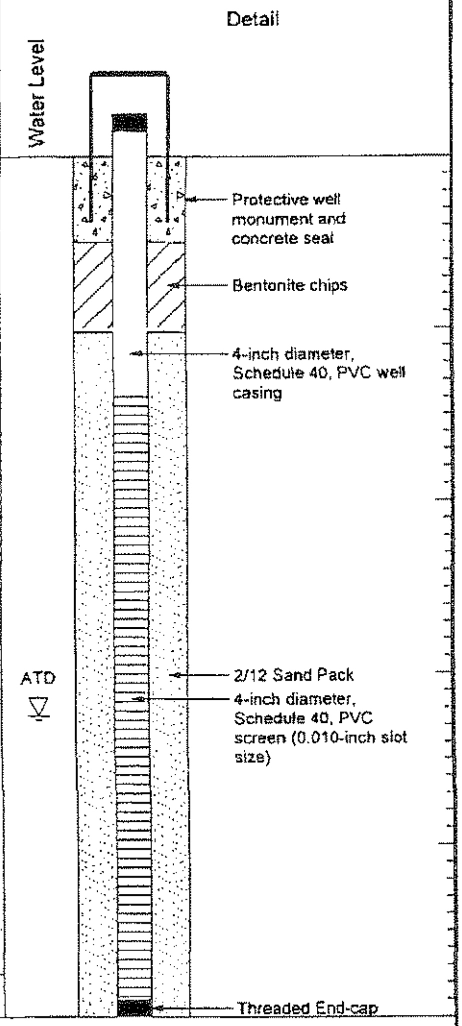
Log of LAI-8

Figure A-14

LAI-9

SAMPLE DATA					SOIL PROFILE		
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): Drilled By: Cascade Drilling Inc.
0						SP/ SM	Light brown, fine to medium SAND with silt and gravel (moist) (no odor, no sheen)
4						SP	Gray, fine to medium SAND with gravel (wet) (very strong gasoline-like odor, medium sheen)
						ML	Brown, SILT with roots (moist) (no odor, no sheen)

GROUNDWATER



Boring Completed 01/21/03
Total Depth of Boring = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-9

Figure A-15

LAI-10

SAMPLE DATA

Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)
1	a1	24	0
2	a1	4	0

SOIL PROFILE

Drilling Method: Hollow-stem Auger

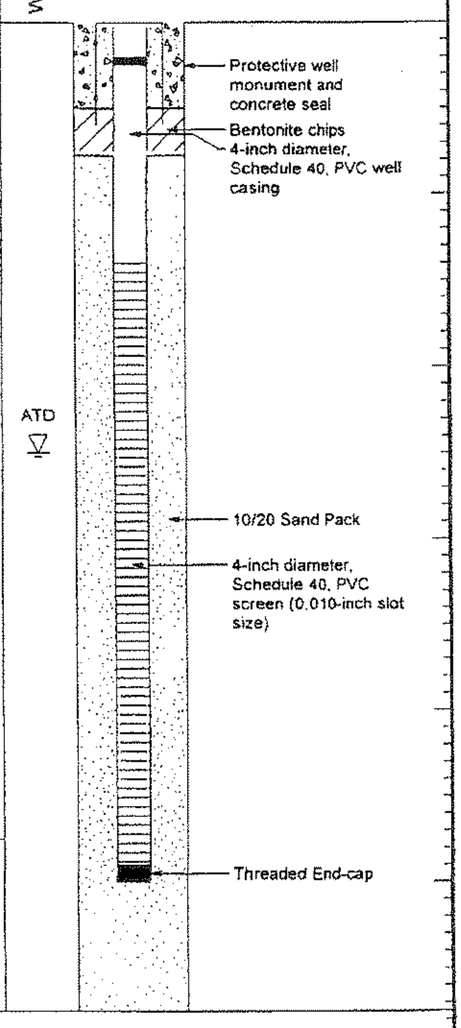
Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

USCS Symbol	
SM	Gray, silty, fine to medium SAND with gravel (medium dense, wet) (no odor, no sheen)
ML	Brown, SILT with trace sand and organics (soft, moist)

Boring Completed 01/29/03
Total Depth of Boring = 11.5 ft.

GROUNDWATER



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-10

Figure
A-16

LAI-11

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

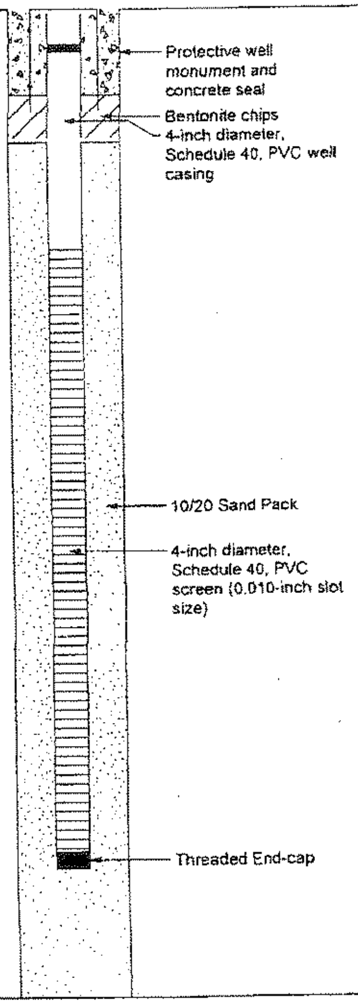
Drilling Method: Hollow-stem Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description	Water Level
0					SM	Gray, silty, fine to medium SAND with gravel (medium dense, wet) (no odor, no sheen)	
							ATD ∇
	1	a1	15	0			
					ML	Brown, SILT with trace sand and organics (soft, moist)	
	2	a1	4	0			

Detail



Boring Completed 01/29/03
Total Depth of Boring = 11.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/10/03 \\EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ WELL LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of LAI-11

Figure A-17

LAI-12

Drilling Method: Hollow-stem Auger
Ground Elevation (ft):
Drilled By: Cascade Drilling Inc.

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SM	Gray, silty, fine to medium SAND with gravel (medium dense, wet) (no odor, no sheen)	
2								
4								∇ ATD
	1	a1	26	0				
6								
8								
						ML	Brown, SILT with trace sand and organics (soft, moist)	
10	2	a1	4	0				
12								
14								

Boring Completed 01/29/03
Total Depth of Boring = 11.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of Boring LAI-12

Figure
A-18

LAI-13

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0						SM	Gray, silty, fine to medium SAND with gravel (medium dense, wet) (no odor, no sheen)	
								⊻ ATD
	1	a1	23	0				
	2	a1	4	0				
						ML	Brown, SILT with trace sand and organics (soft, moist)	

Boring Completed 01/29/03
Total Depth of Boring = 11.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/11/03 \\EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of Boring LAI-13

Figure A-19

LAI-14

Drilling Method: Hollow-stem Auger
Ground Elevation (ft):
Drilled By: Cascade Drilling Inc.

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SM	Gray, silty, fine to medium SAND with gravel (dense, wet) (no odor, no sheen)	
								▽ ATD
	1	a1	32	0				
						ML	Brown, SILT with trace sand and organics (siff, moist)	
	2	a1	11	0				

Boring Completed 01/29/03
Total Depth of Boring = 11.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/11/03 \EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of Boring LAI-14

Figure A-20

LAI-15

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
					SP/ SM	Light brown, fine to medium SAND with trace silt (loose, wet) (no odor, no sheen)	
							ATD
1	a1	6	0				
					ML	Brown, sandy, SILT with organics (medium siff, moist)	
2	a1	7	0				

Depth (ft): 0, 2, 4, 6, 8, 10, 12, 14

Boring Completed 01/29/03
Total Depth of Boring = 11.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/11/03 \EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton
Terminal
Renton, Washington

Log of Boring LAI-15

Figure
A-21

LAI-16

SAMPLE DATA

SOIL PROFILE

Drilling Method: Hollow-stem Auger

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

GROUNDWATER

Depth (ft): 0, 2, 4, 6, 8, 10, 12, 14

Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)
1	a1	14	0
2	a1	4	0

Graphic Symbol	USCS Symbol	
	SM	Light brown, silty, fine to medium SAND with occasional gravel (loose, wet) (no odor, no sheen)
	ML	Brown,SILT with trace sand and organics (medium siff, moist)

Water Level: ▽ ATD

Boring Completed 01/29/03
Total Depth of Boring = 11.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

706002.012 2/11/03 \\EDMNAS\GINT\GINTW\PROJECTS\706002.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

ConocoPhillips - Renton Terminal
Renton, Washington

Log of Boring LAI-16

Figure A-22

APPENDIX D

SEMIANNUAL STATUS REPORT
(LANDAU ASSOCIATES, 10/25/04)

Semiannual Status Report
ConocoPhillips Renton Terminal
Renton, Washington

October 25, 2004

Prepared for

ConocoPhillips Co.

LANDAU
ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

This status report provides a summary of remediation activities conducted from January through June 2004 at the ConocoPhillips bulk petroleum distribution terminal in Renton, Washington (site). Remediation activities conducted at the site and documented in this report are related to a 14,800-gallon petroleum product release, which occurred in November 2002. The petroleum release was reported to the Washington State Department of Ecology (Ecology) on November 14, 2002. A Release Notification Report (Landau Associates 2003a) was submitted to Ecology in February 2003. Summaries of the remedial actions conducted since November 2002 through January 2004 have also been submitted to Ecology (Landau Associates 2003b, 2004a).

BACKGROUND

The site is an active bulk petroleum distribution terminal located at 2423 Lind Avenue SW in Renton, Washington (Figure 1). The site is surrounded by industrial properties, public streets, and undeveloped areas. There are currently seven large aboveground storage tanks located in the tank farm at the site (Figure 2), which store premium and regular unleaded gasoline, kerosene, diesel fuel, and ethanol. Each tank is surrounded by concrete block walls which are approximately 3 ft high, and the entire tank area is surrounded by an earthen containment berm which provides secondary surface spill containment. Surface drainage in the tank area is controlled by a series of gate valves in the concrete containment walls, which are capable of directing flow to a sump in the western portion of the tank area. A large portion of the surface drainage water infiltrates through the earthen material surrounding the tanks and recharges the shallow groundwater table.

HISTORICAL RELEASE

A historical release at the site was discovered in 1986 when petroleum-contaminated soil was encountered in the vicinity of the tanker truck loading area. The responsible party for the release was determined to be Mobil Oil Company (currently ExxonMobil). A subsurface investigation was conducted, which revealed that contaminated groundwater and soil were present throughout the tanker truck loading area and extended south into the tank farm area. Liquid phase hydrocarbons (LPH) floating on the groundwater table were measured up to 3.55 ft thick as recently as May 2003. In response to a consent order by Ecology (Order No. DE 87-N301), an LPH recovery system was constructed and began operation in November 1987. Previous consultants documented that 57,000 gallons of LPH were removed by the product recovery system between December 1987 and November 1993. Based on an interview with the current environmental consultant (Kleinfelder, Inc.) working on behalf of ExxonMobil, the remediation system in operation at the site consists of two recovery wells, an oil/water separator, a product holding tank, a batch tank, and an air stripper. This current configuration has been in operation since March 2003.

NOVEMBER 2002 RELEASE

The petroleum release in November 2002 consisted of 14,800 gallons of super-unleaded gasoline from the bulk storage tank designated as Tank 2 (Figure 2). Upon discovery of the gasoline release from Tank 2, site personnel began transferring the remaining gasoline from Tank 2 into some of the other large bulk tanks in the tank farm and into tanker trucks. On November 14, 2002, Landau Associates began coordinating efforts to assess the extent of impact and conduct interim action LPH recovery efforts. The initial assessment and LPH recovery activities conducted prior to January 21, 2003 were documented in the Release Notification Report (Landau Associates 2003a).

Initial assessment efforts included the installation of 24 postholes around the perimeter of Tank 2 and the monitoring of existing wells (HA-6, HA-7, HA-8, HA-12, HA-13, HA-14) to determine if LPH were present. Only one posthole (located northwest of Tank 2) reported any measurable LPH. No LPH were observed in postholes located to the south, southeast, and southwest of Tank 2. On November 15 and 16, 2002, Landau Associates oversaw the installation of a horizontal total fluids recovery well (HRW-1), seven vertical total fluids recovery wells (RW-1, RW-2, RW-3, RW-4, RW-5, RW-6, and RW-7), and four horizontal vapor recovery lines (VR-1, VR-2, VR-3, and VR-4) as shown on Figure 2. Monitoring data indicated that all vertical recovery wells contained measurable LPH by November 20, 2002.

On November 23 and 24, 2002, Landau Associates installed six groundwater monitoring wells (HA-15, HA-16, HA-17, HA-18, HA-19 and HA-20) inside the tank farm and near Tank 2 using hand auger techniques. Approximately 3.5 ft of LPH were observed in HA-20 on November 27, 2002. To delineate the LPH near HA-20, Landau Associates installed three 4-inch diameter total fluids recovery/monitoring wells (LAI-1 through LAI-3) along the outside of the tank farm on January 3, 2003 using hollow-stem auger drilling methods, as shown on Figure 2.

On January 17, 2003, LPH were discovered floating on the water surface of a stormwater retention pond located to the southeast of Tank 2. ConocoPhillips personnel contacted the Renton Fire Department and Ecology upon observing the LPH on the surface water on January 17, 2003. The Renton Fire Department, with assistance from ConocoPhillips, Emerald Petroleum Services, Inc. (Emerald), and Landau Associates, conducted the initial response. A diaphragm pump was installed in a small ditch located west of the pond, to limit the flow of water and LPH to the retention pond. In addition, a network of Venturi style blowers were temporarily installed near the southern bank of the retention pond to abate vapor concentrations.

Between January 20 and 30, 2003, Landau Associates oversaw the installation of five monitoring wells (LAI-12 through LAI-16), six vertical total fluids recovery wells (LAI-4 through LAI-9) located inside the tank farm area and south-southeast of Tank 2, and two vertical total fluids recovery wells (LAI-10 and LAI-11) located outside the tank area and south-southwest of Tank 2.

REMEDIAL COMPONENTS

Remediation of the November 2002 gasoline release was initiated on November 17, 2002. Since the initiation of remedial efforts, a combination of methods—groundwater/LPH pumping using diaphragm pumps, surface water/LPH pumping using diaphragm pumps, LPH removal using hand bailing methods, groundwater/LPH pumping using downhole pneumatic pumps and soil vapor extraction/LPH volatilization using a dual phase vacuum extraction (DPVE) system—have been utilized in the vicinity of Tank 2. The current configuration of the remediation system being utilized at the site is provided in Figure 3.

DUAL PHASE VACUUM EXTRACTION SYSTEM

A DPVE component was installed and activated on February 12, 2003. During the reporting period, the DPVE utilized a positive displacement blower to apply a vacuum to seven vertical recovery wells (LAI-4, LAI-5, LAI-6, LAI-7, LAI-8, LAI-9, and RW-2) and to the eastern and western ends of a horizontal recovery well (HW-1). The amount of vacuum applied at each well was periodically adjusted to improve system efficiency. Discharged airflow from the water treatment air stripper and the DPVE vapors recovered from the wells by the DPVE blower are routed to a thermal/catalytic oxidizer for treatment prior to atmospheric discharge in accordance with the modified Notice of Construction (NoC) No. 8819 issued by the Puget Sound Clean Air Agency (PSCAA). Fresh air dilution valves were installed at five recovery wells (LAI-4, LAI-7, RW-2, RW-3 and RW-7) to keep the mixture of fresh air and recovered vapors at an optimal concentration for the thermal/catalytic oxidizer.

The oxidizer unit was modified from thermal mode to catalytic mode on November 18, 2003. Petroleum hydrocarbon concentrations in the extracted vapor were becoming low enough so that a catalytic oxydizer would operate with greater efficiency at a lower combustion temperature and require less supplemental fuel (propane).

The DPVE system was in operation for approximately 2,747 hours between January and June 2004. System downtime occurred during the reporting period due to freeze damage issues, replacement of conductivity switches, replacement of switch relays, and replacement of a transfer pump. Landau Associates' field personnel conducted operation and maintenance checks on the system throughout the reporting period. In addition, H2Oil Recovery System (manufacturer of the remediation system) has performed bi-monthly maintenance from January through June 2004. Operational logs completed by maintenance personnel are provided in Appendix A.

GROUNDWATER TREATMENT SYSTEM

Dedicated down-hole pneumatic pumps at LAI-4, LAI-5, LAI-7, LAI-8, LAI-9 and RW-2 have been utilized for groundwater and LPH recovery since March 24, 2003. To optimize LPH recovery, the pneumatic pump at RW-2 was relocated to LAI-6 on July 24, 2003. The groundwater system consists of an oil/water separator, a product holding tank, a batch tank, an air-sparge tank, and an air stripper. The system design schematic is presented on Figure 3. On July 9, 2003, the disposal of treated groundwater was re-routed from the onsite storage in a Baker Tank (final disposal at Ferndale Refinery) to discharge through the sanitary sewer under King County Wastewater Discharge Authorization No. 4057-01.

A horizontal interceptor trench (HW-1) was installed near the southern property boundary south of Tank 2 on November 11, 2003 (Figure 2). The interceptor trench is oriented east-west, spanning 100 ft in length and varies from approximately 8 to 10 ft in depth. Recovery points HW-1E and HW-1W are situated at the east and west end points of the trench, respectively.

Landau Associates installed additional pneumatic groundwater pumps on December 3, 2003 at HW-1E, HW-1W and RW-2. The new pumps were installed to increase the area of groundwater table depression and to limit offsite migration of petroleum impacts.

Landau Associates installed a surface water containment dike in the southwest corner of the storm water retention pond (Figure 2) on November 22, 2003. The dike was installed as a contingency measure to limit the potential for LPH to impact a significant area of the surface water in the pond. In the winter of 2002-2003, LPH was observed in the pond and was determined to be entering the pond near the southwestern corner. The dike is constructed of pre-cast concrete with a flow-through valve that will normally remain closed during the "wet" season (approximately November through April).

Seasonal increases in groundwater table are problematic for LPH recovery. During seasonal high groundwater table conditions (approximately November through April), the pumps recover primarily water and very little, if any, LPH. To avoid the potential accumulation of groundwater in the LPH storage tank, the oil/water separation unit was temporarily bypassed from December 12, 2003 through March 22, 2004.

ADDITIONAL REMEDIAL ACTIVITIES

On June 1, 2004, Landau Associates received a telephone call from ConocoPhillips indicating the Washington State Department of Ecology (Ecology) received information of potential free phase gasoline product observed in the surface water in the stormwater detention pond, located southeast of Tank 2. Landau Associates and Ecology personnel visited the site on June 3, 2004 to investigate the stormwater detention pond. Three hand auger borings were completed to approximately 3 ft BGS. Recovered soil was field screened with a photoionization detector (PID) for volatile vapors. Discrete soil samples were collected from the three borings and analyzed for gasoline range total petroleum hydrocarbons (TPH-G), diesel and lube oil range petroleum hydrocarbons (TPH-Dx), and benzene, toluene, ethylbenzene, and xylenes (BTEX). In addition to the soil samples, a water sample was collected from the standing water present in one of the borings. The water sample was analyzed for TPH-G and BTEX.

The results of the soil and groundwater samples indicate that free phase gasoline product is not impacting the soil or groundwater within the terminal stormwater detention pond (Landau Associates 2004b). The analytical results of the stormwater detention pond soil samples are provided in Table 1.

MONITORING DATA

GROUNDWATER AND PRODUCT ELEVATION MONITORING

Depths of groundwater and LPH, if present, have been measured monthly between January and June 2004 in five hand auger wells, five monitoring wells, one horizontal interceptor trench, and eighteen recovery wells. The wells were selected to allow for evaluation of groundwater elevation and LPH thickness in the vicinity of Tank 2. Depths to groundwater and LPH were measured from the northern portion of the PVC well casing using a decontaminated, intrinsically safe oil/water interface probe with readings recorded to the nearest 0.01 ft. Decontamination procedures consisted of removing any LPH (if present) from the probe using a paper towel, washing the probe with a tap water and alconox soap mixture, and rinsing the probe with distilled water.

The measured depths to groundwater, LPH thickness, and the calculated groundwater elevations are presented in Table 2. Depths to groundwater were converted to groundwater elevations based on previous vertical control surveys conducted at the site. A general decrease in groundwater potentiometric levels was observed from March through June 2004 due to the effect of groundwater pumping and lack of precipitation. As a result of the November 2002 release from Tank 2, measurable amounts of LPH have been consistently detected in wells HA-8, LAI-4, LAI-6 between January and June 2004. Measurable amounts of LPH have also been observed intermittently in wells LAI-5, LAI-7, LAI-8, LAI-9, HW-1 East, RW-3, RW-4, and HA-19 between January and June 2004.

Potentiometric maps have been developed from the depth to groundwater and LPH thickness data collected during the monthly sampling events. Potentiometric contours for January through June 2004 are provided in Figures 4 through 9, respectively. The groundwater potentiometric data compiled for January through June 2004 appear to indicate a natural radial pattern of groundwater flow outward from the tank farm; however, local alterations to the natural groundwater flow direction appear to be related to the active remediation activities at the site. Areas of groundwater depression are apparent around active groundwater pumping locations and mounds are apparent around DPVE recovery wells.

It is our understanding that ExxonMobil's environmental consultant has collected additional groundwater and LPH gauging data during the reporting period; however, this information has not been provided to Landau Associates.

ANALYTICAL DATA COLLECTION AND EVALUATION

GROUNDWATER ANALYTICAL MONITORING

Quarterly groundwater sampling events were conducted during March and June 2004. During quarterly sampling events, monitoring wells located outside the tank farm containment berm were purged using a non-dedicated centrifugal pump and sampled using non-dedicated peristaltic pumps with dedicated polyethylene tubing. Samples from monitoring wells located inside the containment berm of the tank farm were collected using disposable bailers. Authorization to use the centrifugal pump for groundwater purging was granted by the ConocoPhillips Renton Terminal management prior to use, per the requirements of the Health and Safety Plan. Wells were purged prior to sample collection by removing three well volumes of groundwater and noting the stabilization of field parameters. Field parameters consisted of pH, conductivity, and temperature. If the well was purged dry prior to the collection of three well volumes, then the well was considered adequately purged. Sample collection was conducted by slowly filling the laboratory-supplied containers in such a manner as to reduce aeration of the water. Sample containers for analyses that are sensitive to volatilization were completely filled so that no headspace remained. Samples were placed in coolers and packed in ice to keep samples at about 4°C. Groundwater samples were analyzed by North Creek Analytical, Inc. (NCA) for TPH-G using Method NWTPH-G, diesel and lube oil-range petroleum hydrocarbons (TPH-D) using Method NWTPH-Dx, and BTEX using Method 8021B. Groundwater analytical results are summarized in Table 3 and laboratory reports are provided in Appendix B.

Landau Associates reviewed all laboratory analytical results through a focused data validation process. The purpose of the validation was to verify if selected quality control parameters were within the limits specified by the analytical methods. The data validation was performed in accordance with applicable portions of the EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 1994). Some data was flagged as estimated based on the results of the data validation and labeled with an estimated flag "J" for detected compounds and "UJ" for non-detected compounds; however, all data was determined to be acceptable for monitoring purposes.

It is our understanding that ExxonMobil's environmental consultant has collected groundwater samples during the reporting period, but the analytical data has not been shared with Landau Associates.

SYSTEM VAPOR SAMPLING

Samples for this reporting period were collected from the influent and effluent sampling ports of the thermal (catalytic) oxidizer in February and March 2004. Samples were collected using 1-liter Tedlar™ bags. Samples were screened for volatile organic compounds (VOCs) using a portable photoionization detector (PID) meter. Samples were placed in a cooler without ice, for shipment to the laboratory under chain-of-custody documentation. Vapor samples were analyzed for BTEX and TPH-G by NCA using EPA Method 8021B. Influent and effluent analytical results are summarized in Table 4. The laboratory reports are provided in Appendix B.

GROUNDWATER TREATMENT SYSTEM SAMPLING

Groundwater treatment system samples were collected in January, February and March 2004. Samples were collected to comply with the wastewater permit requirement of semiannual sampling, and to assist with mass removal calculations. Water samples at dedicated sample ports were collected prior to entering the air sparge tank, after passing through the air stripper, and after passing through a granular activated carbon vessel, by slowly filling the laboratory supplied containers in such a manner as to reduce aeration of the water. Sample containers for analyses that are sensitive to volatilization were completely filled so that no headspace remained. Samples were placed in coolers and packed in ice to keep samples at about 4°C. Treatment samples were analyzed by NCA for TPH-G (Method NWTPH-G), and BTEX (EPA Method 8021B). Treatment system sample results are summarized in Table 5. The laboratory reports for the treatment system samples are provided in Appendix B.

GASOLINE VOLUME REMOVAL

As reported in the February 23, 2004 Semiannual Status Report (Landau Associates 2004a), approximately 11,013 gallons of gasoline were recovered from the vicinity of Tank 2 prior to January 1, 2004. The volume of gasoline removed by remedial efforts to date can be estimated by summarizing the following:

- Volume of gasoline recovered prior to January 2004
- Volume of LPH collected in the product storage tank and disposed at the ConocoPhillips Ferndale Refinery and the Emerald Airport Way Disposal Center
- Volume of dissolved phase gasoline removed based on the total volume of water recovered and the average TPH-G concentration of the recovered water influent samples
- Volume of vapor phase gasoline removed based on the vapor recovery flow rate and concentration exhibited by the DPVE system influent samples.

LPH REMOVAL

Between January 1 and June 30, 2004 approximately 250 gallons of LPH have been separated and stored onsite in an above ground storage tank.

DISSOLVED PHASE GASOLINE REMOVAL

Between January 1 and June 30, 2004 approximately 187,583 gallons of pumped groundwater has been treated onsite and discharged to the sanitary sewer under King County Wastewater Discharge Authorization No. 4057-01.

Analytical results from the influent sampling port of the groundwater treatment system indicate an average TPH concentration of 39.4 mg/L throughout the period from January through June 2004. Based on a total volume of approximately 187,583 gallons of water disposed, it is estimated that approximately 9.8 gallons of gasoline have been removed by the groundwater recovery operations between January 1 and June 30, 2004.

VAPOR PHASE GASOLINE REMOVAL

Hour-meter readings for the DPVE system indicate that the system has operated approximately 2,747 hours (114 days) between January and June 2004 and a total of 8,445 hours (352 days) hours since the commencement of the system (February 12, 2003). Periodic influent vapor sampling of the DPVE system (Table 6) indicate that the DPVE system has removed approximately 652 lbs (102 gallons) of gasoline between January 9, 2004 and June 28, 2004.

TOTAL VOLUME OF GASOLINE REMOVED

Based on the above information, approximately 11,371 gallons of gasoline has been recovered since the initial release on November 13, 2002. The total estimated volume of gasoline recovered is comprised of the following:

RECOVERY METHOD	GALLONS OF RECOVERED GASOLINE
Recovery Efforts Prior to December 2003: (as reported in previous status reports)	11,013
LPH Recovery (January – June 2004)	250
Dissolved Phase Recovery (January – June 2004)	9.8
Vapor Phase Recovery (January through June 2004)	102
Estimated Total Gasoline Recovered	11,375

CONCLUSIONS

The effectiveness of the remedial efforts being conducted can be evaluated on the following criteria:

- Control of the LPH to reduce migration to the stormwater retention pond and decrease the thickness in the vicinity of Tank 2.
- Control of the dissolved-phase TPH-G and benzene plumes to limit offsite impacts and co-mingling with the plume generated by the historical (Mobil Oil Company) gasoline release near the tanker truck loading racks.
- Discharge treated vapors and water in compliance with appropriate permits applicable to the remedial activities.

The three performance criteria identified are evaluated as follows:

LPH CONTROL

Based on the interpretations of the extent of LPH presented in Figures 10 through 13, it appears that the areal extent of LPH has remained relatively consistent since monitoring began in November 2002. In general, as documented in Table 2, the overall thickness of LPH floating on the water table appears to be decreasing. LPH have not been observed in the stormwater retention pond since March 2003, likely due to the effects of the groundwater and LPH pumping activities and the seasonal lack of precipitation during the dry months. The concrete dike installed in the retention pond in November 2003 is intended to limit the potential to impact a significant area of the surface water in the pond.

DISSOLVED-PHASE PLUME CONTROL

Based on the data interpreted in Figures 4 through 9, it appears that natural groundwater flow follows a radial pattern from the vicinity of Tank 2. The radial flow of groundwater creates the potential for the dissolved phase TPH-G and benzene plumes to co-mingle with the southern extent of the plume related to the historical Mobil Oil Company gasoline release, and it also creates the potential for the dissolved phase plume emanating from Tank 2 to migrate offsite to the south under SW 27th Street. The dissolved phase TPH-G (Figures 10 and 12) and benzene (Figures 11 and 13) concentration data from the March and June 2004 sampling events indicate that pumping groundwater through the treatment system has affected natural groundwater flow patterns and minimized migration to the southeast of Tank 2. The horizontal interceptor trench installed approximately parallel to SW 27th Street and south of the terminal fence line is intended to reduce the potential of offsite migration of the dissolved phase plume.

PERMIT COMPLIANCE

Two operational permits exist for the remediation system at the Renton Terminal.

A wastewater discharge authorization (No. 4057-01) was issued on June 2, 2003 by King County Wastewater Treatment Division. The permit limits the daily water discharge from the remediation system to 8,000 gallons per day and requires that the discharged water meet concentration limits of 130 micrograms per liter (µg/L) for benzene, 1,500 µg/L for toluene, and 1,400 µg/L for ethylbenzene. Monthly sampling of the system was conducted from January through March 2004. The results of the monthly sampling (Table 4) indicate that the system has been operational with no exceedances of the permit during the reporting period.

A PSCAA air permit for Notice of Construction (NoC) 8819 was issued on May 8, 2002 with a subsequent modification issued on July 8, 2003. The NoC limits the total vapor discharge flow rate to 800 cfm and TPH concentration in the vapor effluent to less than 30 ppmv. The conditions of the permit have been monitored between January and June 2004 with no exceedances of the permit, as indicated by information presented in Tables 5 and 6.

RECOMMENDATIONS

Based on the conclusions provided above, the following recommendations are made for the site:

- Continued quarterly sampling of groundwater monitoring wells and analysis for TPH-G and BTEX. The next groundwater sampling event is scheduled for September 2004. We will attempt to coordinate the groundwater sampling events with ExxonMobil's consultant to obtain site-wide information.

- Continued monthly gauging of groundwater and LPH. We will continue to attempt to coordinate these gauging events with ExxonMobil's consultant to obtain site-wide information.

- Continued operation of the DPVE and groundwater recovery and treatment systems. The goals of the remedial system remain to remove LPH and limit migration of LPH and the dissolved-phase plume.

- Preparation of a semi-annual progress report for the period from July through December 2004 and submittal of the report to Ecology by February 2005.

An application to conduct further remedial action at the site under the authority of the Ecology Voluntary Cleanup Program (VCP) was submitted in May 2004. We recommend working with the VCP to develop appropriate cleanup levels for groundwater at the site.

USE OF THIS REPORT

This remediation status report has been prepared for the exclusive use of ConocoPhillips Company for specific application to the ConocoPhillips Renton Terminal. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Christine Kimmel

Christine B. Kimmel, L.G.
Project Geologist

MARTIN T. POWERS
STATE OF WASHINGTON
37603
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 03/29/05

Martin T. Powers
Project Manager

CBK/MTP/rgm

REFERENCES

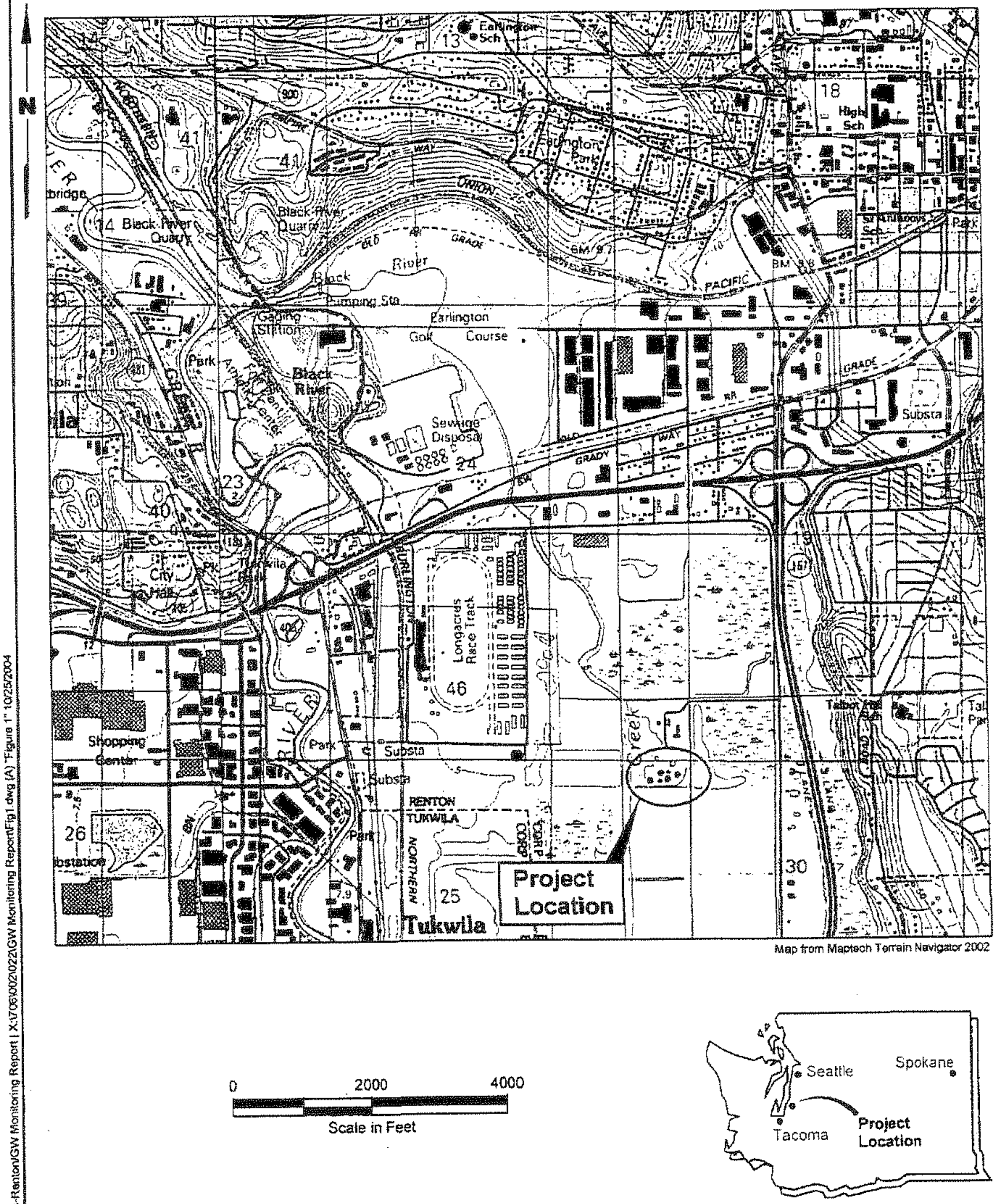
EPA. 1994. *Contract Laboratory Program National Functional Guidelines for Organic Data Review.*

Landau Associates. 2003a. *Release Notification Report, ConocoPhillips Renton Terminal, Renton, Washington.* February 11.

Landau Associates. 2003b. *Status Report, ConocoPhillips Renton Terminal, Renton, Washington.* August 8.

Landau Associates. 2004a. *Semiannual Status Report, ConocoPhillips Renton Terminal, Renton, Washington.* February 23.

Landau Associates. 2004b. *Investigation of Stormwater Detention Pond, ConocoPhillips Renton Terminal, 2423 Lind Avenue, SW, Renton WA.* July 2.



Map from Maptech Terrain Navigator 2002

ConocoPhillips-Renton\GW Monitoring Report | X:\706\002\022\GW Monitoring Report\Fig1.dwg (A) "Figure 1" 10/25/2004

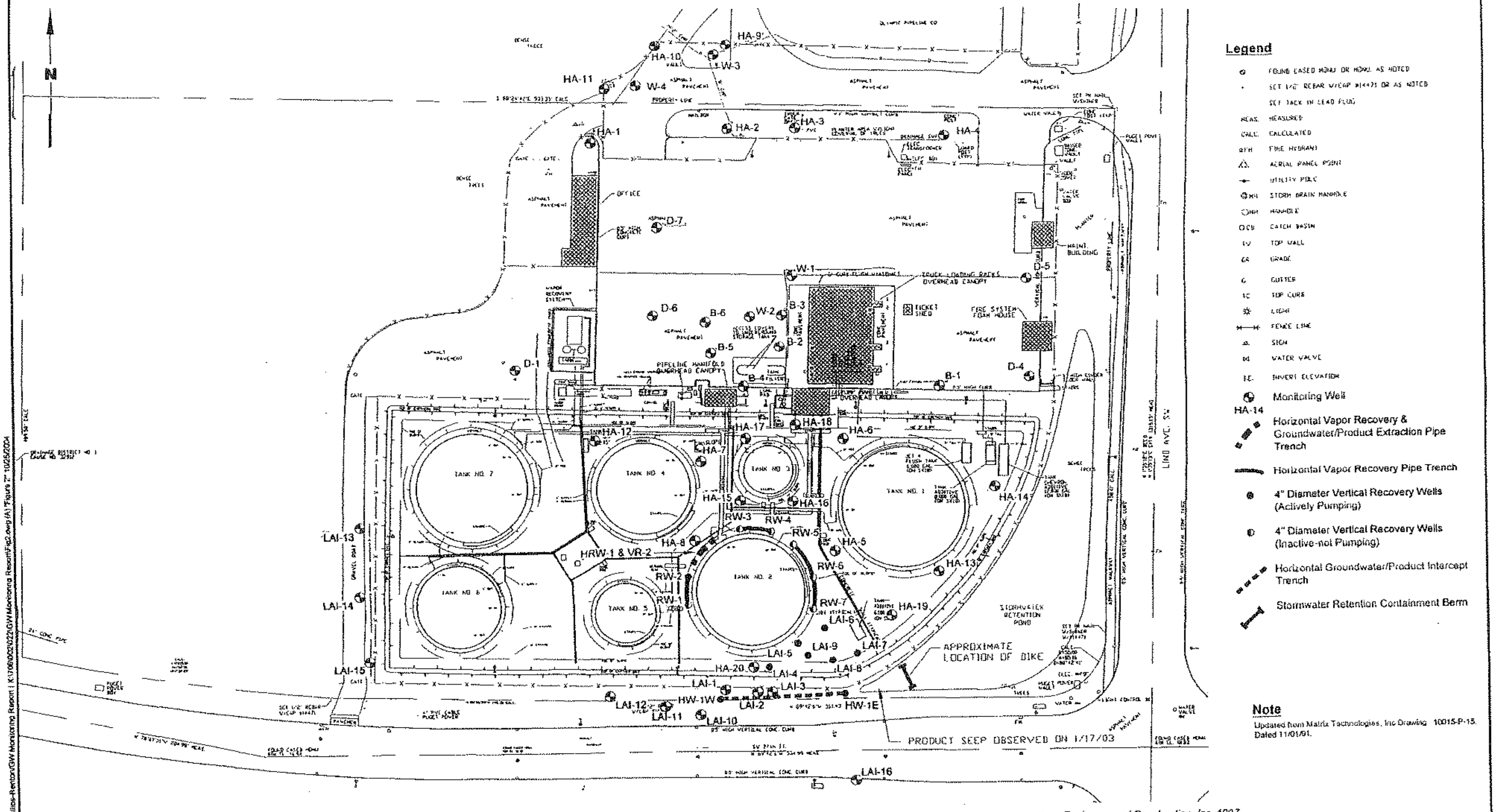
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Vicinity Map

Figure
1

ConocoPhillips-Renton/GW Monitoring Report | K:\1706\002\022\GW Monitoring Report\Fig2.dwg (A) "Figure 2" 10/25/2004



Note

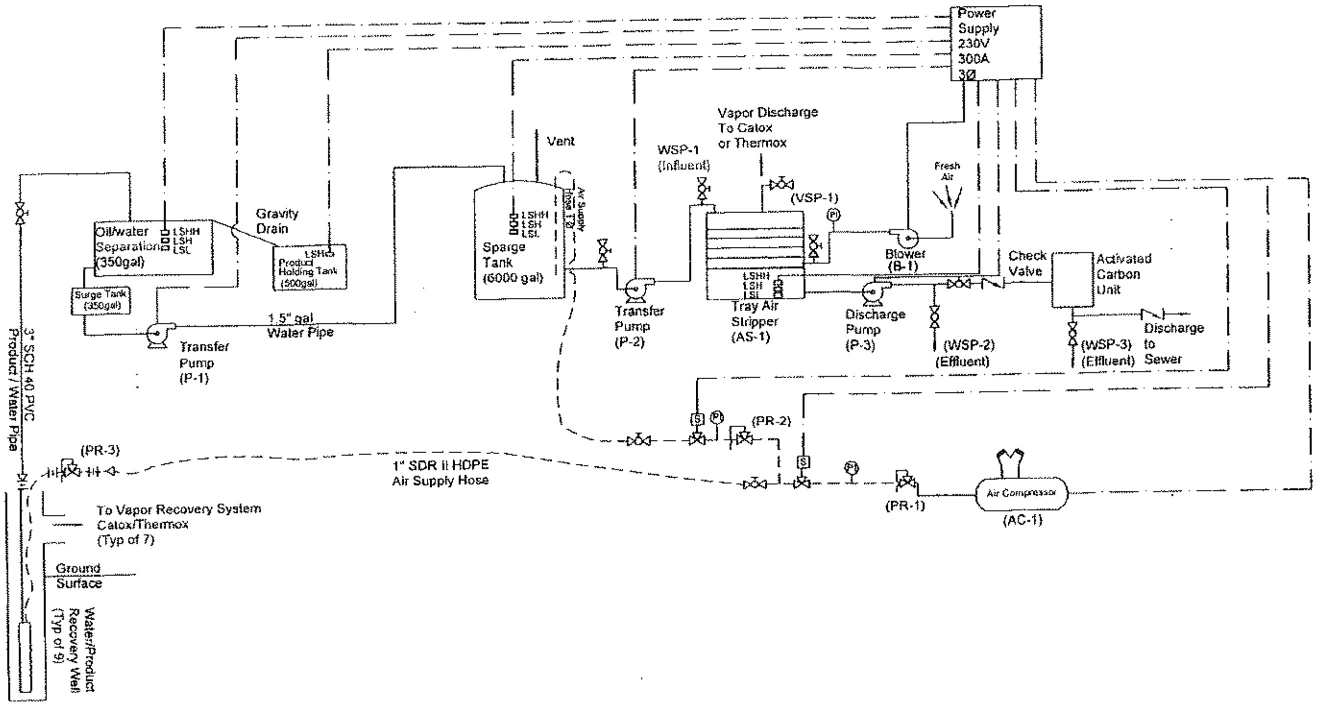
Updated from Matrix Technologies, Inc Drawing 10015-P-15. Dated 11/01/91.

Base map source: *Alpha Engineers and Construction, Inc. 1997*

ConocoPhillips 2423 Lind Avenue SW Renton, Washington	**Site Map**	Figure 2

LANDAU ASSOCIATES

ConocoPhillips-Renton/GW Monitoring Report | X:\706\002\022\GW Monitoring Report\Fig3.dwg (A) "Figure 3" 10/25/2004



Not to Scale

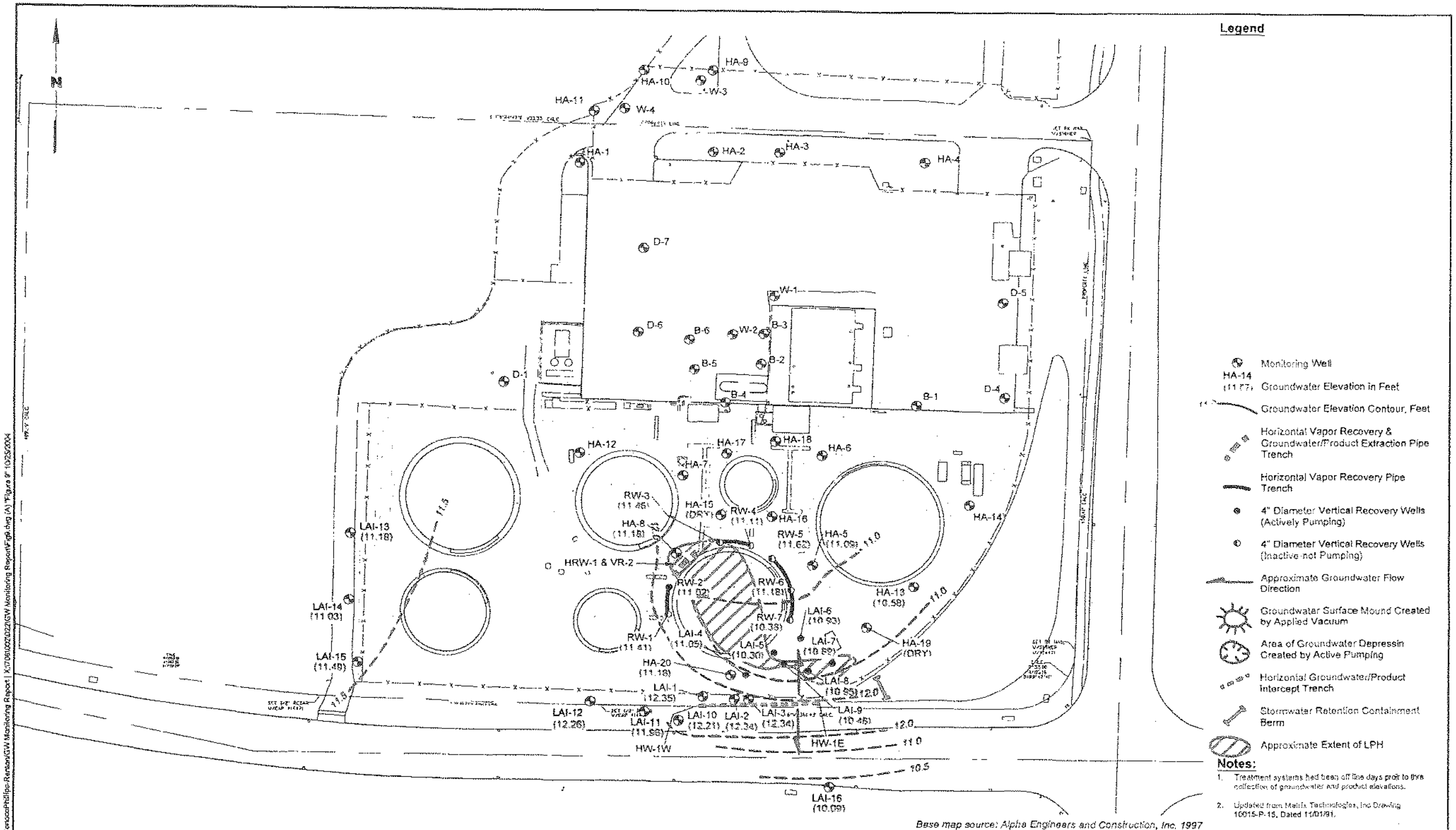
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Groundwater Treatment System Process and Instrumentation Diagram

Figure
3

ConocoPhillips-Renton/GW Monitoring Report | X:\706\002\022\GW Monitoring Report\Fig9.dwg (A) "Figure 9" 10/25/2004



Notes:

1. Treatment systems had been off line days prior to the collection of groundwater and product elevations.
2. Updated from Matrix Technologies, Inc Drawing 10015-P-15, Dated 11/01/91.

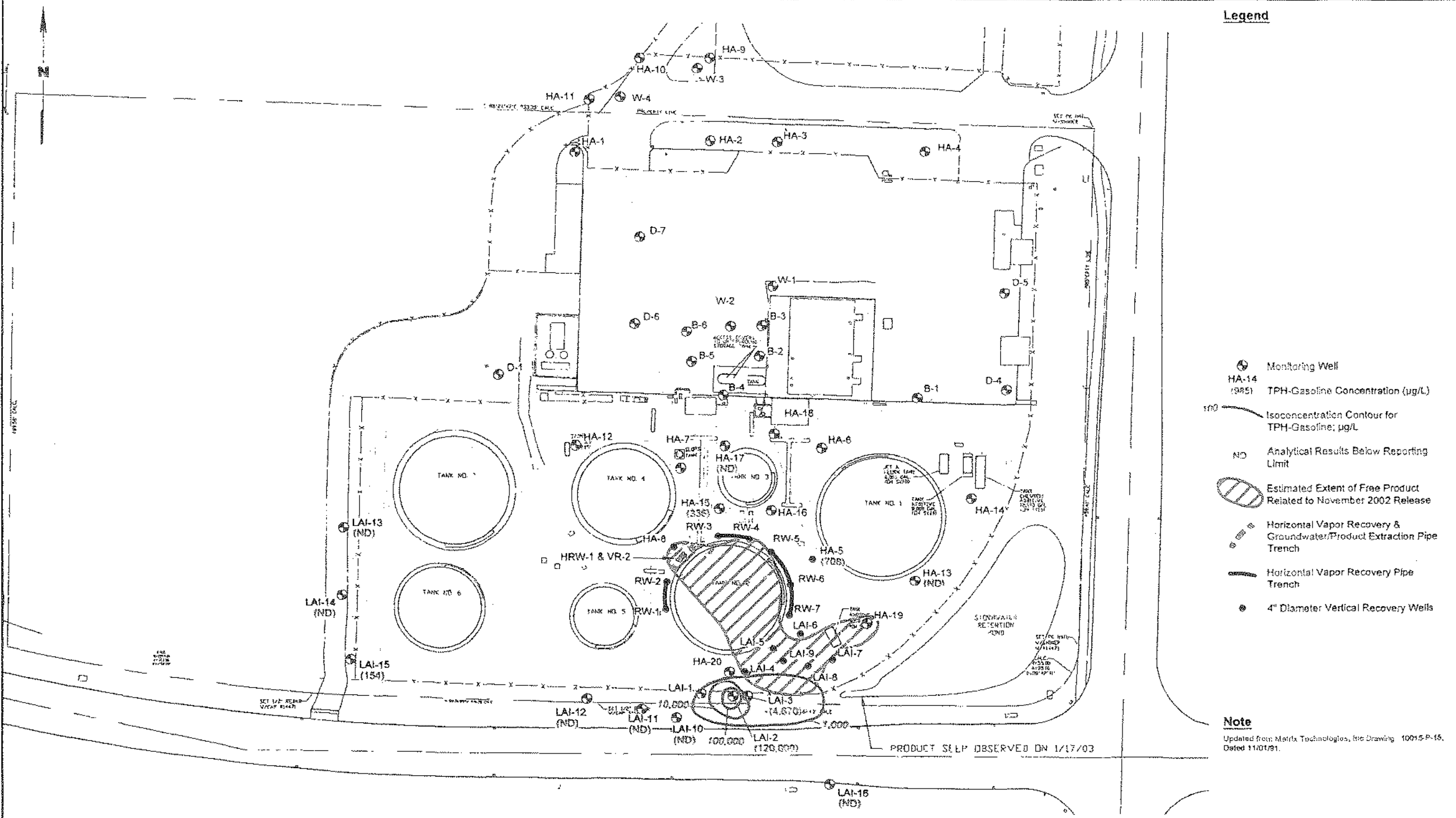
Base map source: Alpha Engineers and Construction, Inc. 1997

LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Potentiometric Map
June 22, 2004

Figure
9



Note

Updated from Matrix Technologies, Inc Drawing 10015-P-15, Dated 11/01/91.

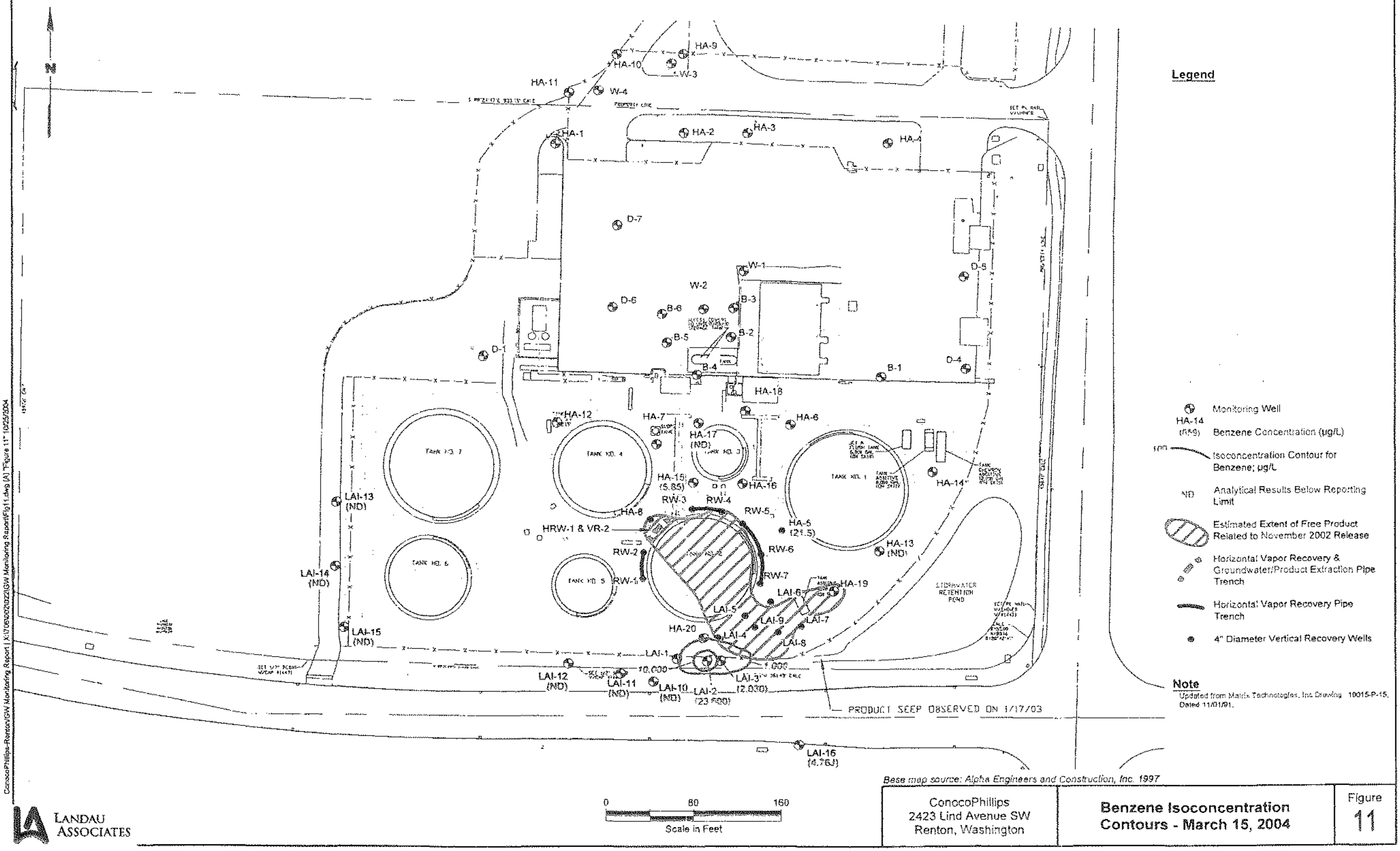
Base map source: Alpha Engineers and Construction, Inc. 1997

LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

TPH-G Isoconcentration Contours - March 15, 2004

Figure 10



Legend

- Monitoring Well
- HA-14 (659) Benzene Concentration (µg/L)
- 100 Isoconcentration Contour for Benzene; µg/L
- ND Analytical Results Below Reporting Limit
- Estimated Extent of Free Product Related to November 2002 Release
- Horizontal Vapor Recovery & Groundwater/Product Extraction Pipe Trench
- Horizontal Vapor Recovery Pipe Trench
- 4" Diameter Vertical Recovery Wells

Note

Updated from Matrix Technologies, Inc Drawing 10015-P-15, Dated 11/01/91.

Base map source: Alpha Engineers and Construction, Inc. 1997

ConocoPhillips-Renton/GW Monitoring Report | X:\706\002\022\GW Monitoring Report\Fig11.dwg (A) "Figure 11" 10/25/2004

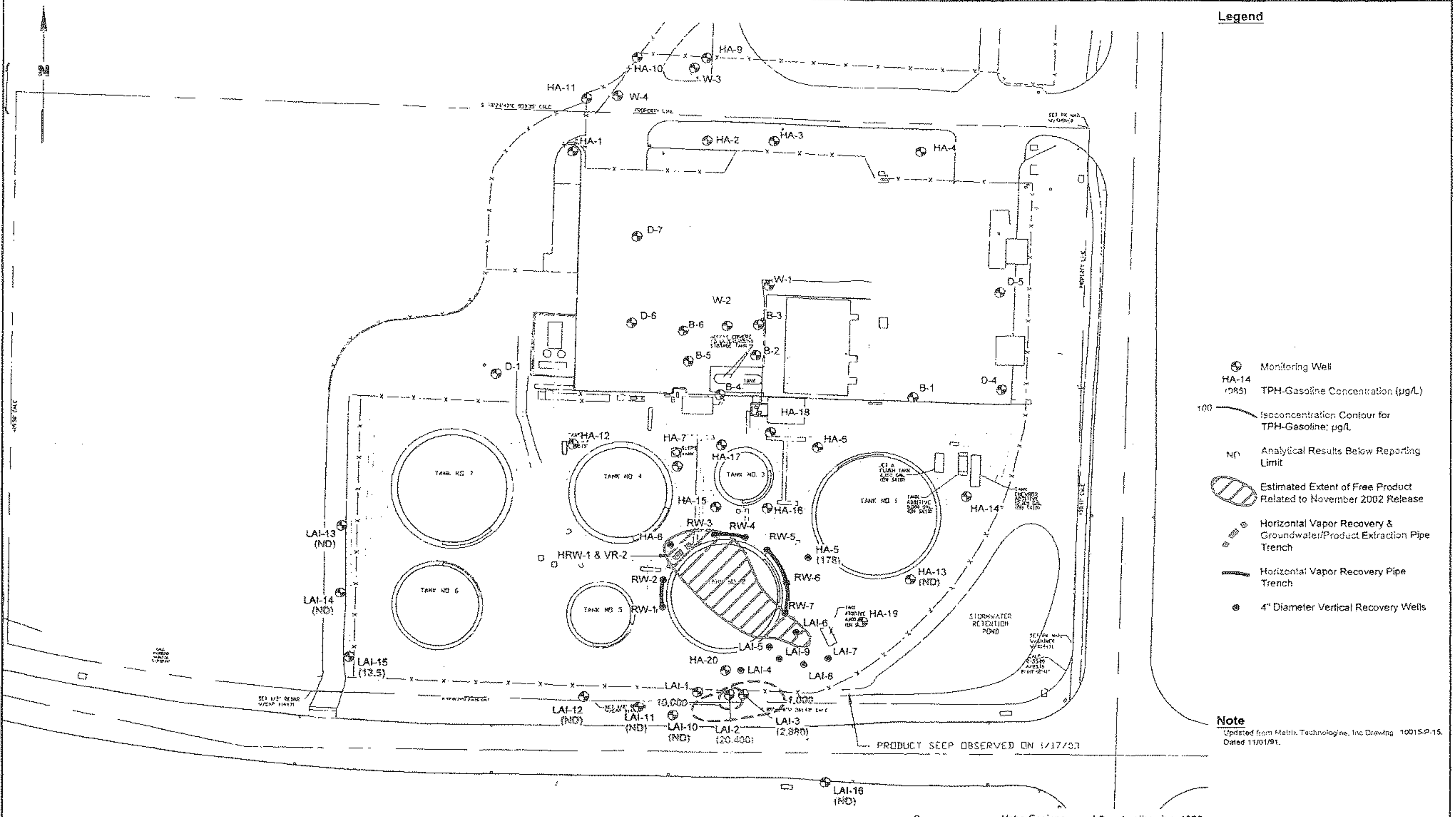
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Benzene Isoconcentration Contours - March 15, 2004

Figure
11

ConocoPhi...ips-Renton\GW Monitoring Report | X:\706\002\022\GW Monitoring Report\Fig12.dwg (A) "Figure 12" 10/25/2004



Note

Updated from Matrix Technologies, Inc Drawing 10015-P-15. Dated 11/01/91.

Base map source: Alpha Engineers and Construction, Inc. 1997

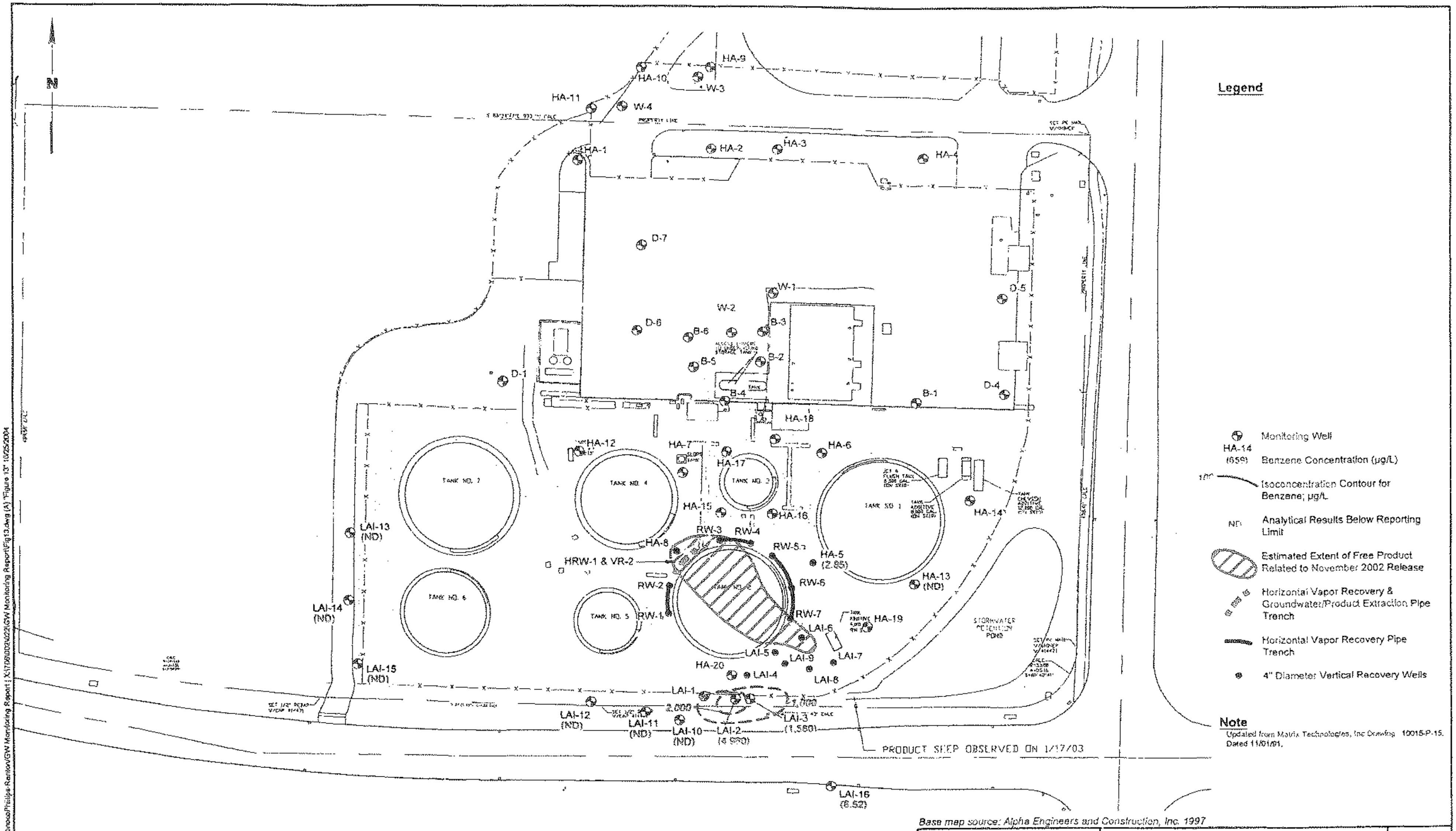
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

TPH-G Isoconcentration Contours - June 2004

Figure
12

ConocoPhillips-Renton\GW Monitoring Report | X:\17051002\022\GW Monitoring Report\Fig13.dwg (A) "Figure 13" 10/25/2004



Legend

⊕	Monitoring Well
HA-14 (659)	Benzene Concentration (µg/L)
100	Isoconcentration Contour for Benzene; µg/L
ND	Analytical Results Below Reporting Limit
▨	Estimated Extent of Free Product Related to November 2002 Release
▨	Horizontal Vapor Recovery & Groundwater/Product Extraction Pipe Trench
▬	Horizontal Vapor Recovery Pipe Trench
●	4" Diameter Vertical Recovery Wells

Note

Updated from Matrix Technologies, Inc Drawing 10015-P-15. Dated 11/01/01.

Base map source: Alpha Engineers and Construction, Inc. 1997

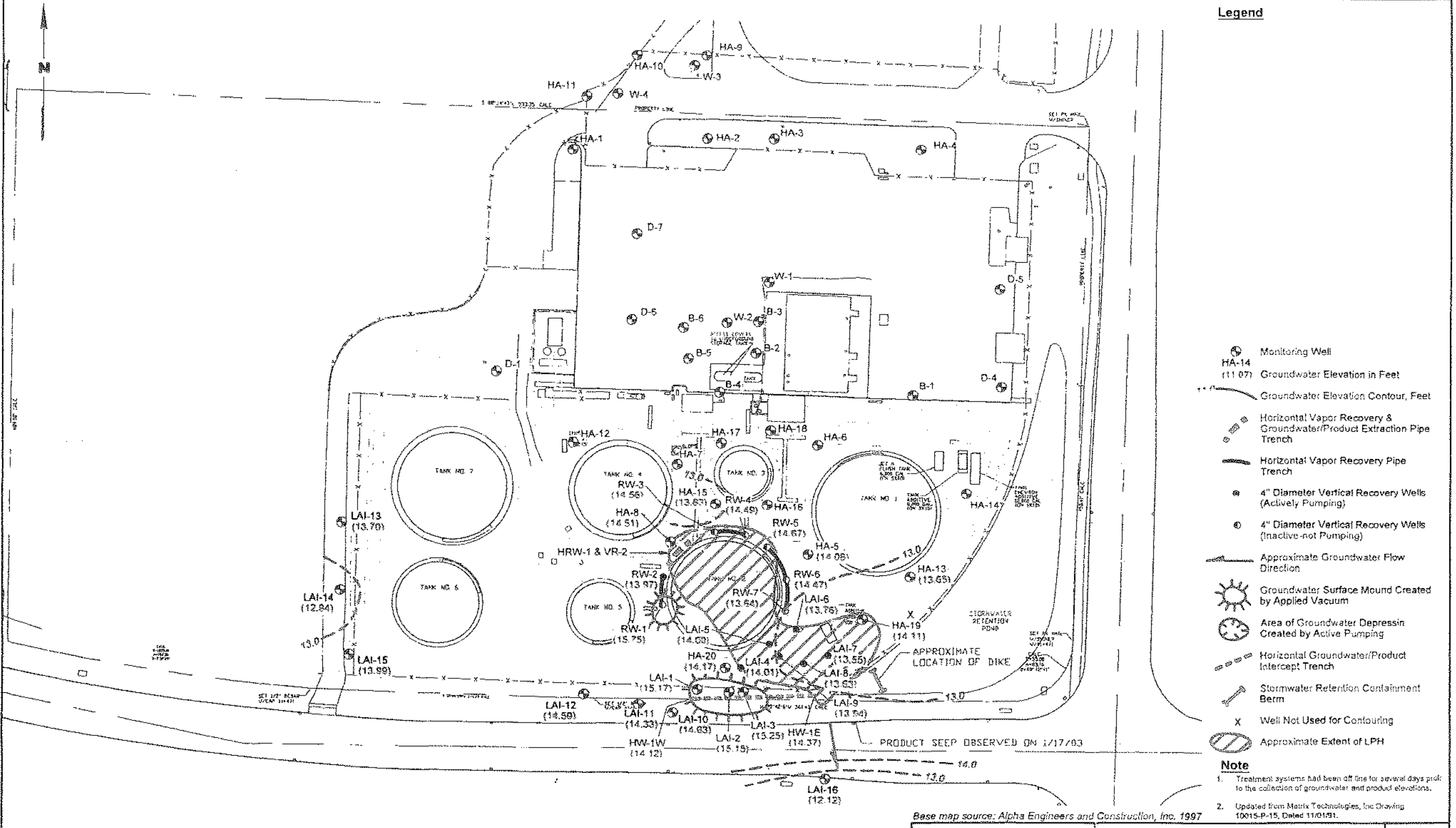
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Benzene Isoconcentration Contours - June 2004

Figure
13

ConocoPhillips-Renton/GW Monitoring Report | X:\706\002\022\GW Monitoring Report\Fig4.dwg (A) "Figure 4" 10/25/2004



Note

1. Treatment systems had been off line for several days prior to the collection of groundwater and product elevations.
2. Updated from Matrix Technologies, Inc Drawing 10015-P-15, Dated 11/01/91.

Base map source: Alpha Engineers and Construction, Inc. 1997

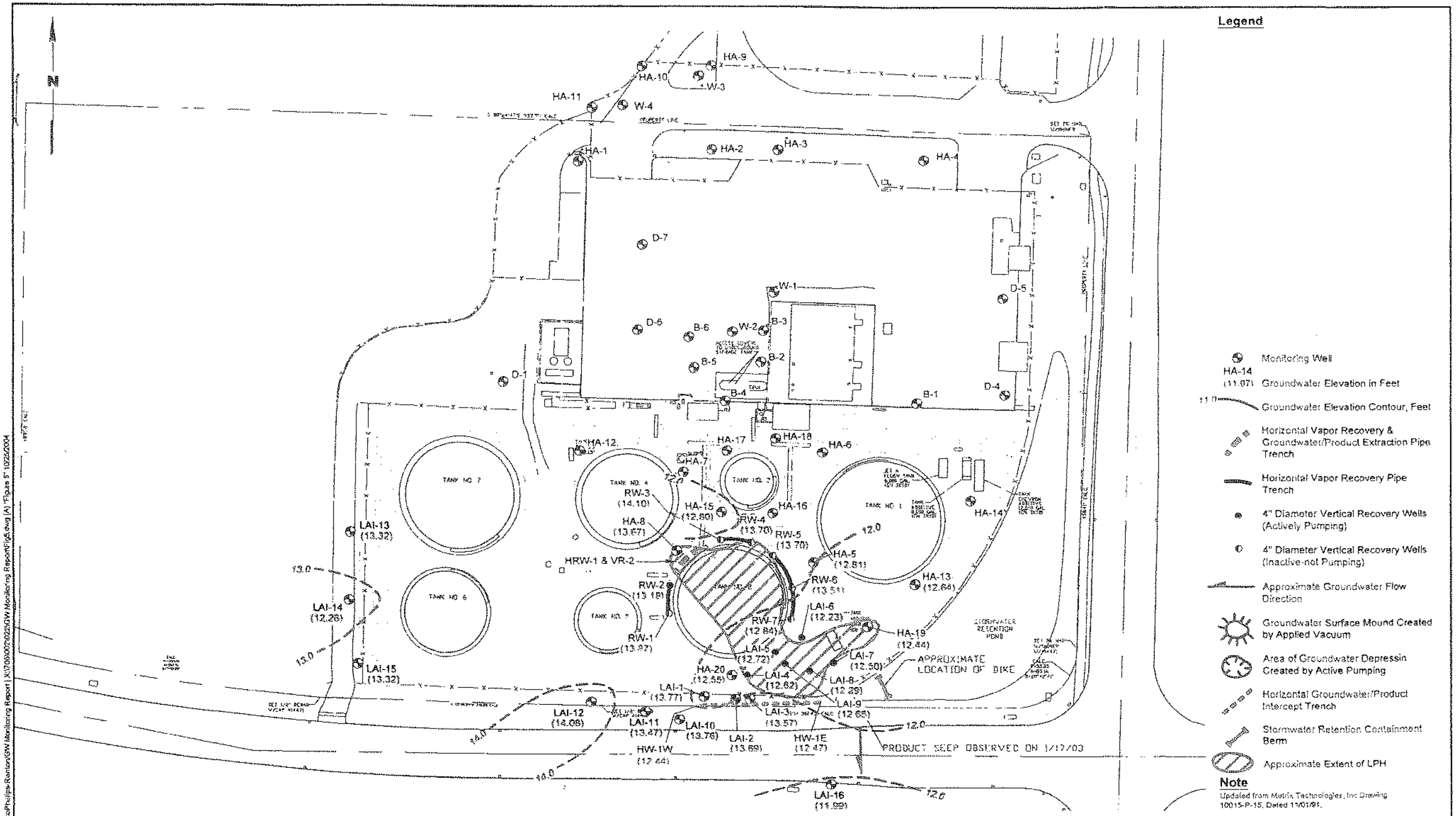
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Potentiometric Map
January 19, 2004

Figure
4

ConocoPhillips-Renton/GW Monitoring Report | X:\706\002\022\GW Monitoring Report\Fig5.dwg (A) "Figure 5" 10/25/2004



Base map source: Alpha Engineers and Construction, Inc. 1997

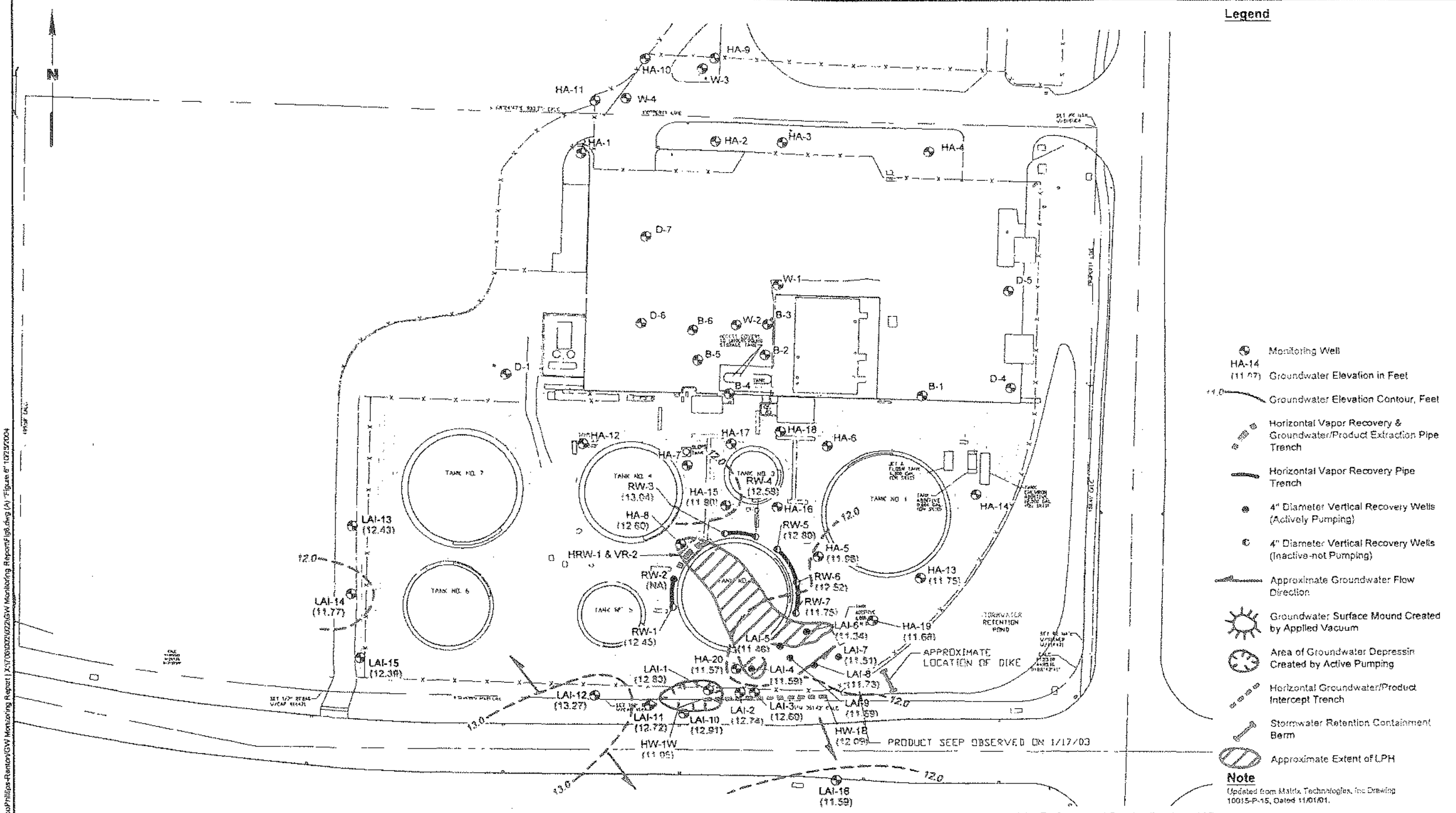
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Potentiometric Map
February 24, 2004

Figure
5

ConocoPhillips-Renton/GW Monitoring Report | X:\706\002\022\GW Monitoring Report\Fig6.dwg (A) "Figure 6" 10/25/2004



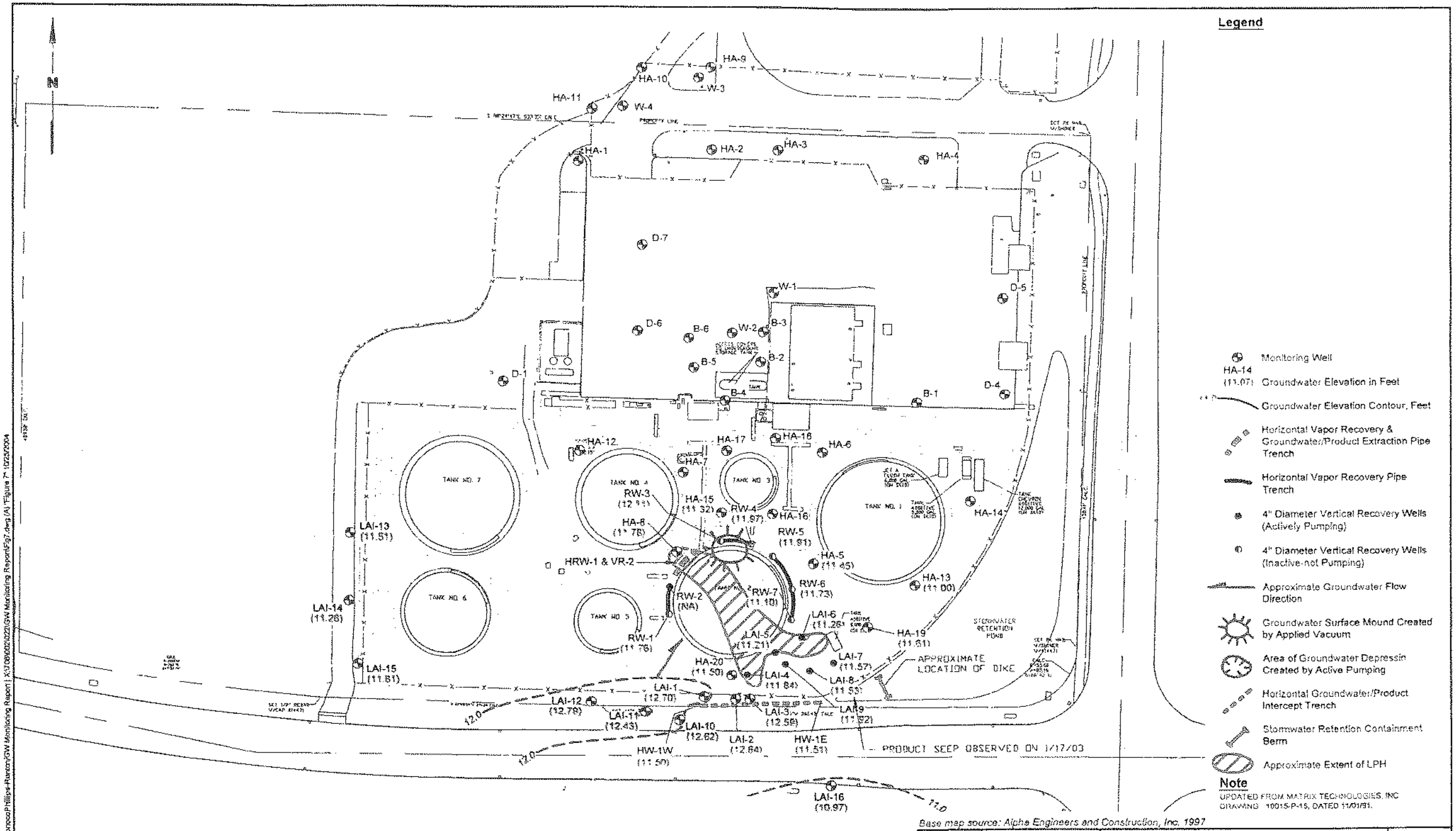
Base map source: Alpha Engineers and Construction, Inc. 1997

LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Potentiometric Map
March 15, 2004

Figure
6



Base map source: Alpha Engineers and Construction, Inc. 1997

ConocoPhillips-Renton/GW Monitoring Report | X:\708\002\022\GW Monitoring Report\Fig7.dwg (A) "Figure 7" 10/25/2004

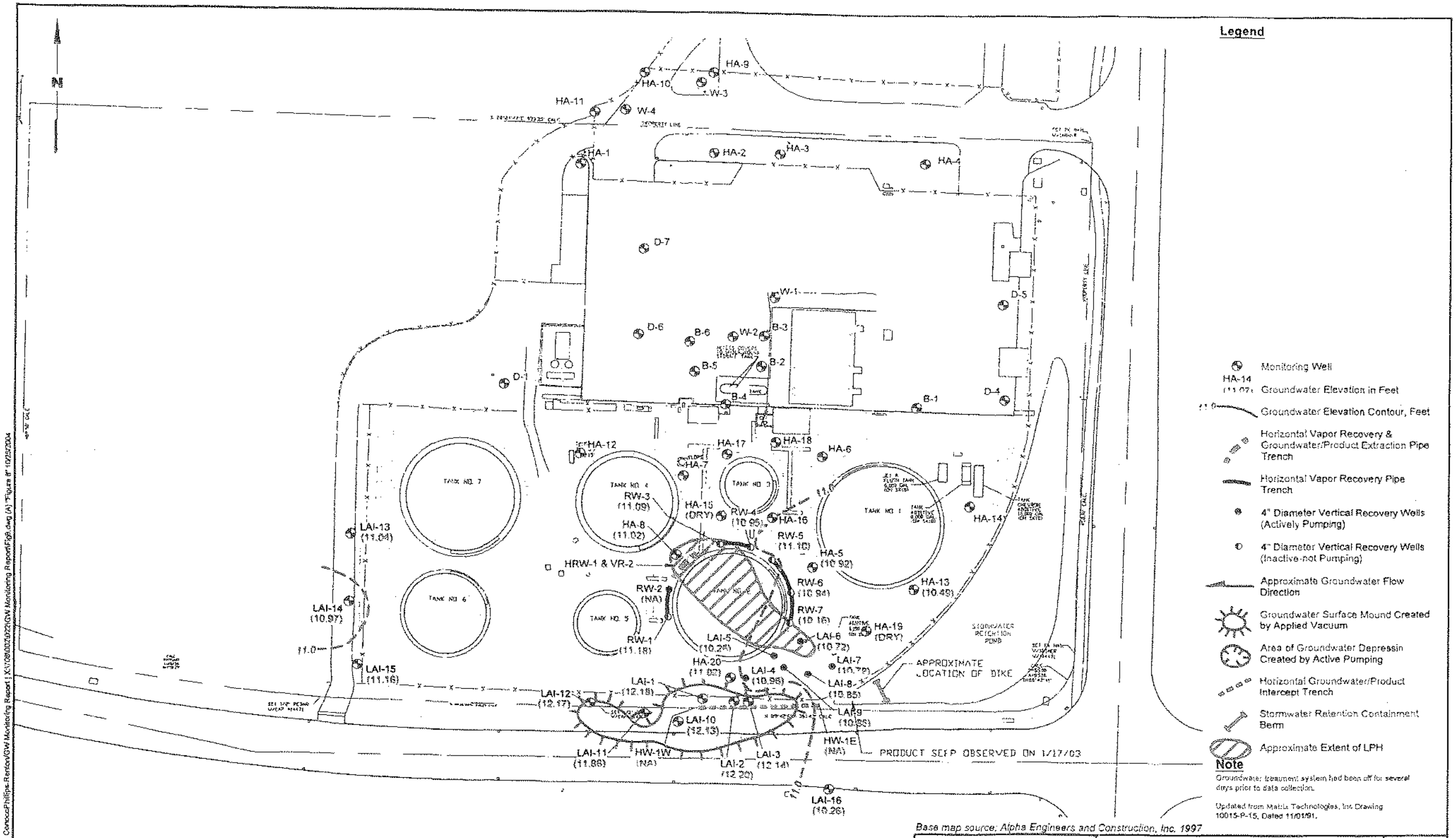
LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Potentiometric Map
April 19, 2004

Figure
7

ConocoPhillips-Renton/GW Monitoring Report | X:\708\002\022\GW Monitoring Report\Fig8.dwg (A) "Figure 8" 10/25/2004



Note

Groundwater treatment system had been off for several days prior to data collection.

Updated from Matrix Technologies, Inc Drawing 10015-P-15, Dated 11/01/91.

Base map source: Alpha Engineers and Construction, Inc. 1997

0 80 160

Scale in Feet

LANDAU ASSOCIATES

ConocoPhillips
2423 Lind Avenue SW
Renton, Washington

Potentiometric Map
May 17, 2004

Figure
8

TABLE 1
STORMWATER POND SOIL ANALYTICAL DATA
CONOCOPHILLIPS RENTON TERMINAL

Location:	B-1	B-2	B-2	D-1	
Depth (ft)	0.5-1.0	1.0-1.5	2.0-2.5	0-0.5	
Lab ID:	B4F0168-01	B4F0168-02	B4F0168-03	B4F0168-04	MTCA
Date Collected:	6/3/2004	6/3/2004	6/3/2004	6/3/2004	Method A
Matrix:	Soil	Soil	Soil	Soil	Level
NWTPH-Gx (mg/kg)					
Gasoline	46.8	8.45	27.3	7.83	30
BETX (mg/kg)					
Method 8021B					
Benzene	2.91	0.169	1.45	0.752	0.03
Toluene	3.01	0.483	0.376	0.379	7
Ethylbenzene	1.07	0.0500 U	0.229	0.200	6
Xylenes (total)	9.30	1.78	0.781	0.771	9
NWTPH-Dx (mg/kg)					
Diesel Range Hydrocarbons	16.4	10.0 U	20.2 U	10.0 U	2,000
Lube Oil Range Hydrocarbons	45.8	25.0 U	50.5 U	25.0 U	2,000
PID Reading, ppm	250	549	59.5	250	

Location:	D-1	
Lab ID:	B4F0168-05	MTCA
Date Collected:	6/3/2004	Method A
Matrix:	Water	Level
NWTPH-Gx (μg/L)		
Gasoline	36200	800
BETX (μg/L)		
Method 8021B		
Benzene	7860	5
Toluene	6920	1000
Ethylbenzene	792	700
Xylenes (total)	3260	1000

U = Indicates the compound was undetected at the reported concentration.

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
HA-1	11/24/2002	19.50	N/A	N/A	N/A	5.71	13.79	13.79	
HA-3	11/24/2002	21.03	N/A	N/A	N/A	9.42	11.61	11.61	
HA-4	11/24/2002	20.24	N/A	N/A	N/A	8.78	11.46	11.46	
HA-5	11/24/2002	18.07	N/A	N/A	N/A	6.80	11.27	11.27	
HA-5	1/17/2003	18.07	4.37	13.70	0.00	4.37	13.70	13.70	
HA-5	1/20/2003	18.07	N/A	N/A	N/A	4.58	13.49	13.49	
HA-5	1/31/2003	18.07	N/A	N/A	N/A	4.49	13.58	13.58	
HA-5	2/7/2003	18.07	N/A	N/A	N/A	4.46	13.61	13.61	
HA-5	2/12/2003	18.07	N/A	N/A	N/A	4.93	13.14	13.14	
HA-5	2/18/2003	18.07	N/A	N/A	N/A	5.30	12.77	12.77	
HA-5	2/21/2003	18.07	N/A	N/A	N/A	5.14	12.93	12.93	
HA-5	2/24/2003	18.07	N/A	N/A	N/A	5.23	12.84	12.84	
HA-5	3/4/2003	18.07	N/A	N/A	N/A	5.55	12.52	12.52	
HA-5	3/12/2003	18.07	N/A	N/A	N/A	5.24	12.83	12.83	
HA-5	3/14/2003	18.07	5.25	12.82	0.01	5.26	12.81	12.82	
HA-5	3/26/2003	18.07	N/A	N/A	N/A	4.41	13.66	13.66	
HA-5	3/28/2003	18.07	N/A	N/A	N/A	4.98	13.09	13.09	
HA-5	4/2/2003	18.07	N/A	N/A	N/A	5.00	13.07	13.07	
HA-5	4/4/2003	18.07	N/A	N/A	N/A	5.44	12.63	12.63	
HA-5	4/8/2003	18.07	N/A	N/A	N/A	5.49	12.58	12.58	
HA-5	4/11/2003	18.07	N/A	N/A	N/A	5.53	12.54	12.54	
HA-5	4/15/2003	18.07	N/A	N/A	N/A	5.06	13.01	13.01	
HA-5	4/17/2003	18.07	N/A	N/A	N/A	5.70	12.37	12.37	
HA-5	4/22/2003	18.07	N/A	N/A	N/A	5.54	12.53	12.53	
HA-5	4/25/2003	18.07	N/A	N/A	N/A	5.92	12.15	12.15	
HA-5	5/2/2003	18.07	N/A	N/A	N/A	5.98	12.09	12.09	
HA-5	5/6/2003	18.07	N/A	N/A	N/A	6.02	12.05	12.05	
HA-5	5/9/2003	18.07	N/A	N/A	N/A	6.34	11.73	11.73	
HA-5	5/23/2003	18.07	N/A	N/A	N/A	6.95	11.12	11.12	
HA-5	5/28/2003	18.07	N/A	N/A	N/A	6.85	11.22	11.22	
HA-5	6/13/2003	18.07	N/A	N/A	N/A	7.22	10.85	10.85	
HA-5	6/18/2003	18.07	N/A	N/A	N/A	7.16	10.91	10.91	
HA-5	6/27/2003	18.07	N/A	N/A	N/A	7.14	10.93	10.93	
HA-5	7/7/2003	18.07	N/A	N/A	N/A	7.47	10.60	10.60	
HA-5	7/16/2003	18.07	N/A	N/A	N/A	7.57	10.50	10.50	
HA-5	7/31/2003	18.07	7.82	10.25	0.01	7.83	10.24	10.25	
HA-5	8/5/2003	18.07	N/A	N/A	N/A	7.90	10.17	10.17	
HA-5	8/11/2003	18.07	N/A	N/A	N/A	9.01	9.06	9.06	
HA-5	8/22/2003	18.07	9.24	8.83	0.01	9.25	8.82	8.83	
HA-5	8/26/2003	18.07	N/A	N/A	N/A	8.19	9.88	9.88	
HA-5	9/2/2003	18.07	N/A	N/A	N/A	8.48	9.59	9.59	
HA-5	9/9/2003	18.07	N/A	N/A	N/A	8.93	9.14	9.14	
HA-5	9/19/2003	18.07	8.80	9.27	0.01	8.81	9.26	9.27	
HA-5	10/14/2003	18.07	N/A	N/A	N/A	N/A	N/A	N/A	Bailer in well
HA-5	11/20/2003	18.07	N/A	N/A	N/A	N/A	N/A	N/A	Submerged well cap
HA-5	12/3/2003	18.07	N/A	N/A	N/A	4.44	13.63	13.63	Bailer in well
HA-5	1/19/2004	18.07	N/A	N/A	N/A	3.99	14.08	14.08	
HA-5	2/24/2004	18.07	N/A	N/A	N/A	5.26	12.81	12.81	
HA-5	3/15/2004	18.07	N/A	N/A	N/A	6.11	11.96	11.96	
HA-5	4/19/2004	18.07	N/A	N/A	N/A	6.62	11.45	11.45	
HA-5	5/17/2004	18.07	N/A	N/A	N/A	7.15	10.92	10.92	
HA-5	6/22/2004	18.07	N/A	N/A	N/A	6.98	11.09	11.09	
HA-6	11/24/2002	18.16	N/A	N/A	N/A	7.12	11.04	11.04	
HA-7	11/24/2002	18.44	N/A	N/A	N/A	7.25	11.19	11.19	
HA-8	11/24/2002	18.88	N/A	N/A	N/A	7.40	11.48	11.48	
HA-8	1/31/2003	18.88	N/A	N/A	N/A	4.04	14.84	14.84	
HA-8	2/7/2003	18.88	N/A	N/A	N/A	4.16	14.72	14.72	
HA-8	2/12/2003	18.88	N/A	N/A	N/A	4.71	14.17	14.17	
HA-8	2/18/2003	18.88	N/A	N/A	N/A	4.99	13.89	13.89	
HA-8	2/21/2003	18.88	N/A	N/A	N/A	5.16	13.72	13.72	
HA-8	2/24/2003	18.88	N/A	N/A	N/A	5.21	13.67	13.67	
HA-8	3/4/2003	18.88	N/A	N/A	N/A	5.89	12.99	12.99	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
HA-8	3/12/2003	18.88	N/A	N/A	N/A	5.36	13.52	13.52	
HA-8	3/14/2003	18.88	5.21	13.67	0.01	5.22	13.66	13.67	
HA-8	3/26/2003	18.88	N/A	N/A	N/A	4.74	14.14	14.14	
HA-8	3/28/2003	18.88	N/A	N/A	N/A	5.21	13.67	13.67	
HA-8	4/2/2003	18.88	N/A	N/A	N/A	5.25	13.63	13.63	
HA-8	4/4/2003	18.88	N/A	N/A	N/A	5.57	13.31	13.31	
HA-8	4/8/2003	18.88	N/A	N/A	N/A	5.57	13.31	13.31	
HA-8	4/11/2003	18.88	N/A	N/A	N/A	5.77	13.11	13.11	
HA-8	4/15/2003	18.88	N/A	N/A	N/A	5.41	13.47	13.47	
HA-8	4/17/2003	18.88	N/A	N/A	N/A	5.91	12.97	12.97	
HA-8	4/22/2003	18.88	N/A	N/A	N/A	6.07	12.81	12.81	
HA-8	4/25/2003	18.88	N/A	N/A	N/A	6.37	12.51	12.51	
HA-8	5/2/2003	18.88	N/A	N/A	N/A	6.44	12.44	12.44	
HA-8	5/6/2003	18.88	N/A	N/A	N/A	6.62	12.26	12.26	
HA-8	5/9/2003	18.88	N/A	N/A	N/A	6.92	11.96	11.96	
HA-8	5/23/2003	18.88	N/A	N/A	N/A	7.38	11.50	11.50	
HA-8	5/28/2003	18.88	N/A	N/A	N/A	7.34	11.54	11.54	
HA-8	6/13/2003	18.88	N/A	N/A	N/A	7.66	11.22	11.22	
HA-8	6/18/2003	18.88	N/A	N/A	N/A	7.60	11.28	11.28	
HA-8	6/27/2003	18.88	N/A	N/A	N/A	7.65	11.23	11.23	
HA-8	7/7/2003	18.88	N/A	N/A	N/A	8.51	10.37	10.37	
HA-8	7/16/2003	18.88	N/A	N/A	N/A	8.24	10.64	10.64	
HA-8	7/31/2003	18.88	N/A	N/A	N/A	8.61	10.27	10.27	
HA-8	8/5/2003	18.88	N/A	N/A	N/A	9.62	9.26	9.26	
HA-8	8/11/2003	18.88	N/A	N/A	N/A	9.70	9.18	9.18	
HA-8	8/22/2003	18.88	10.02	8.86	0.01	10.03	8.85	8.86	
HA-8	8/26/2003	18.88	N/A	N/A	N/A	8.99	9.89	9.89	
HA-8	9/2/2003	18.88	N/A	N/A	N/A	9.02	9.86	9.86	
HA-8	9/9/2003	18.88	9.51	9.37	0.01	9.52	9.36	9.37	
HA-8	9/19/2003	18.88	10.40	8.48	0.10	10.50	8.38	8.46	
HA-8	10/14/2003	18.88	N/A	N/A	N/A	N/A	N/A	N/A	Bailer in well
HA-8	11/20/2003	18.88	7.22	11.66	0.32	7.54	11.34	11.58	
HA-8	12/3/2003	18.88	4.65	14.23	0.57	5.22	13.66	14.09	
HA-8	1/19/2004	18.88	4.23	14.65	0.55	4.78	14.10	14.51	
HA-8	2/24/2004	18.88	5.08	13.80	0.53	5.61	13.27	13.67	
HA-8	3/15/2004	18.88	6.15	12.73	0.51	6.66	12.22	12.60	
HA-8	4/19/2004	18.88	6.98	11.90	0.50	7.48	11.40	11.78	
HA-8	5/17/2004	18.88	7.74	11.14	0.49	8.23	10.65	11.02	
HA-8	6/22/2004	18.88	7.57	11.31	0.51	8.08	10.80	11.18	
HA-9	11/24/2002	19.40	N/A	N/A	N/A	8.20	11.20	11.20	
HA-10	11/24/2002	19.33	N/A	N/A	N/A	8.49	10.84	10.84	
HA-11	11/24/2002	18.51	N/A	N/A	N/A	8.33	10.18	10.18	
HA-12	11/24/2002	19.91	N/A	N/A	N/A	7.43	12.48	12.48	
HA-13	11/24/2002	19.56	N/A	N/A	N/A	8.60	10.96	10.96	
HA-13	1/17/2003	19.56	N/A	N/A	N/A	6.30	13.26	13.26	
HA-13	1/31/2003	19.56	N/A	N/A	N/A	4.49	15.07	15.07	
HA-13	2/7/2003	19.56	N/A	N/A	N/A	6.27	13.29	13.29	
HA-13	2/12/2003	19.56	N/A	N/A	N/A	6.78	12.78	12.78	
HA-13	2/18/2003	19.56	N/A	N/A	N/A	7.13	12.43	12.43	
HA-13	2/21/2003	19.56	N/A	N/A	N/A	6.99	12.57	12.57	
HA-13	2/24/2003	19.56	N/A	N/A	N/A	6.98	12.58	12.58	
HA-13	3/4/2003	19.56	N/A	N/A	N/A	7.49	12.07	12.07	
HA-13	3/12/2003	19.56	N/A	N/A	N/A	6.48	13.08	13.08	
HA-13	3/14/2003	19.56	N/A	N/A	N/A	5.16	14.40	14.40	
HA-13	3/26/2003	19.56	N/A	N/A	N/A	5.65	13.91	13.91	
HA-13	3/28/2003	19.56	N/A	N/A	N/A	6.34	13.22	13.22	
HA-13	4/2/2003	19.56	N/A	N/A	N/A	6.74	12.82	12.82	
HA-13	4/4/2003	19.56	N/A	N/A	N/A	7.08	12.48	12.48	
HA-13	4/8/2003	19.56	N/A	N/A	N/A	7.17	12.39	12.39	
HA-13	4/11/2003	19.56	N/A	N/A	N/A	7.31	12.25	12.25	
HA-13	4/15/2003	19.56	N/A	N/A	N/A	6.93	12.63	12.63	
HA-13	4/17/2003	19.56	N/A	N/A	N/A	7.32	12.24	12.24	
HA-13	4/22/2003	19.56	N/A	N/A	N/A	7.52	12.04	12.04	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
HA-13	4/25/2003	19.56	N/A	N/A	N/A	7.81	11.75	11.75	
HA-13	5/2/2003	19.56	N/A	N/A	N/A	8.04	11.52	11.52	
HA-13	5/6/2003	19.56	N/A	N/A	N/A	8.13	11.43	11.43	
HA-13	5/9/2003	19.56	N/A	N/A	N/A	8.36	11.20	11.20	
HA-13	5/23/2003	19.56	N/A	N/A	N/A	8.93	10.63	10.63	
HA-13	5/28/2003	19.56	N/A	N/A	N/A	8.98	10.58	10.58	
HA-13	6/13/2003	19.56	N/A	N/A	N/A	6.08	13.48	13.48	
HA-13	6/18/2003	19.56	N/A	N/A	N/A	9.12	10.44	10.44	
HA-13	6/27/2003	19.56	N/A	N/A	N/A	9.07	10.49	10.49	
HA-13	7/7/2003	19.56	N/A	N/A	N/A	9.55	10.01	10.01	
HA-13	7/16/2003	19.56	N/A	N/A	N/A	9.42	10.14	10.14	
HA-13	7/31/2003	19.56	N/A	N/A	N/A	9.59	9.97	9.97	
HA-13	8/5/2003	19.56	N/A	N/A	N/A	9.63	9.93	9.93	
HA-13	8/11/2003	19.56	N/A	N/A	N/A	10.75	8.81	8.81	
HA-13	8/22/2003	19.56	N/A	N/A	N/A	11.26	8.30	8.30	
HA-13	8/26/2003	19.56	N/A	N/A	N/A	9.87	9.69	9.69	
HA-13	9/2/2003	19.56	N/A	N/A	N/A	10.31	9.25	9.25	
HA-13	9/9/2003	19.56	N/A	N/A	N/A	10.46	9.10	9.10	
HA-13	9/19/2003	19.56	N/A	N/A	N/A	10.46	9.10	9.10	
HA-13	10/14/2003	19.56	N/A	N/A	N/A	N/A	N/A	N/A	Bailer in well
HA-13	11/20/2003	19.56	N/A	N/A	N/A	5.70	13.86	13.86	
HA-13	12/3/2003	19.56	N/A	N/A	N/A	5.91	13.65	13.65	
HA-13	1/19/2004	19.56	N/A	N/A	N/A	5.91	13.65	13.65	
HA-13	2/24/2004	19.56	N/A	N/A	N/A	6.92	12.64	12.64	
HA-13	3/15/2004	19.56	N/A	N/A	N/A	7.81	11.75	11.75	
HA-13	4/19/2004	19.56	N/A	N/A	N/A	8.56	11.00	11.00	
HA-13	5/17/2004	19.56	N/A	N/A	N/A	9.07	10.49	10.49	
HA-13	6/22/2004	19.56	N/A	N/A	N/A	8.98	10.58	10.58	
HA-14	11/24/2002	20.02	N/A	N/A	N/A	9.67	10.35	10.35	
HA-15	1/31/2003	19.12	N/A	N/A	N/A	5.56	13.56	13.56	
HA-15	2/7/2003	19.12	N/A	N/A	N/A	5.31	13.81	13.81	
HA-15	2/12/2003	19.12	N/A	N/A	N/A	5.64	13.48	13.48	
HA-15	2/18/2003	19.12	N/A	N/A	N/A	6.09	13.03	13.03	
HA-15	2/21/2003	19.12	N/A	N/A	N/A	7.92	11.20	11.20	
HA-15	2/24/2003	19.12	N/A	N/A	N/A	6.04	13.08	13.08	
HA-15	3/4/2003	19.12	N/A	N/A	N/A	6.62	12.50	12.50	
HA-15	3/12/2003	19.12	N/A	N/A	N/A	6.02	13.10	13.10	
HA-15	3/26/2003	19.12	N/A	N/A	N/A	5.46	13.66	13.66	
HA-15	3/28/2003	19.12	N/A	N/A	N/A	5.96	13.16	13.16	
HA-15	4/2/2003	19.12	N/A	N/A	N/A	5.91	13.21	13.21	
HA-15	4/4/2003	19.12	N/A	N/A	N/A	6.22	12.90	12.90	
HA-15	4/8/2003	19.12	N/A	N/A	N/A	6.42	12.70	12.70	
HA-15	4/11/2003	19.12	N/A	N/A	N/A	6.63	12.49	12.49	
HA-15	4/15/2003	19.12	N/A	N/A	N/A	6.28	12.84	12.84	
HA-15	4/17/2003	19.12	N/A	N/A	N/A	6.49	12.63	12.63	
HA-15	4/22/2003	19.12	N/A	N/A	N/A	6.66	12.46	12.46	
HA-15	4/25/2003	19.12	N/A	N/A	N/A	7.07	12.05	12.05	
HA-15	5/2/2003	19.12	N/A	N/A	N/A	7.06	12.06	12.06	
HA-15	5/6/2003	19.12	N/A	N/A	N/A	7.32	11.80	11.80	
HA-15	5/9/2003	19.12	N/A	N/A	N/A	7.52	11.60	11.60	
HA-15	5/23/2003	19.12	N/A	N/A	N/A	7.83	11.29	11.29	
HA-15	5/28/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	6/13/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	6/18/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	6/27/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	7/7/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	7/16/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	7/31/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	8/5/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	8/11/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	8/22/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	8/26/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	9/2/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	9/9/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	9/19/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	10/14/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
HA-15	11/20/2003	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	12/3/2003	19.12	N/A	N/A	N/A	6.08	13.04	13.04	
HA-15	1/19/2004	19.12	N/A	N/A	N/A	5.49	13.63	13.63	
HA-15	2/24/2004	19.12	N/A	N/A	N/A	6.32	12.80	12.80	
HA-15	3/15/2004	19.12	N/A	N/A	N/A	7.32	11.80	11.80	
HA-15	4/19/2004	19.12	N/A	N/A	N/A	7.80	11.32	11.32	
HA-15	5/17/2004	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-15	6/22/2004	19.12	N/A	N/A	N/A	Dry	Dry	Dry	
HA-16	12/5/2002	19.01	7.60	11.41	0.05	7.65	11.36	11.40	
HA-16	12/11/2002	19.01	7.40	11.61	0.68	8.08	10.93	11.44	
HA-16	12/13/2002	19.01	7.33	11.68	0.96	8.29	10.72	11.44	
HA-16	12/17/2002	19.01	6.67	12.34	1.54	8.21	10.80	11.96	
HA-16	1/2/2003	19.01	5.60	13.41	0.22	5.82	13.19	13.36	
HA-16	1/6/2003	19.01	5.08	13.93	0.02	5.1	13.91	13.93	
HA-16	1/7/2003	19.01	5.05	13.96	0.02	5.07	13.94	13.96	
HA-16	1/8/2003	19.01	4.95	14.06	0.03	4.98	14.03	14.05	
HA-16	1/9/2003	19.01	4.92	14.09	0.02	4.94	14.07	14.09	
HA-16	1/10/2003	19.01	4.94	14.07	0.02	4.96	14.05	14.07	
HA-16	1/14/2003	19.01	3.09	15.92	2.03	5.12	13.89	15.41	
HA-16	1/15/2003	19.01	5.00	14.01	0.05	5.05	13.96	14.00	
HA-16	1/16/2003	19.01	4.92	14.09	0.04	4.96	14.05	14.08	
HA-16	1/17/2003	19.01	4.95	14.06	0.02	4.97	14.04	14.06	
HA-16	1/20/2003	19.01	4.98	14.03	0.04	5.02	13.99	14.02	
HA-16	5/28/2003	19.01	7.35	11.66	0.77	8.12	10.89	11.47	
HA-17	8/11/2003		N/A	N/A	N/A	Dry	Dry	Dry	
HA-17	3/15/2004		N/A	N/A	N/A	6.66			Need MP Elev
HA-18	8/11/2003		N/A	N/A	N/A	Dry	Dry	Dry	
HA-18	3/15/2004		6.47			6.47			Need MP Elev
HA-19	--	19.62	--	--	--	--	--	--	
HA-19	4/2/2003	19.62	N/A	N/A	N/A	4.61	15.01	15.01	
HA-19	4/4/2003	19.62	7.10	N/A	N/A	7.13	12.49	12.49	
HA-19	4/8/2003	19.62	6.61			6.62	13.01	13.01	
HA-19	4/11/2003	19.62	5.69	13.93	0.00	5.69	13.93	13.93	
HA-19	4/15/2003	19.62	N/A	N/A	N/A	4.26	15.36	15.36	
HA-19	4/17/2003	19.62	N/A	N/A	N/A	5.62	14.00	14.00	
HA-19	4/22/2003	19.62	7.21	12.41	0.01	7.22	12.40	12.41	
HA-19	4/25/2003	19.62	7.23	12.39	0.00	7.23	12.39	12.39	
HA-19	5/2/2003	19.62	N/A	N/A	N/A	7.87	11.75	11.75	
HA-19	5/6/2003	19.62	N/A	N/A	N/A	7.80	11.82	11.82	
HA-19	5/9/2003	19.62	N/A	N/A	N/A	8.00	11.62	11.62	
HA-19	5/23/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	5/28/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	6/13/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	6/18/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	6/27/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	7/7/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	7/16/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	7/31/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	8/5/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	8/11/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	8/22/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	8/26/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	9/2/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	9/9/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	9/19/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	10/14/2003	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	11/20/2003	19.62	N/A	N/A	N/A	4.74	14.88	14.88	
HA-19	12/3/2003	19.62	N/A	N/A	N/A	5.35	14.27	14.27	
HA-19	1/19/2004	19.62	5.51	14.11	0.005	5.52	14.11	14.11	
HA-19	2/24/2004	19.62	7.18	12.44	0.005	7.19	12.44	12.44	
HA-19	3/15/2004	19.62	N/A	N/A	N/A	7.94	11.68	11.68	
HA-19	4/19/2004	19.62	N/A	N/A	N/A	8.01	11.61	11.61	
HA-19	5/17/2004	19.62	N/A	N/A	N/A	Dry	Dry	Dry	
HA-19	6/22/2004	19.62	N/A	N/A	N/A	Dry	Dry	Dry	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
HA-20	11/24/2002	18.17	N/A	N/A	N/A	7.49	10.68	10.68	
HA-20	11/27/2002	17.46	6.46	11.00	3.51	9.97	7.49	10.12	
HA-20	12/5/2002	17.46	6.25	11.21	3.57	9.82	7.64	10.32	
HA-20	12/11/2002	17.46	6.25	11.21	3.48	9.73	7.73	10.34	
HA-20	12/13/2002	17.46	6.12	11.34	3.55	9.67	7.79	10.45	
HA-20	12/17/2002	17.46	5.29	12.17	4.20	9.49	7.97	11.12	
HA-20	1/3/2003	17.46	3.26	14.20	4.39	7.65	9.81	13.10	
HA-20	1/6/2003	17.46	3.83	13.63	3.10	6.93	10.53	12.86	
HA-20	1/7/2003	17.46	4.45	13.01	1.16	5.61	11.85	12.72	
HA-20	1/8/2003	17.46	4.22	13.24	1.57	5.79	11.67	12.85	
HA-20	1/9/2003	17.46	3.97	13.49	3.11	7.08	10.38	12.71	
HA-20	1/10/2003	17.46	4.04	13.42	3.24	7.28	10.18	12.61	
HA-20	1/13/2003	17.46	4.75	12.71	0.92	5.67	11.79	12.48	
HA-20	1/14/2003	17.46	4.15	13.31	3.47	7.62	9.84	12.44	
HA-20	1/15/2003	17.46	4.05	13.41	3.10	7.15	10.31	12.64	
HA-20	1/16/2003	17.46	4.15	13.31	2.90	7.05	10.41	12.59	
HA-20	1/17/2003	17.46	4.18	13.28	2.82	7.00	10.46	12.58	
HA-20	1/20/2003	17.46	4.15	13.31	3.09	7.24	10.22	12.54	
HA-20	1/22/2003	17.46	3.30	14.16	6.50	9.80	7.66	12.54	
HA-20	1/23/2003	17.46	4.80	12.66	3.78	8.58	8.88	11.72	
HA-20	1/24/2003	17.46	4.55	12.91	3.66	8.21	9.25	12.00	
HA-20	1/27/2003	17.46	3.68	13.78	2.96	6.64	10.82	13.04	
HA-20	1/28/2003	17.46	3.82	13.64	3.68	7.50	9.96	12.72	
HA-20	1/29/2003	17.46	4.05	13.41	4.44	8.49	8.97	12.30	
HA-20	1/30/2003	17.46	4.26	13.20	4.06	8.32	9.14	12.19	
HA-20	2/3/2003	17.46	4.33	13.13	3.17	7.50	9.96	12.34	
HA-20	2/6/2003	20.01	4.59	15.42	1.80	6.39	13.62	14.97	
HA-20	2/11/2003	20.01	6.18	13.83	2.39	8.57	11.44	13.23	
HA-20	2/18/2003	20.01	7.40	12.61	0.88	8.28	11.73	12.39	
HA-20	2/21/2003	20.01	7.34	12.67	0.73	8.07	11.94	12.49	
HA-20	2/26/2003	20.01	6.09	13.92	0.11	6.20	13.81	13.89	
HA-20	3/4/2003	20.01	7.47	12.54	1.87	9.34	10.67	12.07	
HA-20	3/12/2003	20.01	7.05	12.96	2.63	9.68	10.33	12.30	
HA-20	3/14/2003	20.01	7.14	12.87	2.27	9.41	10.60	12.30	
HA-20	3/26/2003	20.01	5.64	14.37	3.93	9.57	10.44	13.39	
HA-20	3/28/2003	20.01	6.91	13.10	2.50	9.41	10.60	12.48	
HA-20	4/2/2003	20.01	6.47	13.54	2.65	9.12	10.89	12.88	
HA-20	4/4/2003	20.01	7.01	13.00	2.13	9.14	10.87	12.47	
HA-20	4/8/2003	20.01	7.16	12.85	1.49	8.65	11.36	12.48	
HA-20	4/11/2003	20.01	7.21	12.80	1.66	8.87	11.14	12.39	
HA-20	4/15/2003	20.01	6.91	13.10	0.40	7.31	12.70	13.00	
HA-20	4/17/2003	20.01	7.71	12.30	1.00	8.71	11.30	12.05	
HA-20	4/22/2003	20.01	7.28	12.73	1.39	8.67	11.34	12.38	
HA-20	4/25/2003	20.01	7.72	12.29	1.24	8.96	11.05	11.98	
HA-20	5/2/2003	20.01	7.46	12.55	2.41	9.87	10.14	11.95	
HA-20	5/6/2003	20.01	7.38	12.63	2.49	9.87	10.14	12.01	
HA-20	5/9/2003	20.01	8.05	11.96	1.95	10.00	10.01	11.47	
HA-20	5/23/2003	20.01	8.69	11.32	1.76	10.45	9.56	10.88	
HA-20	5/28/2003	20.01	8.50	11.51	1.49	9.99	10.02	11.14	
HA-20	6/13/2003	20.01	8.75	11.26	1.46	10.21	9.80	10.90	
HA-20	6/18/2003	20.01	8.68	11.33	1.57	10.25	9.76	10.94	
HA-20	6/27/2003	20.01	8.70	11.31	1.64	10.34	9.67	10.90	
HA-20	7/7/2003	20.01	9.64	10.37	0.73	10.37	9.64	10.19	
HA-20	7/16/2003	20.01	9.11	10.90	1.43	10.54	9.47	10.54	
HA-20	7/31/2003	20.01	9.40	10.61	1.48	10.88	9.13	10.24	
HA-20	8/5/2003	20.01	9.50	10.51	1.25	10.75	9.26	10.20	
HA-20	8/11/2003	20.01	10.65	9.36	1.37	12.02	7.99	9.02	
HA-20	8/22/2003	20.01	10.91	9.10	1.29	12.20	7.81	8.78	
HA-20	8/26/2003	20.01	N/A	N/A	N/A	9.81	10.20	10.20	
HA-20	9/2/2003	20.01	9.94	10.07	1.33	11.27	8.74	9.74	
HA-20	9/9/2003	20.01	10.40	9.61	0.36	10.76	9.25	9.52	
HA-20	9/19/2003	20.01	10.38	9.63	0.24	10.62	9.39	9.57	
HA-20	10/14/2003	20.01	10.26	9.75	0.75	11.01	9.00	9.56	
HA-20	11/20/2003	20.01	N/A	N/A	N/A	7.20	12.81	12.81	
HA-20	12/3/2003	20.01	N/A	N/A	N/A	6.21	13.80	13.80	
HA-20	1/19/2004	20.01	N/A	N/A	N/A	5.84	14.17	14.17	
HA-20	2/24/2004	20.01	N/A	N/A	N/A	7.46	12.55	12.55	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
HA-20	3/15/2004	20.01	N/A	N/A	N/A	8.44	11.57	11.57	Oily trace
HA-20	4/19/2004	20.01	N/A	N/A	N/A	8.51	11.50	11.50	Trace product
HA-20	5/17/2004	20.01	N/A	N/A	N/A	8.99	11.02	11.02	
HA-20	6/22/2004	20.01	N/A	N/A	N/A	8.83	11.18	11.18	
LAI-1	1/17/2003	18.99	N/A	N/A	N/A	4.17	14.82	14.82	
LAI-1	1/20/2003	18.99	N/A	N/A	N/A	4.18	14.81	14.81	
LAI-1	1/31/2003	18.99	N/A	N/A	N/A	4.28	14.71	14.71	
LAI-1	2/7/2003	18.99	4.06	14.93	0.48	4.54	14.45	14.81	
LAI-1	2/12/2003	18.99	4.38	14.61	1.08	5.46	13.53	14.34	
LAI-1	2/18/2003	18.99	N/A	N/A	N/A	5.40	13.59	13.59	
LAI-1	2/21/2003	18.99	N/A	N/A	N/A	5.52	13.47	13.47	
LAI-1	2/24/2003	18.99	N/A	N/A	N/A	5.96	13.03	13.03	
LAI-1	3/3/2003	18.99	N/A	N/A	N/A	5.76	13.23	13.23	
LAI-1	3/12/2003	18.99	N/A	N/A	N/A	5.48	13.51	13.51	
LAI-1	3/14/2003	18.99	N/A	N/A	N/A	5.09	13.90	13.90	
LAI-1	3/26/2003	18.99	N/A	N/A	N/A	4.76	14.23	14.23	
LAI-1	3/28/2003	18.99	N/A	N/A	N/A	4.86	14.13	14.13	
LAI-1	4/2/2003	18.99	5.21	13.78	0.01	5.22	13.77	13.78	
LAI-1	4/4/2003	18.99	5.19	13.80	0.01	5.20	13.79	13.80	
LAI-1	4/8/2003	18.99	5.67	13.32	0.01	5.68	13.31	13.32	
LAI-1	4/11/2003	18.99	5.07	13.92	0.01	5.08	13.91	13.92	
LAI-1	4/15/2003	18.99	4.62	14.37	0.01	4.63	14.36	14.37	
LAI-1	4/17/2003	18.99	6.14	12.85	0.01	6.15	12.84	12.85	
LAI-1	4/22/2003	18.99	N/A	N/A	N/A	5.21	13.78	13.78	
LAI-1	4/25/2003	18.99	N/A	N/A	N/A	5.43	13.56	13.56	
LAI-1	5/2/2003	18.99	N/A	N/A	N/A	5.53	13.46	13.46	
LAI-1	5/6/2003	18.99	N/A	N/A	N/A	5.66	13.33	13.33	
LAI-1	5/9/2003	18.99	N/A	N/A	N/A	6.15	12.84	12.84	
LAI-1	5/16/2003	18.99	N/A	N/A	N/A	6.40	12.59	12.59	
LAI-1	5/23/2003	18.99	6.50	12.49	0.01	6.51	12.48	12.49	
LAI-1	5/28/2003	18.99	6.45	12.54	0.01	6.46	12.53	12.54	
LAI-1	6/13/2003	18.99	6.79	12.20	0.01	6.80	12.19	12.20	
LAI-1	6/18/2003	18.99	N/A	N/A	N/A	6.78	12.21	12.21	
LAI-1	6/27/2003	18.99	N/A	N/A	N/A	6.81	12.18	12.18	
LAI-1	7/7/2003	18.99	N/A	N/A	N/A	7.41	11.58	11.58	
LAI-1	7/16/2003	18.99	N/A	N/A	N/A	6.43	12.56	12.56	
LAI-1	7/31/2003	18.99	N/A	N/A	N/A	7.49	11.50	11.50	
LAI-1	8/5/2003	18.99	N/A	N/A	N/A	7.61	11.38	11.38	
LAI-1	8/11/2003	18.99	N/A	N/A	N/A	8.80	10.19	10.19	
LAI-1	8/22/2003	18.99	N/A	N/A	N/A	8.98	10.01	10.01	
LAI-1	8/26/2003	18.99	N/A	N/A	N/A	7.91	11.08	11.08	
LAI-1	9/2/2003	18.99	N/A	N/A	N/A	8.07	10.92	10.92	
LAI-1	9/9/2003	18.99	8.39	10.60	0.01	8.40	10.59	10.60	
LAI-1	9/19/2003	18.99	N/A	N/A	N/A	8.27	10.72	10.72	
LAI-1	10/14/2003	18.99	N/A	N/A	N/A	8.34	10.65	10.65	
LAI-1	11/20/2003	18.99	N/A	N/A	N/A	4.63	14.36	14.36	
LAI-1	12/3/2003	18.99	N/A	N/A	N/A	4.10	14.89	14.89	
LAI-1	1/19/2004	18.99	N/A	N/A	N/A	3.82	15.17	15.17	
LAI-1	2/24/2004	18.99	N/A	N/A	N/A	5.22	13.77	13.77	
LAI-1	3/15/2004	18.99	N/A	N/A	N/A	6.16	12.83	12.83	
LAI-1	4/19/2004	18.99	N/A	N/A	N/A	6.29	12.70	12.70	
LAI-1	5/17/2004	18.99	N/A	N/A	N/A	6.81	12.18	12.18	
LAI-1	6/22/2004	18.99	N/A	N/A	N/A	6.64	12.35	12.35	
LAI-2	1/17/2003	18.95	N/A	N/A	N/A	4.14	14.81	14.81	
LAI-2	1/20/2003	18.95	N/A	N/A	N/A	4.25	14.70	14.70	
LAI-2	1/31/2003	18.95	N/A	N/A	N/A	4.55	14.40	14.40	
LAI-2	2/7/2003	18.95	N/A	N/A	N/A	4.41	14.54	14.54	
LAI-2	2/12/2003	18.95	N/A	N/A	N/A	4.71	14.24	14.24	
LAI-2	2/18/2003	18.95	N/A	N/A	N/A	5.44	13.51	13.51	
LAI-2	2/21/2003	18.95	N/A	N/A	N/A	5.61	13.34	13.34	
LAI-2	2/24/2003	18.95	N/A	N/A	N/A	5.89	13.06	13.06	
LAI-2	3/3/2003	18.95	N/A	N/A	N/A	5.17	13.78	13.78	
LAI-2	3/12/2003	18.95	N/A	N/A	N/A	5.37	13.58	13.58	
LAI-2	3/14/2003	18.95	N/A	N/A	N/A	5.24	13.71	13.71	
LAI-2	3/26/2003	18.95	N/A	N/A	N/A	4.61	14.34	14.34	
LAI-2	3/28/2003	18.95	N/A	N/A	N/A	4.72	14.23	14.23	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-2	4/2/2003	18.95	N/A	N/A	N/A	5.51	13.44	13.44	
LAI-2	4/4/2003	18.95	N/A	N/A	N/A	5.48	13.47	13.47	
LAI-2	4/8/2003	18.95	N/A	N/A	N/A	5.55	13.40	13.40	
LAI-2	4/11/2003	18.95	N/A	N/A	N/A	5.19	13.76	13.76	
LAI-2	4/15/2003	18.95	N/A	N/A	N/A	4.80	14.15	14.15	
LAI-2	4/17/2003	18.95	N/A	N/A	N/A	5.96	12.99	12.99	
LAI-2	4/22/2003	18.95	N/A	N/A	N/A	5.33	13.62	13.62	
LAI-2	4/25/2003	18.95	N/A	N/A	N/A	5.49	13.46	13.46	
LAI-2	5/2/2003	18.95	N/A	N/A	N/A	5.78	13.17	13.17	
LAI-2	5/6/2003	18.95	N/A	N/A	N/A	5.42	13.53	13.53	
LAI-2	5/9/2003	18.95	N/A	N/A	N/A	6.30	12.65	12.65	
LAI-2	5/16/2003	18.95	N/A	N/A	N/A	6.54	12.41	12.41	
LAI-2	5/23/2003	18.95	N/A	N/A	N/A	6.63	12.32	12.32	
LAI-2	5/28/2003	18.95	N/A	N/A	N/A	6.51	12.44	12.44	
LAI-2	6/13/2003	18.95	N/A	N/A	N/A	6.91	12.04	12.04	
LAI-2	6/18/2003	18.95	N/A	N/A	N/A	6.86	12.09	12.09	
LAI-2	6/27/2003	18.95	N/A	N/A	N/A	6.87	12.08	12.08	
LAI-2	7/7/2003	18.95	N/A	N/A	N/A	7.40	11.55	11.55	
LAI-2	7/16/2003	18.95	N/A	N/A	N/A	6.52	12.43	12.43	
LAI-2	7/31/2003	18.95	N/A	N/A	N/A	7.48	11.47	11.47	
LAI-2	8/5/2003	18.95	N/A	N/A	N/A	7.56	11.39	11.39	
LAI-2	8/11/2003	18.95	N/A	N/A	N/A	8.81	10.14	10.14	
LAI-2	8/22/2003	18.95	N/A	N/A	N/A	8.99	9.96	9.96	
LAI-2	8/26/2003	18.95	N/A	N/A	N/A	7.86	11.09	11.09	
LAI-2	9/2/2003	18.95	8.03	10.92	0.01	8.04	10.91	10.92	
LAI-2	9/9/2003	18.95	N/A	N/A	N/A	8.46	10.49	10.49	
LAI-2	9/19/2003	18.95	N/A	N/A	N/A	8.15	10.80	10.80	
LAI-2	10/14/2003	18.95	N/A	N/A	N/A	8.25	10.70	10.70	
LAI-2	11/20/2003	18.95	N/A	N/A	N/A	4.82	14.13	14.13	
LAI-2	12/3/2003	18.95	N/A	N/A	N/A	4.13	14.82	14.82	
LAI-2	1/19/2004	18.95	N/A	N/A	N/A	3.80	15.15	15.15	
LAI-2	2/24/2004	18.95	N/A	N/A	N/A	5.26	13.69	13.69	
LAI-2	3/15/2004	18.95	N/A	N/A	N/A	6.21	12.74	12.74	
LAI-2	4/19/2004	18.95	N/A	N/A	N/A	6.31	12.64	12.64	
LAI-2	5/17/2004	18.95	N/A	N/A	N/A	6.75	12.20	12.20	
LAI-2	6/22/2004	18.95	N/A	N/A	N/A	6.61	12.34	12.34	
LAI-3	1/17/2003	18.80	N/A	N/A	N/A	4.37	14.43	14.43	
LAI-3	1/20/2003	18.80	N/A	N/A	N/A	4.28	14.52	14.52	
LAI-3	1/31/2003	18.80	N/A	N/A	N/A	4.94	13.86	13.86	
LAI-3	2/7/2003	18.80	N/A	N/A	N/A	4.41	14.39	14.39	
LAI-3	2/12/2003	18.80	N/A	N/A	N/A	4.70	14.10	14.10	
LAI-3	2/18/2003	18.80	N/A	N/A	N/A	5.21	13.59	13.59	
LAI-3	2/21/2003	18.80	N/A	N/A	N/A	5.58	13.22	13.22	
LAI-3	2/24/2003	18.80	N/A	N/A	N/A	5.66	13.14	13.14	
LAI-3	3/3/2003	18.80	N/A	N/A	N/A	5.13	13.67	13.67	
LAI-3	3/12/2003	18.80	N/A	N/A	N/A	5.32	13.48	13.48	
LAI-3	3/14/2003	18.80	N/A	N/A	N/A	5.16	13.64	13.64	
LAI-3	3/26/2003	18.80	N/A	N/A	N/A	4.65	14.15	14.15	
LAI-3	3/28/2003	18.80	N/A	N/A	N/A	4.75	14.05	14.05	
LAI-3	4/2/2003	18.80	N/A	N/A	N/A	5.57	13.23	13.23	
LAI-3	4/4/2003	18.80	N/A	N/A	N/A	5.53	13.27	13.27	
LAI-3	4/8/2003	18.80	N/A	N/A	N/A	5.69	13.11	13.11	
LAI-3	4/11/2003	18.80	N/A	N/A	N/A	5.15	13.65	13.65	
LAI-3	4/15/2003	18.80	N/A	N/A	N/A	4.75	14.05	14.05	
LAI-3	4/17/2003	18.80	N/A	N/A	N/A	6.08	12.72	12.72	
LAI-3	4/22/2003	18.80	N/A	N/A	N/A	5.27	13.53	13.53	
LAI-3	4/25/2003	18.80	N/A	N/A	N/A	5.45	13.35	13.35	
LAI-3	5/2/2003	18.80	N/A	N/A	N/A	5.76	13.04	13.04	
LAI-3	5/6/2003	18.80	N/A	N/A	N/A	5.61	13.19	13.19	
LAI-3	5/9/2003	18.80	N/A	N/A	N/A	6.30	12.50	12.50	
LAI-3	5/16/2003	18.80	N/A	N/A	N/A	6.53	12.27	12.27	
LAI-3	5/23/2003	18.80	N/A	N/A	N/A	6.57	12.23	12.23	
LAI-3	5/28/2003	18.80	N/A	N/A	N/A	6.44	12.36	12.36	
LAI-3	6/13/2003	18.80	N/A	N/A	N/A	6.85	11.95	11.95	
LAI-3	6/18/2003	18.80	N/A	N/A	N/A	6.81	11.99	11.99	
LAI-3	6/27/2003	18.80	N/A	N/A	N/A	6.83	11.97	11.97	
LAI-3	7/7/2003	18.80	N/A	N/A	N/A	7.32	11.48	11.48	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-3	7/16/2003	18.80	N/A	N/A	N/A	6.47	12.33	12.33	
LAI-3	7/31/2003	18.80	N/A	N/A	N/A	7.37	11.43	11.43	
LAI-3	8/5/2003	18.80	N/A	N/A	N/A	7.49	11.31	11.31	
LAI-3	8/11/2003	18.80	N/A	N/A	N/A	7.68	11.12	11.12	
LAI-3	8/22/2003	18.80	N/A	N/A	N/A	8.74	10.06	10.06	
LAI-3	8/26/2003	18.80	N/A	N/A	N/A	7.74	11.06	11.06	
LAI-3	9/2/2003	18.80	N/A	N/A	N/A	8.03	10.77	10.77	
LAI-3	9/9/2003	18.80	N/A	N/A	N/A	8.45	10.35	10.35	
LAI-3	9/19/2003	18.80	N/A	N/A	N/A	8.10	10.70	10.70	
LAI-3	10/14/2003	18.80	N/A	N/A	N/A	8.20	10.60	10.60	
LAI-3	11/20/2003	18.80	N/A	N/A	N/A	4.77	14.03	14.03	
LAI-3	12/3/2003	18.80	N/A	N/A	N/A	4.08	14.72	14.72	
LAI-3	1/19/2004	18.80	N/A	N/A	N/A	3.55	15.25	15.25	
LAI-3	2/24/2004	18.80	N/A	N/A	N/A	5.23	13.57	13.57	
LAI-3	3/15/2004	18.80	N/A	N/A	N/A	6.20	12.60	12.60	
LAI-3	4/19/2004	18.80	N/A	N/A	N/A	6.21	12.59	12.59	
LAI-3	5/17/2004	18.80	N/A	N/A	N/A	6.66	12.14	12.14	
LAI-3	6/22/2004	18.80	N/A	N/A	N/A	6.46	12.34	12.34	
LAI-4	1/22/2003	19.58	6.87	12.71	0.43	7.30	12.28	12.60	
LAI-4	1/23/2003	19.58	7.48	12.10	0.20	7.68	11.90	12.05	
LAI-4	1/24/2003	19.58	6.72	12.86	0.67	7.39	12.19	12.69	
LAI-4	1/27/2003	19.58	4.47	15.11	4.67	9.14	10.44	13.94	
LAI-4	1/28/2003	19.58	4.97	14.61	4.43	9.40	10.18	13.50	
LAI-4	1/29/2003	19.58	7.40	12.18	0.05	7.45	12.13	12.17	
LAI-4	1/30/2003	19.58	7.88	11.70	0.06	7.94	11.64	11.69	
LAI-4	2/3/2003	19.58	6.25	13.33	2.16	8.41	11.17	12.79	
LAI-4	2/6/2003	21.03	6.28	14.75	1.04	7.32	13.71	14.49	
LAI-4	2/11/2003	21.03	7.54	13.49	1.44	8.98	12.05	13.13	
LAI-4	2/18/2003	21.03	9.28	11.75	0.17	9.45	11.58	11.71	
LAI-4	2/21/2003	21.03	9.11	11.92	0.09	9.20	11.83	11.90	
LAI-4	2/26/2003	21.03	8.37	12.66	1.35	9.72	11.31	12.32	
LAI-4	3/3/2003	21.03	8.57	12.46	0.86	9.43	11.60	12.25	
LAI-4	3/12/2003	21.03	8.80	12.23	0.14	8.94	12.09	12.20	
LAI-4	3/14/2003	21.03	8.68	12.35	0.14	8.82	12.21	12.32	
LAI-4	3/26/2003	21.03	N/A	N/A	N/A	9.06	11.97	11.97	
LAI-4	3/28/2003	21.03	N/A	N/A	N/A	9.28	11.75	11.75	
LAI-4	4/2/2003	21.03	8.21	12.82	0.08	8.29	12.74	12.80	
LAI-4	4/4/2003	21.03	8.58	12.45	0.04	8.62	12.41	12.44	
LAI-4	4/8/2003	21.03	8.51	12.52	0.13	8.64	12.39	12.49	
LAI-4	4/11/2003	21.03	8.78	12.25	0.14	8.92	12.11	12.22	
LAI-4	4/15/2003	21.03	7.86	13.17	0.95	8.81	12.22	12.93	
LAI-4	4/17/2003	21.03	9.19	11.84	0.02	9.21	11.82	11.84	
LAI-4	4/22/2003	21.03	6.61	14.42	0.19	6.80	14.23	14.37	
LAI-4	4/25/2003	21.03	8.96	12.07	0.25	9.21	11.82	12.01	
LAI-4	5/2/2003	21.03	9.06	11.97	0.10	9.16	11.87	11.95	
LAI-4	5/6/2003	21.03	8.56	12.47	1.85	10.41	10.62	12.01	
LAI-4	5/9/2003	21.03	10.96	10.07	0.02	10.98	10.05	10.07	
LAI-4	5/23/2003	21.03	10.17	10.86	0.02	10.19	10.84	10.86	
LAI-4	5/28/2003	21.03	9.81	11.22	0.03	9.84	11.19	11.21	
LAI-4	6/13/2003	21.03	10.09	10.94	0.03	10.12	10.91	10.93	
LAI-4	6/18/2003	21.03	10.05	10.98	0.08	10.13	10.90	10.96	
LAI-4	6/27/2003	21.03	9.92	11.11	0.82	10.74	10.29	10.91	
LAI-4	7/7/2003	21.03	10.27	10.76	1.44	11.71	9.32	10.40	
LAI-4	7/16/2003	21.03	9.92	11.11	2.10	12.02	9.01	10.59	
LAI-4	7/31/2003	21.03	10.58	10.45	1.12	11.70	9.33	10.17	
LAI-4	8/5/2003	21.03	10.32	10.71	1.97	12.29	8.74	10.22	
LAI-4	8/11/2003	21.03	11.70	9.33	1.09	12.79	8.24	9.06	
LAI-4	8/22/2003	21.03	11.96	9.07	1.28	13.24	7.79	8.75	
LAI-4	8/26/2003	21.03	11.09	9.94	1.15	12.24	8.79	9.65	
LAI-4	9/2/2003	21.03	11.04	9.99	1.32	12.36	8.67	9.66	
LAI-4	9/9/2003	21.03	11.10	9.93	2.16	13.26	7.77	9.39	
LAI-4	9/19/2003	21.03	11.14	9.89	1.35	12.49	8.54	9.55	
LAI-4	10/14/2003	21.03	11.21	9.82	1.59	12.80	8.23	9.42	
LAI-4	11/20/2003	21.03	8.21	12.82	0.09	8.30	12.73	12.80	
LAI-4	12/3/2003	21.03	7.12	13.91	1.06	8.18	12.85	13.65	
LAI-4	1/19/2004	21.03	6.84	14.19	0.72	7.56	13.47	14.01	
LAI-4	2/24/2004	21.03	8.25	12.78	0.65	8.90	12.13	12.62	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-4	3/15/2004	21.03	9.42	11.61	0.09	9.51	11.52	11.59	Oily trace
LAI-4	4/19/2004	21.03	9.19	11.84	0.01	9.20	11.83	11.84	
LAI-4	5/17/2004	21.03	N/A	N/A	N/A	10.05	10.98	10.98	Trace product
LAI-4	6/22/2004	21.03	N/A	N/A	N/A	9.98	11.05	11.05	
LAI-5	1/22/2003	19.92	6.55	13.37	4.18	10.73	9.19	12.33	
LAI-5	1/23/2003	19.92	6.54	13.38	4.02	10.56	9.36	12.38	
LAI-5	1/24/2003	19.92	6.40	13.52	3.92	10.32	9.60	12.54	
LAI-5	1/27/2003	19.92	5.51	14.41	3.66	9.17	10.75	13.50	
LAI-5	1/28/2003	19.92	6.85	13.07	0.55	7.40	12.52	12.93	
LAI-5	1/29/2003	19.92	6.20	13.72	4.20	10.40	9.52	12.67	
LAI-5	1/30/2003	19.92	6.31	13.61	4.04	10.35	9.57	12.60	
LAI-5	2/3/2003	19.92	6.36	13.56	3.29	9.65	10.27	12.74	
LAI-5	2/6/2003	21.40	7.18	14.22	3.57	10.75	10.65	13.33	
LAI-5	2/11/2003	21.40	7.53	13.87	3.64	11.17	10.23	12.96	
LAI-5	2/18/2003	21.40	6.50	14.90	4.75	11.25	10.15	13.71	
LAI-5	2/21/2003	21.40	8.21	13.19	3.30	11.51	9.89	12.37	
LAI-5	2/26/2003	21.40	7.78	13.62	3.23	11.01	10.39	12.81	
LAI-5	3/4/2003	21.40	7.78	13.62	3.23	11.01	10.39	12.81	
LAI-5	3/12/2003	21.40	8.32	13.08	3.36	11.68	9.72	12.24	
LAI-5	3/14/2003	21.40	8.36	13.04	3.08	11.44	9.96	12.27	
LAI-5	3/26/2003	21.40	N/A	N/A	N/A	10.01	11.39	11.39	
LAI-5	3/28/2003	21.40	N/A	N/A	N/A	9.96	11.44	11.44	
LAI-5	4/2/2003	21.40	8.52	12.88	0.83	9.35	12.05	12.67	
LAI-5	4/4/2003	21.40	8.90	12.50	0.68	9.58	11.82	12.33	
LAI-5	4/8/2003	21.40	8.96	12.44	0.55	9.51	11.89	12.30	
LAI-5	4/11/2003	21.40	8.72	12.68	1.62	10.34	11.06	12.28	
LAI-5	4/15/2003	21.40	8.01	13.39	2.43	10.44	10.96	12.78	
LAI-5	4/17/2003	21.40	9.60	11.80	0.16	9.76	11.64	11.76	
LAI-5	4/22/2003	21.40	9.04	12.36	0.39	9.43	11.97	12.26	
LAI-5	4/25/2003	21.40	9.05	12.35	2.10	11.15	10.25	11.83	
LAI-5	5/2/2003	21.40	9.48	11.92	0.24	9.72	11.68	11.86	
LAI-5	5/6/2003	21.40	8.94	12.46	2.24	11.18	10.22	11.90	
LAI-5	5/9/2003	21.40	10.28	11.12	0.07	10.35	11.05	11.10	
LAI-5	5/23/2003	21.40	10.65	10.75	0.02	10.67	10.73	10.75	
LAI-5	5/28/2003	21.40	10.36	11.04	0.09	10.45	10.95	11.02	
LAI-5	6/13/2003	21.40	10.58	10.82	0.05	10.63	10.77	10.81	
LAI-5	6/18/2003	21.40	10.51	10.89	0.01	10.52	10.88	10.89	
LAI-5	6/27/2003	21.40	10.08	11.32	1.63	11.71	9.69	10.91	
LAI-5	7/7/2003	21.40	10.52	10.88	1.85	12.37	9.03	10.42	
LAI-5	7/16/2003	21.40	10.30	11.10	2.15	12.45	8.95	10.56	
LAI-5	7/31/2003	21.40	10.77	10.63	1.67	12.44	8.96	10.21	
LAI-5	8/5/2003	21.40	11.30	10.10	2.35	13.65	7.75	9.51	
LAI-5	8/11/2003	21.40	N/A	N/A	N/A	12.22	9.18	9.18	
LAI-5	8/22/2003	21.40	N/A	N/A	N/A	12.34	9.06	9.06	
LAI-5	8/26/2003	21.40	12.39	9.01	1.29	13.68	7.72	8.69	
LAI-5	9/2/2003	21.40	11.57	9.83	0.03	11.60	9.80	9.82	
LAI-5	9/9/2003	21.40	11.14	10.26	2.49	13.63	7.77	9.64	
LAI-5	9/19/2003	21.40	11.89	9.51	0.57	12.46	8.94	9.37	
LAI-5	10/14/2003	21.40	12.13	9.27	0.45	12.58	8.82	9.16	
LAI-5	11/20/2003	21.40	NA	NA	NA	8.72	12.68	12.68	
LAI-5	12/3/2003	21.40	7.76	13.64	0.33	8.09	13.31	13.56	
LAI-5	1/19/2004	21.40	7.38	14.02	0.07	7.45	13.95	14.00	
LAI-5	2/24/2004	21.40	8.65	12.75	0.11	8.76	12.64	12.72	
LAI-5	3/15/2004	21.40	N/A	N/A	N/A	9.94	11.46	11.46	Oily trace
LAI-5	4/19/2004	21.40	N/A	N/A	N/A	10.19	11.21	11.21	Trace product
LAI-5	5/17/2004	21.40	N/A	N/A	N/A	11.14	10.26	10.26	Trace product
LAI-5	6/22/2004	21.40	11.10	10.30	0.01	11.11	10.29	10.30	
LAI-6	1/22/2003	19.78	6.67	13.11	3.78	10.45	9.33	12.17	
LAI-6	1/23/2003	19.78	6.45	13.33	3.85	10.30	9.48	12.37	
LAI-6	1/24/2003	19.78	6.32	13.46	4.00	10.32	9.46	12.46	
LAI-6	1/27/2003	19.78	5.68	14.10	3.37	9.05	10.73	13.26	
LAI-6	1/28/2003	19.78	6.91	12.87	0.93	7.84	11.94	12.64	
LAI-6	1/29/2003	19.78	6.51	13.27	2.53	9.04	10.74	12.64	
LAI-6	1/30/2003	19.78	6.36	13.42	3.60	9.96	9.82	12.52	
LAI-6	2/3/2003	19.78	6.27	13.51	3.69	9.96	9.82	12.59	
LAI-6	2/6/2003	19.78	5.79	13.99	3.79	9.58	10.20	13.04	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-6	2/11/2003	19.78	6.03	13.75	3.61	9.64	10.14	12.85	
LAI-6	2/18/2003	19.78	7.98	11.80	0.42	8.40	11.38	11.70	
LAI-6	2/21/2003	19.78	7.57	12.21	0.54	8.11	11.67	12.08	
LAI-6	2/26/2003	19.78	7.15	12.63	0.47	7.62	12.16	12.51	
LAI-6	3/3/2003	19.78	8.01	11.77	0.45	8.46	11.32	11.66	
LAI-6	3/12/2003	19.78	7.46	12.32	0.23	7.69	12.09	12.26	
LAI-6	3/14/2003	19.78	7.72	12.06	0.19	7.91	11.87	12.01	
LAI-6	3/26/2003	19.78	6.37	13.41	1.45	7.82	11.96	13.05	
LAI-6	3/28/2003	19.78	7.10	12.68	1.65	8.75	11.03	12.27	
LAI-6	4/2/2003	19.78	6.65	13.13	2.15	8.80	10.98	12.59	
LAI-6	4/4/2003	19.78	7.06	12.72	1.74	8.80	10.98	12.29	
LAI-6	4/8/2003	19.78	7.13	12.65	1.70	8.83	10.95	12.23	
LAI-6	4/11/2003	19.78	7.22	12.56	0.88	8.10	11.68	12.34	
LAI-6	4/15/2003	19.78	6.56	13.22	1.82	8.38	11.40	12.77	
LAI-6	4/17/2003	19.78	7.61	12.17	1.74	9.35	10.43	11.74	
LAI-6	4/22/2003	19.78	7.16	12.62	1.65	8.81	10.97	12.21	
LAI-6	4/25/2003	19.78	7.70	12.08	0.83	8.53	11.25	11.87	
LAI-6	5/2/2003	19.78	7.61	12.17	1.65	9.26	10.52	11.76	
LAI-6	5/6/2003	19.78	8.45	11.33	0.99	9.44	10.34	11.08	
LAI-6	5/9/2003	19.78	8.00	11.78	1.95	9.95	9.83	11.29	
LAI-6	5/23/2003	19.78	8.41	11.37	2.00	10.41	9.37	10.87	
LAI-6	5/28/2003	19.78	8.23	11.55	1.78	10.01	9.77	11.11	
LAI-6	6/13/2003	19.78	8.50	11.28	2.11	10.61	9.17	10.75	
LAI-6	6/18/2003	19.78	8.46	11.32	2.10	10.56	9.22	10.80	
LAI-6	6/27/2003	19.78	9.91	9.87	0.77	10.68	9.10	9.68	
LAI-6	7/7/2003	19.78	8.98	10.80	2.08	11.06	8.72	10.28	
LAI-6	7/16/2003	19.78	8.75	11.03	2.20	10.95	8.83	10.48	
LAI-6	7/31/2003	19.78	9.14	10.64	2.06	11.20	8.58	10.13	
LAI-6	8/5/2003	19.78	9.15	10.63	2.01	11.16	8.62	10.13	
LAI-6	8/11/2003	19.78	10.24	9.54	1.97	12.21	7.57	9.05	
LAI-6	8/22/2003	19.78	10.45	9.33	1.90	12.35	7.43	8.86	
LAI-6	8/26/2003	19.78	9.78	10.00	0.02	9.80	9.98	10.00	
LAI-6	9/2/2003	19.78	10.13	9.65	0.90	11.03	8.75	9.43	
LAI-6	9/9/2003	19.78	10.48	9.30	0.79	11.27	8.51	9.10	
LAI-6	9/19/2003	19.78	10.44	9.34	0.61	11.05	8.73	9.19	
LAI-6	10/14/2003	19.78	9.11	10.67	0.91	10.02	9.76	10.44	
LAI-6	11/20/2003	19.78	7.22	12.56	0.01	7.23	12.55	12.56	
LAI-6	12/3/2003	19.78	6.30	13.48	0.35	6.65	13.13	13.39	
LAI-6	1/19/2004	19.78	5.85	13.93	0.71	6.56	13.22	13.75	
LAI-6	2/24/2004	19.78	7.52	12.26	0.11	7.63	12.15	12.23	
LAI-6	3/15/2004	19.78	8.32	11.46	0.50	8.82	10.96	11.34	
LAI-6	4/19/2004	19.78	8.52	11.26	0.02	8.54	11.24	11.26	
LAI-6	5/17/2004	19.78	9.05	10.73	0.03	9.08	10.70	10.72	
LAI-6	6/22/2004	19.78	NA	NA	NA	8.85	10.93	10.93	Trace product
LAI-7	1/22/2003	19.76	8.10	11.66	1.10	9.20	10.56	11.39	
LAI-7	1/23/2003	19.76	7.58	12.18	1.07	8.65	11.11	11.91	
LAI-7	1/24/2003	19.76	6.99	12.77	2.36	9.35	10.41	12.18	
LAI-7	1/27/2003	19.76	5.18	14.58	5.30	10.48	9.28	13.26	
LAI-7	1/28/2003	19.76	7.08	12.68	0.90	7.98	11.78	12.46	
LAI-7	1/29/2003	19.76	7.41	12.35	0.44	7.85	11.91	12.24	
LAI-7	1/30/2003	19.76	8.11	11.65	0.26	8.37	11.39	11.59	
LAI-7	2/3/2003	19.76	8.90	10.86	0.06	8.96	10.80	10.85	
LAI-7	2/6/2003	21.22	7.82	13.40	1.56	9.38	11.84	13.01	
LAI-7	2/11/2003	21.22	8.23	12.99	1.56	9.79	11.43	12.60	
LAI-7	2/18/2003	21.22	9.45	11.77	0.20	9.65	11.57	11.72	
LAI-7	2/21/2003	21.22	8.57	12.65	2.34	10.91	10.31	12.07	
LAI-7	2/26/2003	21.22	8.53	12.69	3.18	11.71	9.51	11.90	
LAI-7	3/3/2003	21.22	9.53	11.69	0.18	9.71	11.51	11.65	
LAI-7	3/12/2003	21.22	8.99	12.23	0.19	9.18	12.04	12.18	
LAI-7	3/14/2003	21.22	9.18	12.04	0.18	9.36	11.86	12.00	
LAI-7	3/26/2003	21.22	N/A	N/A	N/A	9.97	11.25	11.25	
LAI-7	3/28/2003	21.22	N/A	N/A	N/A	9.95	11.27	11.27	
LAI-7	4/2/2003	21.22	8.79	12.43	0.08	8.87	12.35	12.41	
LAI-7	4/4/2003	21.22	9.04	12.18	0.08	9.12	12.10	12.16	
LAI-7	4/8/2003	21.22	8.53	12.69	0.10	8.63	12.59	12.67	
LAI-7	4/11/2003	21.22	9.06	12.16	0.17	9.23	11.99	12.12	
LAI-7	4/15/2003	21.22	8.41	12.81	0.94	9.35	11.87	12.58	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-7	4/17/2003	21.22	9.55	11.67	0.17	9.72	11.50	11.63	
LAI-7	4/22/2003	21.22	9.03	12.19	0.34	9.37	11.85	12.11	
LAI-7	4/25/2003	21.22	9.00	12.22	0.31	9.31	11.91	12.14	
LAI-7	5/2/2003	21.22	9.60	11.62	0.05	9.65	11.57	11.61	
LAI-7	5/6/2003	21.22	9.17	12.05	1.19	10.36	10.86	11.75	
LAI-7	5/9/2003	21.22	10.04	11.18	0.06	10.10	11.12	11.17	
LAI-7	5/23/2003	21.22	10.60	10.62	0.02	10.62	10.60	10.62	
LAI-7	5/28/2003	21.22	10.21	11.01	0.01	10.22	11.00	11.01	
LAI-7	6/13/2003	21.22	9.90	11.32	0.55	10.45	10.77	11.18	
LAI-7	6/18/2003	21.22	10.57	10.65	0.02	10.59	10.63	10.65	
LAI-7	6/27/2003	21.22	10.42	10.80	0.63	11.05	10.17	10.64	
LAI-7	7/7/2003	21.22	10.85	10.37	0.52	11.37	9.85	10.24	
LAI-7	7/16/2003	21.22	10.43	10.79	1.65	12.08	9.14	10.38	
LAI-7	7/31/2003	21.22	11.06	10.16	0.31	11.37	9.85	10.08	
LAI-7	8/5/2003	21.22	10.66	10.56	0.90	11.56	9.66	10.34	
LAI-7	8/11/2003	21.22	12.45	8.77	0.01	12.46	8.76	8.77	
LAI-7	8/22/2003	21.22	12.40	8.82	0.20	12.60	8.62	8.77	
LAI-7	8/26/2003	21.22	11.32	9.90	1.43	12.75	8.47	9.54	
LAI-7	9/2/2003	21.22	11.61	9.61	0.20	11.81	9.41	9.56	
LAI-7	9/9/2003	21.22	11.66	9.56	1.64	13.30	7.92	9.15	
LAI-7	9/19/2003	21.22	11.66	9.56	1.35	13.01	8.21	9.22	
LAI-7	10/14/2003	21.22	11.59	9.63	1.46	13.05	8.17	9.27	
LAI-7	11/20/2003	21.22	NA	NA	NA	8.67	12.55	12.55	
LAI-7	12/3/2003	21.22	7.98	13.24	0.23	8.21	13.01	13.18	
LAI-7	1/19/2004	21.22	7.59	13.63	0.32	7.91	13.31	13.55	
LAI-7	2/24/2004	21.22	N/A	N/A	N/A	8.72	12.50	12.50	
LAI-7	3/15/2004	21.22	N/A	N/A	N/A	9.71	11.51	11.51	Oily trace
LAI-7	4/19/2004	21.22	N/A	N/A	N/A	9.65	11.57	11.57	Trace product
LAI-7	5/17/2004	21.22	N/A	N/A	N/A	10.43	10.79	10.79	Trace product
LAI-7	6/22/2004	21.22	10.33	10.89	0.01	10.34	10.88	10.89	
LAI-8	1/22/2003	20.02	8.10	11.92	0.91	9.01	11.01	11.69	
LAI-8	1/23/2003	20.02	7.72	12.30	0.88	8.60	11.42	12.08	
LAI-8	1/24/2003	20.02	7.50	12.52	1.55	9.05	10.97	12.13	
LAI-8	1/27/2003	20.02	5.34	14.68	5.08	10.42	9.60	13.41	
LAI-8	1/28/2003	20.02	6.90	13.12	1.75	8.65	11.37	12.68	
LAI-8	1/29/2003	20.02	7.99	12.03	0.31	8.30	11.72	11.95	
LAI-8	1/30/2003	20.02	7.90	12.12	0.69	8.59	11.43	11.95	
LAI-8	2/3/2003	20.02	8.47	11.55	0.01	8.48	11.54	11.55	
LAI-8	2/6/2003	21.44	6.46	14.98	2.95	9.41	12.03	14.24	
LAI-8	2/11/2003	21.44	8.45	12.99	1.22	9.67	11.77	12.69	
LAI-8	2/18/2003	21.44	6.85	14.59	5.75	12.60	8.84	13.15	
LAI-8	2/21/2003	21.44	8.49	12.95	3.16	11.65	9.79	12.16	
LAI-8	2/26/2003	21.44	7.92	13.52	4.02	11.94	9.50	12.52	
LAI-8	3/4/2003	21.44	7.46	13.98	5.02	12.48	8.96	12.73	
LAI-8	3/12/2003	21.44	8.67	12.77	3.03	11.70	9.74	12.01	
LAI-8	3/14/2003	21.44	8.88	12.56	2.53	11.41	10.03	11.93	
LAI-8	3/26/2003	21.44	8.63	12.81	0.88	9.51	11.93	12.59	
LAI-8	3/28/2003	21.44	N/A	N/A	N/A	9.48	11.96	11.96	
LAI-8	4/2/2003	21.44	8.97	12.47	0.14	9.11	12.33	12.44	
LAI-8	4/4/2003	21.44	9.32	12.12	0.04	9.36	12.08	12.11	
LAI-8	4/8/2003	21.44	9.25	12.19	0.03	9.28	12.16	12.18	
LAI-8	4/11/2003	21.44	9.21	12.23	0.46	9.67	11.77	12.12	
LAI-8	4/15/2003	21.44	8.57	12.87	1.13	9.70	11.74	12.59	
LAI-8	4/17/2003	21.44	9.82	11.62	0.08	9.90	11.54	11.60	
LAI-8	4/22/2003	21.44	9.28	12.16	0.23	9.51	11.93	12.10	
LAI-8	4/25/2003	21.44	9.61	11.83	0.25	9.86	11.58	11.77	
LAI-8	5/2/2003	21.44	9.71	11.73	0.40	10.11	11.33	11.63	
LAI-8	5/6/2003	21.44	9.36	12.08	1.40	10.76	10.68	11.73	
LAI-8	5/9/2003	21.44	N/A	N/A	N/A	10.23	11.21	11.21	
LAI-8	5/23/2003	21.44	10.80	10.64	0.01	10.81	10.63	10.64	
LAI-8	5/28/2003	21.44	10.51	10.93	0.03	10.54	10.90	10.92	
LAI-8	6/13/2003	21.44	10.20	11.24	1.56	11.76	9.68	10.85	
LAI-8	6/18/2003	21.44	10.35	11.09	1.85	12.20	9.24	10.63	
LAI-8	6/27/2003	21.44	10.62	10.82	0.49	11.11	10.33	10.70	
LAI-8	7/7/2003	21.44	10.67	10.77	2.18	12.85	8.59	10.23	
LAI-8	7/16/2003	21.44	10.45	10.99	1.37	11.82	9.62	10.65	
LAI-8	7/31/2003	21.44	10.96	10.48	1.79	12.75	8.69	10.03	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-8	8/5/2003	21.44	10.82	10.62	2.23	13.05	8.39	10.06	
LAI-8	8/11/2003	21.44	12.12	9.32	1.57	13.69	7.75	8.93	
LAI-8	8/22/2003	21.44	12.40	9.04	1.66	14.06	7.38	8.63	
LAI-8	8/26/2003	21.44	11.44	10.00	1.44	12.88	8.56	9.64	
LAI-8	9/2/2003	21.44	11.45	9.99	1.78	13.23	8.21	9.55	
LAI-8	9/9/2003	21.44	11.54	9.90	1.68	13.22	8.22	9.48	
LAI-8	9/19/2003	21.44	11.61	9.83	1.64	13.25	8.19	9.42	
LAI-8	10/14/2003	21.44	11.58	9.86	1.60	13.18	8.26	9.46	
LAI-8	11/20/2003	21.44	8.87	12.57	0.07	8.94	12.50	12.55	
LAI-8	12/3/2003	21.44	8.01	13.43	0.41	8.42	13.02	13.33	
LAI-8	1/19/2004	21.44	7.70	13.74	0.44	8.14	13.30	13.63	
LAI-8	2/24/2004	21.44	N/A	N/A	N/A	9.15	12.29	12.29	
LAI-8	3/15/2004	21.44	N/A	N/A	N/A	9.71	11.73	11.73	
LAI-8	4/19/2004	21.44	N/A	N/A	N/A	9.91	11.53	11.53	Trace product
LAI-8	5/17/2004	21.44	N/A	N/A	N/A	10.59	10.85	10.85	Trace product
LAI-8	6/22/2004	21.44	10.48	10.96	0.030	10.51	10.93	10.95	
LAI-9	1/22/2003	19.32	N/A	N/A	N/A	7.90	11.42	11.42	
LAI-9	1/23/2003	19.32	N/A	N/A	N/A	8.38	10.94	10.94	
LAI-9	1/24/2003	19.32	7.10	12.22	0.04	7.14	12.18	12.21	
LAI-9	1/27/2003	19.32	5.32	14.00	1.54	6.86	12.46	13.62	
LAI-9	1/28/2003	19.32	5.90	13.42	1.50	7.40	11.92	13.05	
LAI-9	1/29/2003	19.32	N/A	N/A	N/A	8.44	10.88	10.88	
LAI-9	1/30/2003	19.32	N/A	N/A	N/A	8.40	10.92	10.92	
LAI-9	2/3/2003	19.32	6.57	12.75	0.70	7.27	12.05	12.58	
LAI-9	2/6/2003	20.77	7.53	13.24	0.15	7.68	13.09	13.20	
LAI-9	2/11/2003	20.77	7.93	12.84	0.11	8.04	12.73	12.81	
LAI-9	2/18/2003	20.77	5.50	15.27	2.50	8.00	12.77	14.65	
LAI-9	2/21/2003	20.77	7.63	13.14	3.68	11.31	9.46	12.22	
LAI-9	2/26/2003	20.77	6.94	13.83	3.54	10.48	10.29	12.95	
LAI-9	3/4/2003	20.77	6.98	13.79	3.94	10.92	9.85	12.81	
LAI-9	3/12/2003	20.77	7.82	12.95	3.39	11.21	9.56	12.10	
LAI-9	3/14/2003	20.77	8.09	12.68	2.21	10.30	10.47	12.13	
LAI-9	3/26/2003	20.77	N/A	N/A	N/A	8.95	11.82	11.82	
LAI-9	3/28/2003	20.77	N/A	N/A	N/A	9.04	11.73	11.73	
LAI-9	4/2/2003	20.77	8.08	12.69	0.32	8.40	12.37	12.61	
LAI-9	4/4/2003	20.77	8.34	12.43	0.48	8.82	11.95	12.31	
LAI-9	4/8/2003	20.77	8.10	12.67	0.49	8.59	12.18	12.55	
LAI-9	4/11/2003	20.77	8.36	12.41	0.49	8.85	11.92	12.29	
LAI-9	4/15/2003	20.77	7.81	12.96	0.21	8.02	12.75	12.91	
LAI-9	4/17/2003	20.77	9.11	11.66	0.13	9.24	11.53	11.63	
LAI-9	4/22/2003	20.77	8.41	12.36	0.35	8.76	12.01	12.27	
LAI-9	4/25/2003	20.77	8.32	12.45	0.80	9.12	11.65	12.25	
LAI-9	5/2/2003	20.77	8.99	11.78	0.01	9.00	11.77	11.78	
LAI-9	5/6/2003	20.77	8.66	12.11	0.85	9.51	11.26	11.90	
LAI-9	5/9/2003	20.77	9.75	11.02	0.02	9.77	11.00	11.02	
LAI-9	5/23/2003	20.77	N/A	N/A	N/A	10.10	10.67	10.67	
LAI-9	5/28/2003	20.77	10.50	10.27	0.01	10.51	10.26	10.27	
LAI-9	6/13/2003	20.77	9.91	10.86	0.37	10.28	10.49	10.77	
LAI-9	6/18/2003	20.77	9.81	10.96	0.51	10.32	10.45	10.83	
LAI-9	6/27/2003	20.77	9.91	10.86	0.33	10.24	10.53	10.78	
LAI-9	7/7/2003	20.77	10.21	10.56	0.83	11.04	9.73	10.35	
LAI-9	7/16/2003	20.77	10.03	10.74	0.84	10.87	9.90	10.53	
LAI-9	7/31/2003	20.77	10.44	10.33	0.95	11.39	9.38	10.09	
LAI-9	8/5/2003	20.77	10.25	10.52	1.19	11.44	9.33	10.22	
LAI-9	8/11/2003	20.77	11.89	8.88	0.12	12.01	8.76	8.85	
LAI-9	8/22/2003	20.77	11.92	8.85	0.08	12.00	8.77	8.83	
LAI-9	8/26/2003	20.77	11.03	9.74	0.64	11.67	9.10	9.58	
LAI-9	9/2/2003	20.77	10.96	9.81	1.03	11.99	8.78	9.55	
LAI-9	9/9/2003	20.77	11.12	9.65	0.51	11.63	9.14	9.52	
LAI-9	9/19/2003	20.77	10.89	9.88	1.58	12.47	8.30	9.49	
LAI-9	10/14/2003	20.77	11.75	9.02	1.07	12.82	7.95	8.75	
LAI-9	11/20/2003	20.77	NA	NA	NA	8.05	12.72	12.72	
LAI-9	12/3/2003	20.77	7.21	13.56	0.01	7.22	13.55	13.56	
LAI-9	1/19/2004	20.77	6.83	13.94	0.01	6.84	13.93	13.94	
LAI-9	2/24/2004	20.77	NA	NA	NA	8.11	12.66	12.66	
LAI-9	3/15/2004	20.77	NA	NA	NA	9.08	11.69	11.69	Trace product
LAI-9	4/19/2004	20.77	NA	NA	NA	8.85	11.92	11.92	Trace product

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-9	5/17/2004	20.77	NA	NA	NA	9.91	10.86	10.86	Trace product
LAI-9	8/18/2004	20.77	NA	NA	NA	11.10	9.67	9.67	Trace product
LAI-10	1/31/2003	17.92	N/A	N/A	N/A	4.34	13.58	13.58	
LAI-10	2/12/2003	17.92	N/A	N/A	N/A	3.93	13.99	13.99	
LAI-10	2/18/2003	17.92	N/A	N/A	N/A	4.51	13.41	13.41	
LAI-10	2/21/2003	17.92	N/A	N/A	N/A	4.50	13.42	13.42	
LAI-10	2/24/2003	17.92	N/A	N/A	N/A	4.48	13.44	13.44	
LAI-10	3/3/2003	17.92	N/A	N/A	N/A	4.38	13.54	13.54	
LAI-10	3/12/2003	17.92	N/A	N/A	N/A	4.31	13.61	13.61	
LAI-10	3/14/2003	17.92	N/A	N/A	N/A	4.08	13.84	13.84	
LAI-10	3/26/2003	17.92	N/A	N/A	N/A	4.78	13.14	13.14	
LAI-10	3/28/2003	17.92	N/A	N/A	N/A	4.82	13.10	13.10	
LAI-10	4/2/2003	17.92	N/A	N/A	N/A	4.25	13.67	13.67	
LAI-10	4/4/2003	17.92	N/A	N/A	N/A	4.21	13.71	13.71	
LAI-10	4/8/2003	17.92	N/A	N/A	N/A	4.50	13.42	13.42	
LAI-10	4/11/2003	17.92	N/A	N/A	N/A	4.48	13.44	13.44	
LAI-10	4/15/2003	17.92	N/A	N/A	N/A	4.09	13.83	13.83	
LAI-10	4/17/2003	17.92	N/A	N/A	N/A	4.50	13.42	13.42	
LAI-10	4/22/2003	17.92	N/A	N/A	N/A	4.45	13.47	13.47	
LAI-10	4/25/2003	17.92	N/A	N/A	N/A	4.58	13.34	13.34	
LAI-10	5/2/2003	17.92	N/A	N/A	N/A	4.23	13.69	13.69	
LAI-10	5/6/2003	17.92	N/A	N/A	N/A	4.86	13.06	13.06	
LAI-10	5/9/2003	17.92	N/A	N/A	N/A	5.10	12.82	12.82	
LAI-10	5/16/2003	17.92	N/A	N/A	N/A	5.38	12.54	12.54	
LAI-10	5/23/2003	17.92	N/A	N/A	N/A	6.50	11.42	11.42	
LAI-10	5/28/2003	17.92	N/A	N/A	N/A	5.55	12.37	12.37	
LAI-10	6/13/2003	17.92	N/A	N/A	N/A	6.17	11.75	11.75	
LAI-10	6/18/2003	17.92	N/A	N/A	N/A	5.86	12.06	12.06	
LAI-10	6/27/2003	17.92	N/A	N/A	N/A	5.89	12.03	12.03	
LAI-10	7/7/2003	17.92	N/A	N/A	N/A	6.51	11.41	11.41	
LAI-10	7/16/2003	17.92	N/A	N/A	N/A	5.53	12.39	12.39	
LAI-10	7/31/2003	17.92	N/A	N/A	N/A	6.61	11.31	11.31	
LAI-10	8/5/2003	17.92	N/A	N/A	N/A	6.68	11.24	11.24	
LAI-10	8/11/2003	17.92	N/A	N/A	N/A	7.15	10.77	10.77	
LAI-10	8/22/2003	17.92	N/A	N/A	N/A	8.68	9.24	9.24	
LAI-10	8/26/2003	17.92	N/A	N/A	N/A	7.03	10.89	10.89	
LAI-10	9/2/2003	17.92	N/A	N/A	N/A	7.15	10.77	10.77	
LAI-10	9/9/2003	17.92	7.33	10.59	0.01	7.34	10.58	10.59	
LAI-10	9/19/2003	17.92	N/A	N/A	N/A	7.37	10.55	10.55	
LAI-10	10/14/2003	17.92	N/A	N/A	N/A	7.75	10.17	10.17	
LAI-10	11/20/2003	17.92	N/A	N/A	N/A	4.48	13.44	13.44	
LAI-10	12/3/2003	17.92	N/A	N/A	N/A	3.58	14.34	14.34	
LAI-10	1/19/2004	17.92	N/A	N/A	N/A	3.29	14.63	14.63	
LAI-10	2/24/2004	17.92	N/A	N/A	N/A	4.16	13.76	13.76	
LAI-10	3/15/2004	17.92	N/A	N/A	N/A	5.01	12.91	12.91	
LAI-10	4/19/2004	17.92	N/A	N/A	N/A	5.30	12.62	12.62	
LAI-10	5/17/2004	17.92	N/A	N/A	N/A	5.79	12.13	12.13	
LAI-10	6/22/2004	17.92	N/A	N/A	N/A	5.71	12.21	12.21	
LAI-11	1/31/2003	18.66	N/A	N/A	N/A	4.55	14.11	14.11	
LAI-11	2/12/2003	18.66	N/A	N/A	N/A	4.92	13.74	13.74	
LAI-11	2/18/2003	18.66	N/A	N/A	N/A	5.41	13.25	13.25	
LAI-11	2/21/2003	18.66	N/A	N/A	N/A	5.51	13.15	13.15	
LAI-11	2/24/2003	18.66	N/A	N/A	N/A	5.48	13.18	13.18	
LAI-11	3/3/2003	18.66	N/A	N/A	N/A	5.38	13.28	13.28	
LAI-11	3/12/2003	18.66	N/A	N/A	N/A	5.32	13.34	13.34	
LAI-11	3/14/2003	18.66	N/A	N/A	N/A	5.19	13.47	13.47	
LAI-11	3/26/2003	18.66	N/A	N/A	N/A	4.81	13.85	13.85	
LAI-11	3/28/2003	18.66	N/A	N/A	N/A	4.89	13.77	13.77	
LAI-11	4/2/2003	18.66	N/A	N/A	N/A	5.28	13.38	13.38	
LAI-11	4/4/2003	18.66	N/A	N/A	N/A	5.33	13.33	13.33	
LAI-11	4/8/2003	18.66	N/A	N/A	N/A	5.41	13.25	13.25	
LAI-11	4/11/2003	18.66	N/A	N/A	N/A	5.42	13.24	13.24	
LAI-11	4/15/2003	18.66	N/A	N/A	N/A	5.08	13.58	13.58	
LAI-11	4/17/2003	18.66	N/A	N/A	N/A	5.46	13.20	13.20	
LAI-11	4/22/2003	18.66	N/A	N/A	N/A	5.47	13.19	13.19	
LAI-11	4/25/2003	18.66	N/A	N/A	N/A	5.67	12.99	12.99	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-11	5/2/2003	18.66	N/A	N/A	N/A	5.12	13.54	13.54	
LAI-11	5/6/2003	18.66	N/A	N/A	N/A	5.81	12.85	12.85	
LAI-11	5/9/2003	18.66	N/A	N/A	N/A	6.00	12.66	12.66	
LAI-11	5/16/2003	18.66	N/A	N/A	N/A	6.30	12.36	12.36	
LAI-11	5/23/2003	18.66	N/A	N/A	N/A	6.58	12.08	12.08	
LAI-11	5/28/2003	18.66	N/A	N/A	N/A	6.44	12.22	12.22	
LAI-11	6/13/2003	18.66	N/A	N/A	N/A	6.70	11.96	11.96	
LAI-11	6/18/2003	18.66	N/A	N/A	N/A	6.80	11.86	11.86	
LAI-11	6/27/2003	18.66	N/A	N/A	N/A	6.81	11.85	11.85	
LAI-11	7/7/2003	18.66	N/A	N/A	N/A	7.51	11.15	11.15	
LAI-11	7/16/2003	18.66	N/A	N/A	N/A	6.42	12.24	12.24	
LAI-11	7/31/2003	18.66	N/A	N/A	N/A	8.91	9.75	9.75	
LAI-11	8/5/2003	18.66	N/A	N/A	N/A	8.51	10.15	10.15	
LAI-11	8/11/2003	18.66	N/A	N/A	N/A	8.79	9.87	9.87	
LAI-11	8/22/2003	18.66	N/A	N/A	N/A	8.43	10.23	10.23	
LAI-11	8/26/2003	18.66	N/A	N/A	N/A	8.92	9.74	9.74	
LAI-11	9/2/2003	18.66	N/A	N/A	N/A	8.95	9.71	9.71	
LAI-11	9/9/2003	18.66	N/A	N/A	N/A	9.24	9.42	9.42	
LAI-11	9/19/2003	18.66	N/A	N/A	N/A	8.99	9.67	9.67	
LAI-11	10/14/2003	18.66	N/A	N/A	N/A	9.15	9.51	9.51	
LAI-11	11/20/2003	18.66	N/A	N/A	N/A	5.31	13.35	13.35	
LAI-11	12/3/2003	18.66	N/A	N/A	N/A	4.50	14.16	14.16	
LAI-11	1/19/2004	18.66	N/A	N/A	N/A	4.33	14.33	14.33	
LAI-11	2/24/2004	18.66	N/A	N/A	N/A	5.19	13.47	13.47	
LAI-11	3/15/2004	18.66	N/A	N/A	N/A	5.94	12.72	12.72	
LAI-11	4/19/2004	18.66	N/A	N/A	N/A	6.23	12.43	12.43	
LAI-11	5/17/2004	18.66	N/A	N/A	N/A	6.80	11.85	11.86	
LAI-11	6/22/2004	18.66	N/A	N/A	N/A	6.70	11.96	11.96	
LAI-12	1/31/2003	18.40	N/A	N/A	N/A	3.28	15.12	15.12	
LAI-12	2/12/2003	18.40	N/A	N/A	N/A	3.98	14.42	14.42	
LAI-12	2/18/2003	18.40	N/A	N/A	N/A	4.50	13.90	13.90	
LAI-12	2/21/2003	18.40	N/A	N/A	N/A	4.60	13.80	13.80	
LAI-12	2/24/2003	18.40	N/A	N/A	N/A	4.58	13.82	13.82	
LAI-12	3/3/2003	18.40	N/A	N/A	N/A	4.61	13.79	13.79	
LAI-12	3/12/2003	18.40	N/A	N/A	N/A	4.38	14.02	14.02	
LAI-12	3/14/2003	18.40	N/A	N/A	N/A	4.17	14.23	14.23	
LAI-12	3/26/2003	18.40	N/A	N/A	N/A	4.04	14.36	14.36	
LAI-12	3/28/2003	18.40	N/A	N/A	N/A	4.10	14.30	14.30	
LAI-12	4/2/2003	18.40	N/A	N/A	N/A	4.34	14.06	14.06	
LAI-12	4/4/2003	18.40	N/A	N/A	N/A	4.45	13.95	13.95	
LAI-12	4/8/2003	18.40	N/A	N/A	N/A	4.58	13.82	13.82	
LAI-12	4/11/2003	18.40	N/A	N/A	N/A	4.65	13.75	13.75	
LAI-12	4/15/2003	18.40	N/A	N/A	N/A	4.25	14.15	14.15	
LAI-12	4/17/2003	18.40	N/A	N/A	N/A	4.69	13.71	13.71	
LAI-12	4/22/2003	18.40	N/A	N/A	N/A	4.69	13.71	13.71	
LAI-12	4/25/2003	18.40	N/A	N/A	N/A	4.81	13.59	13.59	
LAI-12	5/2/2003	18.40	N/A	N/A	N/A	4.98	13.42	13.42	
LAI-12	5/6/2003	18.40	N/A	N/A	N/A	5.22	13.18	13.18	
LAI-12	5/9/2003	18.40	N/A	N/A	N/A	5.46	12.94	12.94	
LAI-12	5/16/2003	18.40	N/A	N/A	N/A	5.74	12.66	12.66	
LAI-12	5/23/2003	18.40	N/A	N/A	N/A	5.27	13.13	13.13	
LAI-12	5/28/2003	18.40	N/A	N/A	N/A	5.88	12.52	12.52	
LAI-12	6/13/2003	18.40	N/A	N/A	N/A	5.45	12.95	12.95	
LAI-12	6/18/2003	18.40	N/A	N/A	N/A	6.18	12.22	12.22	
LAI-12	6/27/2003	18.40	N/A	N/A	N/A	6.22	12.18	12.18	
LAI-12	7/7/2003	18.40	N/A	N/A	N/A	6.95	11.45	11.45	
LAI-12	7/16/2003	18.40	N/A	N/A	N/A	5.84	12.56	12.56	
LAI-12	7/31/2003	18.40	N/A	N/A	N/A	6.97	11.43	11.43	
LAI-12	8/5/2003	18.40	N/A	N/A	N/A	7.05	11.35	11.35	
LAI-12	8/11/2003	18.40	N/A	N/A	N/A	6.80	11.60	11.60	
LAI-12	8/22/2003	18.40	N/A	N/A	N/A	8.19	10.21	10.21	
LAI-12	8/26/2003	18.40	N/A	N/A	N/A	7.33	11.07	11.07	
LAI-12	9/2/2003	18.40	N/A	N/A	N/A	7.45	10.95	10.95	
LAI-12	9/9/2003	18.40	N/A	N/A	N/A	7.64	10.76	10.76	
LAI-12	9/19/2003	18.40	N/A	N/A	N/A	7.93	10.47	10.47	
LAI-12	10/14/2003	18.40	N/A	N/A	N/A	7.48	10.92	10.92	
LAI-12	11/20/2003	18.40	N/A	N/A	N/A	4.06	14.34	14.34	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-12	12/3/2003	18.40	N/A	N/A	N/A	3.37	15.03	15.03	
LAI-12	1/19/2004	18.40	N/A	N/A	N/A	3.81	14.59	14.59	
LAI-12	2/24/2004	18.40	N/A	N/A	N/A	4.32	14.08	14.08	
LAI-12	3/15/2004	18.40	N/A	N/A	N/A	5.13	13.27	13.27	
LAI-12	4/19/2004	18.40	N/A	N/A	N/A	5.61	12.79	12.79	
LAI-12	5/17/2004	18.40	N/A	N/A	N/A	6.23	12.17	12.17	
LAI-12	6/22/2004	18.40	N/A	N/A	N/A	6.14	12.26	12.26	
LAI-13	1/31/2003	19.09	N/A	N/A	N/A	5.25	13.84	13.84	
LAI-13	2/12/2003	19.09	N/A	N/A	N/A	6.28	12.81	12.81	
LAI-13	2/18/2003	19.09	N/A	N/A	N/A	6.15	12.94	12.94	
LAI-13	2/21/2003	19.09	N/A	N/A	N/A	6.29	12.80	12.80	
LAI-13	2/24/2003	19.09	N/A	N/A	N/A	6.65	12.44	12.44	
LAI-13	3/3/2003	19.09	N/A	N/A	N/A	6.88	12.21	12.21	
LAI-13	3/12/2003	19.09	N/A	N/A	N/A	6.87	12.22	12.22	
LAI-13	3/14/2003	19.09	N/A	N/A	N/A	6.62	12.47	12.47	
LAI-13	3/26/2003	19.09	6.16	12.93	0.00	6.16	12.93	12.93	
LAI-13	3/28/2003	19.09	N/A	N/A	N/A	6.21	12.88	12.88	
LAI-13	4/2/2003	19.09	N/A	N/A	N/A	6.25	12.84	12.84	
LAI-13	4/4/2003	19.09	N/A	N/A	N/A	6.25	12.84	12.84	
LAI-13	4/8/2003	19.09	N/A	N/A	N/A	6.69	12.40	12.40	
LAI-13	4/11/2003	19.09	N/A	N/A	N/A	6.69	12.40	12.40	
LAI-13	4/15/2003	19.09	N/A	N/A	N/A	6.61	12.48	12.48	
LAI-13	4/17/2003	19.09	N/A	N/A	N/A	6.66	12.43	12.43	
LAI-13	4/22/2003	19.09	N/A	N/A	N/A	6.87	12.22	12.22	
LAI-13	4/25/2003	19.09	N/A	N/A	N/A	6.92	12.17	12.17	
LAI-13	5/2/2003	19.09	N/A	N/A	N/A	6.71	12.38	12.38	
LAI-13	5/6/2003	19.09	N/A	N/A	N/A	7.25	11.84	11.84	
LAI-13	5/9/2003	19.09	N/A	N/A	N/A	7.36	11.73	11.73	
LAI-13	5/16/2003	19.09	N/A	N/A	N/A	7.63	11.46	11.46	
LAI-13	5/23/2003	19.09	N/A	N/A	N/A	7.78	11.31	11.31	
LAI-13	5/28/2003	19.09	N/A	N/A	N/A	7.80	11.29	11.29	
LAI-13	6/13/2003	19.09	N/A	N/A	N/A	8.01	11.08	11.08	
LAI-13	6/18/2003	19.09	N/A	N/A	N/A	8.02	11.07	11.07	
LAI-13	6/27/2003	19.09	N/A	N/A	N/A	8.06	11.03	11.03	
LAI-13	7/7/2003	19.09	N/A	N/A	N/A	8.45	10.64	10.64	
LAI-13	7/16/2003	19.09	N/A	N/A	N/A	7.71	11.38	11.38	
LAI-13	7/31/2003	19.09	N/A	N/A	N/A	8.51	10.58	10.58	
LAI-13	8/5/2003	19.09	N/A	N/A	N/A	8.54	10.55	10.55	
LAI-13	8/11/2003	19.09	N/A	N/A	N/A	8.62	10.47	10.47	
LAI-13	8/22/2003	19.09	N/A	N/A	N/A	9.81	9.28	9.28	
LAI-13	8/26/2003	19.09	N/A	N/A	N/A	8.81	10.28	10.28	
LAI-13	9/2/2003	19.09	N/A	N/A	N/A	8.88	10.21	10.21	
LAI-13	9/9/2003	19.09	N/A	N/A	N/A	8.91	10.18	10.18	
LAI-13	9/19/2003	19.09	N/A	N/A	N/A	10.94	8.15	8.15	
LAI-13	10/14/2003	19.09	N/A	N/A	N/A	9.08	10.01	10.01	
LAI-13	11/20/2003	19.09	N/A	N/A	N/A	5.94	13.15	13.15	
LAI-13	12/3/2003	19.09	N/A	N/A	N/A	5.52	13.57	13.57	
LAI-13	1/19/2004	19.09	N/A	N/A	N/A	5.39	13.70	13.70	
LAI-13	2/24/2004	19.09	N/A	N/A	N/A	5.77	13.32	13.32	
LAI-13	3/15/2004	19.09	N/A	N/A	N/A	6.66	12.43	12.43	
LAI-13	4/19/2004	19.09	N/A	N/A	N/A	7.58	11.51	11.51	
LAI-13	5/17/2004	19.09	N/A	N/A	N/A	8.05	11.04	11.04	
LAI-13	6/22/2004	19.09	N/A	N/A	N/A	7.91	11.18	11.18	
LAI-14	1/31/2003	19.29	N/A	N/A	N/A	6.12	13.17	13.17	
LAI-14	2/12/2003	19.29	N/A	N/A	N/A	7.11	12.18	12.18	
LAI-14	2/18/2003	19.29	N/A	N/A	N/A	7.17	12.12	12.12	
LAI-14	2/21/2003	19.29	N/A	N/A	N/A	7.25	12.04	12.04	
LAI-14	2/24/2003	19.29	N/A	N/A	N/A	7.25	12.04	12.04	
LAI-14	3/3/2003	19.29	N/A	N/A	N/A	7.50	11.79	11.79	
LAI-14	3/12/2003	19.29	N/A	N/A	N/A	7.40	11.89	11.89	
LAI-14	3/14/2003	19.29	N/A	N/A	N/A	7.23	12.06	12.06	
LAI-14	3/26/2003	19.29	N/A	N/A	N/A	7.04	12.25	12.25	
LAI-14	3/28/2003	19.29	N/A	N/A	N/A	7.07	12.22	12.22	
LAI-14	4/2/2003	19.29	N/A	N/A	N/A	7.00	12.29	12.29	
LAI-14	4/4/2003	19.29	N/A	N/A	N/A	7.24	12.05	12.05	
LAI-14	4/8/2003	19.29	N/A	N/A	N/A	7.41	11.88	11.88	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-14	4/11/2003	19.29	N/A	N/A	N/A	7.36	11.93	11.93	
LAI-14	4/15/2003	19.29	N/A	N/A	N/A	7.34	11.95	11.95	
LAI-14	4/17/2003	19.29	N/A	N/A	N/A	7.39	11.90	11.90	
LAI-14	4/22/2003	19.29	N/A	N/A	N/A	7.53	11.76	11.76	
LAI-14	4/25/2003	19.29	N/A	N/A	N/A	7.62	11.67	11.67	
LAI-14	5/2/2003	19.29	N/A	N/A	N/A	7.20	12.09	12.09	
LAI-14	5/6/2003	19.29	N/A	N/A	N/A	7.82	11.47	11.47	
LAI-14	5/9/2003	19.29	N/A	N/A	N/A	7.86	11.43	11.43	
LAI-14	5/16/2003	19.29	N/A	N/A	N/A	8.00	11.29	11.29	
LAI-14	5/23/2003	19.29	N/A	N/A	N/A	8.03	11.26	11.26	
LAI-14	5/28/2003	19.29	N/A	N/A	N/A	8.14	11.15	11.15	
LAI-14	6/13/2003	19.29	N/A	N/A	N/A	8.30	10.99	10.99	
LAI-14	6/18/2003	19.29	N/A	N/A	N/A	8.33	10.96	10.96	
LAI-14	6/27/2003	19.29	N/A	N/A	N/A	8.35	10.94	10.94	
LAI-14	7/7/2003	19.29	N/A	N/A	N/A	8.65	10.64	10.64	
LAI-14	7/16/2003	19.29	N/A	N/A	N/A	7.83	11.46	11.46	
LAI-14	7/31/2003	19.29	N/A	N/A	N/A	8.41	10.88	10.88	
LAI-14	8/5/2003	19.29	N/A	N/A	N/A	8.73	10.56	10.56	
LAI-14	8/11/2003	19.29	N/A	N/A	N/A	8.80	10.49	10.49	
LAI-14	8/22/2003	19.29	N/A	N/A	N/A	9.89	9.40	9.40	
LAI-14	8/26/2003	19.29	N/A	N/A	N/A	9.04	10.25	10.25	
LAI-14	9/2/2003	19.29	N/A	N/A	N/A	9.07	10.22	10.22	
LAI-14	9/9/2003	19.29	N/A	N/A	N/A	9.14	10.15	10.15	
LAI-14	9/19/2003	19.29	N/A	N/A	N/A	9.14	10.15	10.15	
LAI-14	10/14/2003	19.29	N/A	N/A	N/A	9.30	9.99	9.99	
LAI-14	11/20/2003	19.29	N/A	N/A	N/A	6.59	12.70	12.70	
LAI-14	12/3/2003	19.29	N/A	N/A	N/A	6.53	12.76	12.76	
LAI-14	1/19/2004	19.29	N/A	N/A	N/A	6.45	12.84	12.84	
LAI-14	2/24/2004	19.29	N/A	N/A	N/A	7.03	12.26	12.26	
LAI-14	3/15/2004	19.29	N/A	N/A	N/A	7.52	11.77	11.77	
LAI-14	4/19/2004	19.29	N/A	N/A	N/A	8.03	11.26	11.26	
LAI-14	5/17/2004	19.29	N/A	N/A	N/A	8.32	10.97	10.97	
LAI-14	6/22/2004	19.29	N/A	N/A	N/A	8.26	11.03	11.03	
LAI-15	1/31/2003	17.58	N/A	N/A	N/A	6.13	11.45	11.45	
LAI-15	2/12/2003	17.58	N/A	N/A	N/A	4.23	13.35	13.35	
LAI-15	2/18/2003	17.58	N/A	N/A	N/A	4.51	13.07	13.07	
LAI-15	2/21/2003	17.58	N/A	N/A	N/A	4.72	12.86	12.86	
LAI-15	2/24/2003	17.58	N/A	N/A	N/A	4.74	12.84	12.84	
LAI-15	3/3/2003	17.58	N/A	N/A	N/A	4.96	12.62	12.62	
LAI-15	3/12/2003	17.58	N/A	N/A	N/A	4.81	12.77	12.77	
LAI-15	3/14/2003	17.58	N/A	N/A	N/A	4.14	13.44	13.44	
LAI-15	3/26/2003	17.58	N/A	N/A	N/A	3.82	13.76	13.76	
LAI-15	3/28/2003	17.58	N/A	N/A	N/A	3.85	13.73	13.73	
LAI-15	4/2/2003	17.58	N/A	N/A	N/A	4.40	13.18	13.18	
LAI-15	4/4/2003	17.58	N/A	N/A	N/A	4.49	13.09	13.09	
LAI-15	4/8/2003	17.58	N/A	N/A	N/A	4.71	12.87	12.87	
LAI-15	4/11/2003	17.58	N/A	N/A	N/A	4.80	12.78	12.78	
LAI-15	4/15/2003	17.58	N/A	N/A	N/A	4.75	12.83	12.83	
LAI-15	4/17/2003	17.58	N/A	N/A	N/A	4.77	12.81	12.81	
LAI-15	4/22/2003	17.58	N/A	N/A	N/A	4.99	12.59	12.59	
LAI-15	4/25/2003	17.58	N/A	N/A	N/A	5.09	12.49	12.49	
LAI-15	5/2/2003	17.58	N/A	N/A	N/A	5.13	12.45	12.45	
LAI-15	5/6/2003	17.58	N/A	N/A	N/A	5.55	12.03	12.03	
LAI-15	5/9/2003	17.58	N/A	N/A	N/A	5.68	11.90	11.90	
LAI-15	5/16/2003	17.58	N/A	N/A	N/A	4.90	12.68	12.68	
LAI-15	5/23/2003	17.58	N/A	N/A	N/A	6.12	11.46	11.46	
LAI-15	5/28/2003	17.58	N/A	N/A	N/A	6.13	11.45	11.45	
LAI-15	6/13/2003	17.58	N/A	N/A	N/A	6.33	11.25	11.25	
LAI-15	6/18/2003	17.58	N/A	N/A	N/A	6.35	11.23	11.23	
LAI-15	6/27/2003	17.58	N/A	N/A	N/A	6.39	11.19	11.19	
LAI-15	7/7/2003	17.58	N/A	N/A	N/A	6.75	10.83	10.83	
LAI-15	7/16/2003	17.58	N/A	N/A	N/A	6.03	11.55	11.55	
LAI-15	7/31/2003	17.58	N/A	N/A	N/A	6.83	10.75	10.75	
LAI-15	8/5/2003	17.58	N/A	N/A	N/A	6.85	10.73	10.73	
LAI-15	8/11/2003	17.58	N/A	N/A	N/A	6.93	10.65	10.65	
LAI-15	8/22/2003	17.58	N/A	N/A	N/A	8.04	9.54	9.54	
LAI-15	8/26/2003	17.58	N/A	N/A	N/A	7.11	10.47	10.47	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
LAI-15	9/2/2003	17.58	N/A	N/A	N/A	7.21	10.37	10.37	
LAI-15	9/9/2003	17.58	N/A	N/A	N/A	7.23	10.35	10.35	
LAI-15	9/19/2003	17.58	N/A	N/A	N/A	N/A	N/A	N/A	
LAI-15	10/14/2003	17.58	N/A	N/A	N/A	7.45	10.13	10.13	
LAI-15	11/20/2003	17.58	N/A	N/A	N/A	4.11	13.47	13.47	
LAI-15	12/3/2003	17.58	N/A	N/A	N/A	3.65	13.93	13.93	
LAI-15	1/19/2004	17.58	N/A	N/A	N/A	3.59	13.99	13.99	
LAI-15	2/24/2004	17.58	N/A	N/A	N/A	4.26	13.32	13.32	
LAI-15	3/15/2004	17.58	N/A	N/A	N/A	5.19	12.39	12.39	
LAI-15	4/19/2004	17.58	N/A	N/A	N/A	5.97	11.61	11.61	
LAI-15	5/17/2004	17.58	N/A	N/A	N/A	6.42	11.16	11.16	
LAI-15	6/22/2004	17.58	N/A	N/A	N/A	6.09	11.49	11.49	
LAI-16	1/31/2003	18.61	N/A	N/A	N/A	6.28	12.33	12.33	
LAI-16	2/12/2003	18.61	N/A	N/A	N/A	6.65	11.96	11.96	
LAI-16	2/18/2003	18.61	N/A	N/A	N/A	6.70	11.91	11.91	
LAI-16	2/21/2003	18.61	N/A	N/A	N/A	6.73	11.88	11.88	
LAI-16	2/24/2003	18.61	N/A	N/A	N/A	6.74	11.87	11.87	
LAI-16	3/3/2003	18.61	N/A	N/A	N/A	6.86	11.75	11.75	
LAI-16	3/12/2003	18.61	N/A	N/A	N/A	6.52	12.09	12.09	
LAI-16	3/14/2003	18.61	N/A	N/A	N/A	6.39	12.22	12.22	
LAI-16	3/26/2003	18.61	N/A	N/A	N/A	6.48	12.13	12.13	
LAI-16	3/28/2003	18.61	N/A	N/A	N/A	7.46	11.15	11.15	
LAI-16	4/2/2003	18.61	N/A	N/A	N/A	6.63	11.98	11.98	
LAI-16	4/4/2003	18.61	N/A	N/A	N/A	6.71	11.90	11.90	
LAI-16	4/8/2003	18.61	N/A	N/A	N/A	6.90	11.71	11.71	
LAI-16	4/11/2003	18.61	N/A	N/A	N/A	6.75	11.86	11.86	
LAI-16	4/15/2003	18.61	N/A	N/A	N/A	6.68	11.93	11.93	
LAI-16	4/17/2003	18.61	N/A	N/A	N/A	6.73	11.88	11.88	
LAI-16	4/22/2003	18.61	N/A	N/A	N/A	6.87	11.74	11.74	
LAI-16	4/25/2003	18.61	N/A	N/A	N/A	6.99	11.62	11.62	
LAI-16	5/2/2003	18.61	N/A	N/A	N/A	6.78	11.83	11.83	
LAI-16	5/6/2003	18.61	N/A	N/A	N/A	7.26	11.35	11.35	
LAI-16	5/9/2003	18.61	N/A	N/A	N/A	7.35	11.26	11.26	
LAI-16	5/16/2003	18.61	N/A	N/A	N/A	7.60	11.01	11.01	
LAI-16	5/23/2003	18.61	N/A	N/A	N/A	8.08	10.53	10.53	
LAI-16	5/28/2003	18.61	N/A	N/A	N/A	7.87	10.74	10.74	
LAI-16	6/13/2003	18.61	N/A	N/A	N/A	8.31	10.30	10.30	
LAI-16	6/18/2003	18.61	N/A	N/A	N/A	8.45	10.16	10.16	
LAI-16	6/27/2003	18.61	N/A	N/A	N/A	8.08	10.53	10.53	
LAI-16	7/7/2003	18.61	N/A	N/A	N/A	N/A	N/A	N/A	Faulty meter
LAI-16	7/16/2003	18.61	N/A	N/A	N/A	8.00	10.61	10.61	
LAI-16	7/31/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	8/5/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	8/11/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	8/22/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	8/26/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	9/2/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	9/9/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	9/19/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	10/14/2003	18.61	N/A	N/A	N/A	Dry	Dry	Dry	
LAI-16	11/20/2003	18.61	N/A	N/A	N/A	6.95	11.66	11.66	
LAI-16	12/3/2003	18.61	N/A	N/A	N/A	6.68	11.93	11.93	
LAI-16	1/19/2004	18.61	N/A	N/A	N/A	6.49	12.12	12.12	
LAI-16	2/24/2004	18.61	N/A	N/A	N/A	6.62	11.99	11.99	
LAI-16	3/15/2004	18.61	N/A	N/A	N/A	7.02	11.59	11.59	
LAI-16	4/19/2004	18.61	N/A	N/A	N/A	7.64	10.97	10.97	
LAI-16	5/17/2004	18.61	N/A	N/A	N/A	8.35	10.26	10.26	
LAI-16	6/22/2004	18.61	N/A	N/A	N/A	8.52	10.09	10.09	
R-1	11/24/2002	16.94	N/A	N/A	N/A	5.90	11.04	11.04	
R-2	11/24/2002	17.52	N/A	N/A	N/A	6.69	10.83	10.83	
RW-1	11/20/2002	21.68	8.25	13.43	0.95	9.2	12.48	13.19	
RW-1	11/21/2002	21.68	8.25	13.43	1.15	9.4	12.28	13.14	
RW-1	11/22/2002	21.68	8.22	13.46	1.20	9.42	12.26	13.16	
RW-1	11/24/2002	21.68	8.35	13.33	1.06	9.41	12.27	13.07	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
RW-1	1/2/2003	21.68	5.61	16.07	0.21	5.82	15.86	16.02	
RW-1	1/3/2003	21.68	5.51	16.17	0.21	5.72	15.96	16.12	
RW-1	1/6/2003	21.68	5.35	16.33	0.29	5.64	16.04	16.26	
RW-1	1/7/2003	21.68	5.68	16.00	0.28	5.96	15.72	15.93	
RW-1	1/8/2003	21.68	5.95	15.73	0.28	6.23	15.45	15.66	
RW-1	1/9/2003	21.68	6.03	15.65	0.29	6.32	15.36	15.58	
RW-1	1/10/2003	21.68	6.20	15.48	0.30	6.5	15.18	15.41	
RW-1	1/13/2003	21.68	6.00	15.68	0.32	6.32	15.36	15.60	
RW-1	1/14/2003	21.68	5.72	15.96	0.73	6.45	15.23	15.78	
RW-1	1/15/2003	21.68	5.99	15.69	0.19	6.18	15.50	15.64	
RW-1	1/16/2003	21.68	6.10	15.58	0.30	6.4	15.28	15.51	
RW-1	1/17/2003	21.68	6.15	15.53	0.30	6.45	15.23	15.46	
RW-1	1/20/2003	21.68	6.34	15.34	0.35	6.69	14.99	15.25	
RW-1	1/22/2003	21.68	5.60	16.08	0.29	5.89	15.79	16.01	
RW-1	1/23/2003	21.68	5.80	15.88	0.35	6.15	15.53	15.79	
RW-1	1/24/2003	21.68	5.37	16.31	0.38	5.75	15.93	16.22	
RW-1	1/27/2003	21.68	4.68	17.00	0.47	5.15	16.53	16.88	
RW-1	1/28/2003	21.68	4.66	17.02	0.45	5.11	16.57	16.91	
RW-1	1/29/2003	21.68	4.67	17.01	0.46	5.13	16.55	16.90	
RW-1	1/30/2003	21.68	4.90	16.78	0.44	5.34	16.34	16.67	
RW-1	2/3/2003	21.68	5.65	16.03	0.41	6.06	15.62	15.93	
RW-1	2/6/2003	21.32	6.76	14.56	0.40	7.16	14.16	14.46	
RW-1	2/11/2003	21.32	7.35	13.97	0.42	7.77	13.55	13.87	
RW-1	2/18/2003	21.32	N/A	N/A	N/A	6.55	14.77	14.77	
RW-1	2/21/2003	21.32	7.90	13.42	0.93	8.83	12.49	13.19	
RW-1	2/26/2003	21.32	7.70	13.62	0.81	8.51	12.81	13.42	
RW-1	3/4/2003	21.32	7.11	14.21	0.63	7.74	13.58	14.05	
RW-1	3/12/2003	21.32	7.30	14.02	0.46	7.76	13.56	13.91	
RW-1	3/14/2003	21.32	6.85	14.47	N/A	7.31	14.01	14.01	
RW-1	3/26/2003	21.32	6.39	14.93	0.13	6.52	14.80	14.90	
RW-1	3/28/2003	21.32	7.41	13.91	0.15	7.56	13.76	13.87	
RW-1	4/2/2003	21.32	7.45	13.87	0.10	7.55	13.77	13.85	
RW-1	4/4/2003	21.32	7.70	13.62	0.05	7.75	13.57	13.61	
RW-1	4/8/2003	21.32	7.25	14.07	0.02	7.27	14.05	14.07	
RW-1	4/11/2003	21.32	7.15	14.17	0.03	7.18	14.14	14.16	
RW-1	4/15/2003	21.32	6.57	14.75	0.02	6.59	14.73	14.75	
RW-1	4/17/2003	21.32	7.52	13.80	0.02	7.54	13.78	13.80	
RW-1	4/22/2003	21.32	7.53	13.79	0.02	7.55	13.77	13.79	
RW-1	4/25/2003	21.32	7.42	13.90	0.01	7.43	13.89	13.90	
RW-1	5/2/2003	21.32	8.84	12.48	0.01	8.85	12.47	12.48	
RW-1	5/6/2003	21.32	N/A	N/A	N/A	9.02	12.30	12.30	
RW-1	5/9/2003	21.32	N/A	N/A	N/A	9.21	12.11	12.11	
RW-1	5/23/2003	21.32	N/A	N/A	N/A	9.26	12.06	12.06	
RW-1	5/28/2003	21.32	9.35	11.97	0.01	9.36	11.96	11.97	
RW-1	6/13/2003	21.32	9.52	11.80	0.49	10.01	11.31	11.68	
RW-1	6/18/2003	21.32	9.22	12.10	0.91	10.13	11.19	11.87	
RW-1	6/27/2003	21.32	N/A	N/A	N/A	9.81	11.51	11.51	
RW-1	7/7/2003	21.32	10.26	11.06	0.03	10.29	11.03	11.05	
RW-1	7/16/2003	21.32	10.09	11.23	0.26	10.35	10.97	11.17	
RW-1	7/31/2003	21.32	10.34	10.98	0.01	10.35	10.97	10.98	
RW-1	8/5/2003	21.32	10.32	11.00	0.08	10.40	10.92	10.98	
RW-1	8/11/2003	21.32	11.34	9.98	0.01	11.35	9.97	9.98	
RW-1	8/22/2003	21.32	11.34	9.98	0.01	11.35	9.97	9.98	
RW-1	8/26/2003	21.32	N/A	N/A	N/A	10.36	10.96	10.96	
RW-1	9/2/2003	21.32	N/A	N/A	N/A	10.36	10.96	10.96	
RW-1	9/9/2003	21.32	10.33	10.99	0.05	10.38	10.94	10.98	
RW-1	9/19/2003	21.32	10.33	10.99	0.03	10.36	10.96	10.98	
RW-1	10/14/2003	21.32	N/A	N/A	N/A	10.30	11.02	11.02	
RW-1	11/20/2003	21.32	N/A	N/A	N/A	5.52	15.80	15.80	
RW-1	12/3/2003	21.32	N/A	N/A	N/A	5.44	15.88	15.88	
RW-1	1/19/2004	21.32	N/A	N/A	N/A	5.57	15.75	15.75	
RW-1	2/24/2004	21.32	N/A	N/A	N/A	7.45	13.87	13.87	
RW-1	3/15/2004	21.32	N/A	N/A	N/A	8.87	12.45	12.45	
RW-1	4/19/2004	21.32	N/A	N/A	N/A	9.56	11.76	11.76	
RW-1	5/17/2004	21.32	N/A	N/A	N/A	10.14	11.18	11.18	
RW-1	6/22/2004	21.32	N/A	N/A	N/A	9.91	11.41	11.41	
RW-2	11/20/2002	21.49	8.05	13.44	1.35	9.4	12.09	13.10	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
RW-2	11/21/2002	21.49	8.00	13.49	1.40	9.4	12.09	13.14	
RW-2	11/22/2002	21.49	8.00	13.49	1.41	9.41	12.08	13.14	
RW-2	11/24/2002	21.49	8.21	13.28	1.49	9.70	11.79	12.91	
RW-2	1/2/2003	21.49	6.11	15.38	2.27	8.38	13.11	14.81	
RW-2	1/6/2003	21.49	5.40	16.09	2.78	8.18	13.31	15.40	
RW-2	1/7/2003	21.49	6.41	15.08	0.54	6.95	14.54	14.95	
RW-2	1/8/2003	21.49	7.67	13.82	0.01	7.68	13.81	13.82	
RW-2	1/9/2003	21.49	8.72	12.77	0.01	8.73	12.76	12.77	
RW-2	1/10/2003	21.49	6.38	15.11	0.54	6.92	14.57	14.98	
RW-2	1/13/2003	21.49	8.42	13.07	0.10	8.52	12.97	13.05	
RW-2	1/14/2003	21.49	6.17	15.32	1.32	7.49	14.00	14.99	
RW-2	1/15/2003	21.49	5.95	15.54	0.85	6.80	14.69	15.33	
RW-2	1/16/2003	21.49	6.51	14.98	1.00	7.51	13.98	14.73	
RW-2	1/17/2003	21.49	6.40	15.09	1.12	7.52	13.97	14.81	
RW-2	1/20/2003	21.49	6.35	15.14	1.59	7.94	13.55	14.74	
RW-2	1/22/2003	21.49	5.86	15.63	2.74	8.60	12.89	14.95	
RW-2	1/23/2003	21.49	5.92	15.57	3.23	9.15	12.34	14.76	
RW-2	1/24/2003	21.49	5.37	16.12	0.62	5.99	15.50	15.97	
RW-2	1/27/2003	21.49	4.69	16.80	0.53	5.22	16.27	16.67	
RW-2	1/28/2003	21.49	4.83	16.66	3.71	8.54	12.95	15.73	
RW-2	1/29/2003	21.49	4.82	16.67	3.66	8.48	13.01	15.76	
RW-2	1/30/2003	21.49	4.95	16.54	0.94	5.89	15.60	16.31	
RW-2	2/3/2003	21.49	5.29	16.20	3.82	9.11	12.38	15.25	
RW-2	2/6/2003	21.10	6.16	14.94	3.48	9.64	11.46	14.07	
RW-2	2/11/2003	21.10	6.61	14.49	3.17	9.78	11.32	13.70	
RW-2	2/18/2003	21.10	7.46	13.64	2.72	10.18	10.92	12.96	
RW-2	2/21/2003	21.10	7.40	13.70	2.76	10.16	10.94	13.01	
RW-2	2/26/2003	21.10	7.66	13.44	0.69	8.35	12.75	13.27	
RW-2	3/4/2003	21.10	7.15	13.95	1.42	8.57	12.53	13.60	
RW-2	3/12/2003	21.10	7.60	13.50	0.02	7.62	13.48	13.50	
RW-2	3/14/2003	21.10	7.38	13.72	1.61	8.99	12.11	13.32	
RW-2	3/26/2003	21.10	6.85	14.25	0.70	7.55	13.55	14.08	
RW-2	3/28/2003	21.10	7.48	13.62	0.87	8.35	12.75	13.40	
RW-2	4/2/2003	21.10	7.55	13.55	0.86	8.41	12.69	13.34	
RW-2	4/4/2003	21.10	7.95	13.15	0.56	8.51	12.59	13.01	
RW-2	4/8/2003	21.10	8.02	13.08	0.03	8.05	13.05	13.07	
RW-2	4/11/2003	21.10	8.22	12.88	0.01	8.23	12.87	12.88	
RW-2	4/15/2003	21.10	NA	N/A	N/A	7.68	13.42	13.42	
RW-2	4/17/2003	21.10	8.34	12.76	0.06	8.40	12.70	12.75	
RW-2	4/22/2003	21.10	8.36	12.74	0.16	8.52	12.58	12.70	
RW-2	4/25/2003	21.10	8.30	12.80	0.11	8.41	12.69	12.77	
RW-2	5/2/2003	21.10	8.75	12.35	0.31	9.06	12.04	12.27	
RW-2	5/6/2003	21.10	8.82	12.28	0.61	9.43	11.67	12.13	
RW-2	5/9/2003	21.10	9.16	11.94	0.62	9.78	11.32	11.79	
RW-2	5/23/2003	21.10	9.15	11.95	1.42	10.57	10.53	11.60	
RW-2	5/28/2003	21.10	8.95	12.15	1.49	10.44	10.66	11.78	
RW-2	6/13/2003	21.10	9.24	11.86	1.35	10.59	10.51	11.52	
RW-2	6/18/2003	21.10	9.20	11.90	1.31	10.51	10.59	11.57	
RW-2	6/27/2003	21.10	9.23	11.87	1.26	10.49	10.61	11.56	
RW-2	7/7/2003	21.10	10.01	11.09	0.42	10.43	10.67	10.99	
RW-2	7/16/2003	21.10	9.83	11.27	0.71	10.54	10.56	11.09	Had to pull pump to measure
RW-2	7/31/2003	21.10	10.31	10.79	0.15	10.46	10.64	10.75	
RW-2	8/5/2003	21.10	10.28	10.82	0.22	10.50	10.60	10.77	
RW-2	8/11/2003	21.10	NA	N/A	N/A	11.38	9.72	9.72	
RW-2	8/22/2003	21.10	NA	N/A	N/A	11.38	9.72	9.72	
RW-2	8/26/2003	21.10	NA	N/A	N/A	11.26	9.84	9.84	
RW-2	9/2/2003	21.10	NA	N/A	N/A	10.40	10.70	10.70	
RW-2	9/9/2003	21.10	10.34	10.76	0.06	10.40	10.70	10.75	
RW-2	9/19/2003	21.10	NA	N/A	N/A	10.70	10.40	10.40	
RW-2	10/14/2003	21.10	NA	N/A	N/A	10.38	10.72	10.72	
RW-2	11/20/2003	21.10	NA	N/A	N/A	7.66	13.44	13.44	
RW-2	12/3/2003	21.10	NA	N/A	N/A	6.65	14.45	14.45	
RW-2	1/19/2004	21.10	NA	N/A	N/A	7.13	13.97	13.97	
RW-2	2/24/2004	21.10	NA	N/A	N/A	7.92	13.18	13.18	
RW-2	3/15/2004	21.10	NA	NA	NA	NA	NA	NA	No water above pump
RW-2	4/19/2004	21.10	NA	NA	NA	10.01	NA	NA	
RW-2	5/17/2004	21.10	NA	NA	NA	NA	NA	NA	
RW-2	6/22/2004	21.10	NA	NA	NA	10.08	11.02	11.02	Trace product

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
RW-3	11/20/2002	20.00	8.45	11.55	0.80	9.25	10.75	11.35	
RW-3	11/21/2002	20.00	8.27	11.73	1.20	9.47	10.53	11.43	
RW-3	11/22/2002	20.00	8.18	11.82	1.28	9.46	10.54	11.50	
RW-3	11/24/2002	20.00	7.94	12.06	1.68	9.62	10.38	11.64	
RW-3	1/2/2003	20.00	6.52	13.48	0.04	6.56	13.44	13.47	
RW-3	1/3/2003	20.00	6.38	13.62	0.23	6.61	13.39	13.56	
RW-3	1/6/2003	20.00	5.92	14.08	0.03	5.95	14.05	14.07	
RW-3	1/7/2003	20.00	5.81	14.19	0.04	5.85	14.15	14.18	
RW-3	1/8/2003	20.00	5.74	14.26	0.05	5.79	14.21	14.25	
RW-3	1/9/2003	20.00	5.78	14.22	0.05	5.83	14.17	14.21	
RW-3	1/10/2003	20.00	5.88	14.12	0.05	5.93	14.07	14.11	
RW-3	1/13/2003	20.00	6.02	13.98	0.08	6.10	13.90	13.96	
RW-3	1/14/2003	20.00	5.97	14.03	0.09	6.06	13.94	14.01	
RW-3	1/15/2003	20.00	5.87	14.13	0.12	5.99	14.01	14.10	
RW-3	1/16/2003	20.00	5.89	14.11	0.09	5.98	14.02	14.09	
RW-3	1/17/2003	20.00	5.85	14.15	0.07	5.92	14.08	14.13	
RW-3	1/20/2003	20.00	5.98	14.02	0.13	6.11	13.89	13.99	
RW-3	1/22/2003	20.00	5.91	14.09	0.09	6.00	14.00	14.07	
RW-3	1/23/2003	20.00	6.20	13.80	0.49	6.69	13.31	13.68	
RW-3	1/24/2003	20.00	6.02	13.98	0.24	6.26	13.74	13.92	
RW-3	1/27/2003	20.00	5.57	14.43	0.08	5.65	14.35	14.41	
RW-3	1/28/2003	20.00	5.55	14.45	0.07	5.62	14.38	14.43	
RW-3	1/29/2003	20.00	5.44	14.56	0.06	5.50	14.50	14.55	
RW-3	1/30/2003	20.00	5.56	14.44	0.06	5.62	14.38	14.43	
RW-3	2/3/2003	20.00	5.75	14.25	0.10	5.85	14.15	14.23	
RW-3	2/6/2003	20.82	6.44	14.38	0.12	6.56	14.26	14.35	
RW-3	2/11/2003	20.82	6.81	14.01	0.32	7.13	13.69	13.93	
RW-3	2/18/2003	20.82	7.29	13.53	0.88	8.17	12.65	13.31	
RW-3	2/21/2003	20.82	7.19	13.63	0.75	7.94	12.88	13.44	
RW-3	2/26/2003	20.82	6.73	14.09	0.31	7.04	13.78	14.01	
RW-3	3/4/2003	20.82	6.83	13.99	0.34	7.17	13.65	13.91	
RW-3	3/12/2003	20.82	7.38	13.44	0.06	7.44	13.38	13.43	
RW-3	3/14/2003	20.82	7.21	13.61	0.07	7.28	13.54	13.59	
RW-3	3/26/2003	20.82	6.52	14.30	0.01	6.53	14.29	14.30	
RW-3	3/28/2003	20.82	N/A	N/A	N/A	7.09	13.73	13.73	
RW-3	4/2/2003	20.82	N/A	N/A	N/A	7.05	13.77	13.77	
RW-3	4/4/2003	20.82	N/A	N/A	N/A	7.26	13.56	13.56	
RW-3	4/8/2003	20.82	N/A	N/A	N/A	6.90	13.92	13.92	
RW-3	4/11/2003	20.82	N/A	N/A	N/A	7.51	13.31	13.31	
RW-3	4/15/2003	20.82	N/A	N/A	N/A	6.67	14.15	14.15	
RW-3	4/17/2003	20.82	N/A	N/A	N/A	7.61	13.21	13.21	
RW-3	4/22/2003	20.82	N/A	N/A	N/A	7.61	13.21	13.21	
RW-3	4/25/2003	20.82	N/A	N/A	N/A	7.22	13.60	13.60	
RW-3	5/2/2003	20.82	8.21	12.61	0.25	8.46	12.36	12.55	
RW-3	5/6/2003	20.82	8.51	12.31	0.24	8.75	12.07	12.25	
RW-3	5/9/2003	20.82	8.71	12.11	0.12	8.83	11.99	12.08	
RW-3	5/23/2003	20.82	9.74	11.08	0.03	9.77	11.05	11.07	
RW-3	5/28/2003	20.82	8.75	12.07	0.01	8.76	12.06	12.07	
RW-3	6/13/2003	20.82	9.19	11.63	0.02	9.21	11.61	11.63	
RW-3	6/18/2003	20.82	9.16	11.66	0.06	9.22	11.60	11.65	
RW-3	6/27/2003	20.82	N/A	N/A	N/A	9.50	11.32	11.32	
RW-3	7/7/2003	20.82	10.05	10.77	0.06	10.11	10.71	10.76	
RW-3	7/16/2003	20.82	10.02	10.80	0.01	10.03	10.79	10.80	
RW-3	7/31/2003	20.82	10.18	10.64	0.11	10.29	10.53	10.61	
RW-3	8/5/2003	20.82	N/A	N/A	N/A	Dry	Dry	Dry	
RW-3	8/11/2003	20.82	11.00	9.82	0.30	11.30	9.52	9.75	
RW-3	8/22/2003	20.82	10.98	9.84	0.29	11.27	9.55	9.77	
RW-3	8/26/2003	20.82	N/A	N/A	N/A	11.14	9.68	9.68	
RW-3	9/2/2003	20.82	N/A	N/A	N/A	10.28	10.54	10.54	
RW-3	9/9/2003	20.82	N/A	N/A	N/A	10.29	10.53	10.53	
RW-3	9/19/2003	20.82	N/A	N/A	N/A	10.29	10.53	10.53	
RW-3	10/14/2003	20.82	N/A	N/A	N/A	10.30	10.52	10.52	
RW-3	11/20/2003	20.82	7.16	13.66	1.29	8.45	12.37	13.34	
RW-3	12/3/2003	20.82	6.72	14.10	0.05	6.77	14.05	14.09	
RW-3	1/19/2004	20.82	N/A	N/A	N/A	6.26	14.56	14.56	
RW-3	2/24/2004	20.82	N/A	N/A	N/A	6.72	14.10	14.10	
RW-3	3/15/2004	20.82	N/A	N/A	N/A	7.78	13.04	13.04	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
RW-3	4/19/2004	20.82	N/A	N/A	N/A	8.71	12.11	12.11	
RW-3	5/17/2004	20.82	9.73	11.09	0.01	9.74	11.08	11.09	
RW-3	6/22/2004	20.82	9.36	11.46	0.02	9.38	11.44	11.46	
RW-4	11/20/2002	19.92	7.50	12.42	2.64	10.14	9.78	11.76	
RW-4	11/21/2002	19.92	7.50	12.42	2.64	10.14	9.78	11.76	
RW-4	11/22/2002	19.92	8.37	11.55	0.77	9.14	10.78	11.36	
RW-4	11/24/2002	19.92	7.57	12.35	2.52	10.09	9.83	11.72	
RW-4	1/3/2003	19.92	6.31	13.61	0.50	6.81	13.11	13.49	
RW-4	1/6/2003	19.92	6.02	13.90	0.04	6.06	13.86	13.89	
RW-4	1/7/2003	19.92	5.74	14.18	0.18	5.92	14.00	14.14	
RW-4	1/8/2003	19.92	5.67	14.25	0.14	5.81	14.11	14.22	
RW-4	1/9/2003	19.92	5.67	14.25	0.19	5.86	14.06	14.20	
RW-4	1/10/2003	19.92	5.76	14.16	0.25	6.01	13.91	14.10	
RW-4	1/13/2003	19.92	5.80	14.12	0.35	6.15	13.77	14.03	
RW-4	1/14/2003	19.92	5.85	14.07	0.29	6.14	13.78	14.00	
RW-4	1/15/2003	19.92	5.05	14.87	1.80	6.85	13.07	14.42	
RW-4	1/16/2003	19.92	5.78	14.14	0.27	6.05	13.87	14.07	
RW-4	1/17/2003	19.92	5.72	14.20	0.27	5.99	13.93	14.13	
RW-4	1/20/2003	19.92	5.84	14.08	0.30	6.14	13.78	14.01	
RW-4	1/22/2003	19.92	5.82	14.10	0.34	6.16	13.76	14.02	
RW-4	1/23/2003	19.92	6.12	13.80	0.58	6.70	13.22	13.66	
RW-4	1/24/2003	19.92	5.97	13.95	0.38	6.35	13.57	13.86	
RW-4	1/27/2003	19.92	5.51	14.41	0.13	5.64	14.28	14.38	
RW-4	1/28/2003	19.92	5.50	14.42	0.10	5.60	14.32	14.40	
RW-4	1/29/2003	19.92	5.36	14.56	0.07	5.43	14.49	14.54	
RW-4	1/30/2003	19.92	5.45	14.47	0.13	5.58	14.34	14.44	
RW-4	2/3/2003	19.92	5.66	14.26	0.21	5.87	14.05	14.21	
RW-4	2/6/2003	20.68	6.35	14.33	0.28	6.63	14.05	14.26	
RW-4	2/11/2003	20.68	6.75	13.93	0.39	7.14	13.54	13.83	
RW-4	2/18/2003	20.68	7.22	13.46	1.07	8.29	12.39	13.19	
RW-4	2/21/2003	20.68	7.10	13.58	0.97	8.07	12.61	13.34	
RW-4	2/26/2003	20.68	6.74	13.94	0.84	7.58	13.10	13.73	
RW-4	3/4/2003	20.68	7.08	13.60	0.14	7.22	13.46	13.57	
RW-4	3/12/2003	20.68	7.34	13.34	0.41	7.75	12.93	13.24	
RW-4	3/14/2003	20.68	7.20	13.48	0.64	7.84	12.84	13.32	
RW-4	3/26/2003	20.68	6.61	14.07	0.40	7.01	13.67	13.97	
RW-4	3/28/2003	20.68	7.15	13.53	0.47	7.62	13.06	13.41	
RW-4	4/2/2003	20.68	7.21	13.47	0.24	7.45	13.23	13.41	
RW-4	4/4/2003	20.68	7.52	13.16	0.15	7.67	13.01	13.12	
RW-4	4/8/2003	20.68	N/A	N/A	N/A	7.26	13.42	13.42	
RW-4	4/11/2003	20.68	7.72	12.96	0.03	7.75	12.93	12.95	
RW-4	4/15/2003	20.68	7.14	13.54	0.06	7.20	13.48	13.53	
RW-4	4/17/2003	20.68	7.82	12.86	0.08	7.90	12.78	12.84	
RW-4	4/22/2003	20.68	7.87	12.81	0.08	7.95	12.73	12.79	
RW-4	4/25/2003	20.68	7.91	12.77	0.11	8.02	12.66	12.74	
RW-4	5/2/2003	20.68	8.32	12.36	0.13	8.45	12.23	12.33	
RW-4	5/6/2003	20.68	8.50	12.18	0.31	8.81	11.87	12.10	
RW-4	5/9/2003	20.68	8.72	11.96	0.36	9.08	11.60	11.87	
RW-4	5/23/2003	20.68	8.92	11.76	1.11	10.03	10.65	11.48	
RW-4	5/28/2003	20.68	8.80	11.88	0.02	8.82	11.86	11.88	
RW-4	6/13/2003	20.68	8.90	11.78	1.72	10.62	10.06	11.35	
RW-4	6/18/2003	20.68	8.85	11.83	1.96	10.81	9.87	11.34	
RW-4	6/27/2003	20.68	9.40	11.28	1.42	10.82	9.86	10.93	
RW-4	7/7/2003	20.68	9.54	11.14	1.27	10.81	9.87	10.82	
RW-4	7/16/2003	20.68	9.41	11.27	1.40	10.81	9.87	10.92	
RW-4	7/31/2003	20.68	9.95	10.73	0.85	10.80	9.88	10.52	
RW-4	8/5/2003	20.68	9.82	10.86	0.98	10.80	9.88	10.62	
RW-4	8/11/2003	20.68	10.84	9.84	0.94	11.78	8.90	9.61	
RW-4	8/22/2003	20.68	10.87	9.81	0.92	11.79	8.89	9.58	
RW-4	8/26/2003	20.68	10.36	10.32	0.44	10.80	9.88	10.21	
RW-4	9/2/2003	20.68	10.22	10.46	0.58	10.80	9.88	10.32	
RW-4	9/9/2003	20.68	N/A	N/A	N/A	10.80	9.88	9.88	
RW-4	9/19/2003	20.68	N/A	N/A	N/A	10.81	9.87	9.87	
RW-4	10/14/2003	20.68	N/A	N/A	N/A	10.80	9.88	9.88	
RW-4	11/20/2003	20.68	7.96	12.72	1.54	9.50	11.18	12.34	
RW-4	12/3/2003	20.68	6.75	13.93	1.03	7.78	12.90	13.67	
RW-4	1/19/2004	20.68	6.18	14.50	0.06	6.24	14.44	14.49	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
RW-4	2/24/2004	20.68	6.97	13.71	0.06	7.03	13.65	13.70	
RW-4	3/15/2004	20.68	N/A	N/A	N/A	8.10	12.58	12.58	Oily trace
RW-4	4/19/2004	20.68	N/A	N/A	N/A	8.71	11.97	11.97	
RW-4	5/17/2004	20.68	N/A	N/A	N/A	9.73	10.95	10.95	
RW-4	6/22/2004	20.68	N/A	N/A	N/A	9.57	11.11	11.11	Trace product
RW-5	11/20/2002	20.64	8.65	11.99	0.02	8.67	11.97	11.99	
RW-5	11/21/2002	20.64	8.30	12.34	0.10	8.4	12.24	12.32	
RW-5	11/22/2002	20.64	8.46	12.18	0.06	8.52	12.12	12.17	
RW-5	11/24/2002	20.64	8.63	12.01	0.28	8.91	11.73	11.94	
RW-5	1/2/2003	20.64	6.87	13.77	0.04	6.91	13.73	13.76	
RW-5	1/3/2003	20.64	6.77	13.87	0.03	6.8	13.84	13.86	
RW-5	1/6/2003	20.64	6.46	14.18	0.04	6.5	14.14	14.17	
RW-5	1/7/2003	20.64	6.36	14.28	0.06	6.42	14.22	14.27	
RW-5	1/8/2003	20.64	6.13	14.51	0.03	6.16	14.48	14.50	
RW-5	1/9/2003	20.64	6.25	14.39	0.03	6.28	14.36	14.38	
RW-5	1/10/2003	20.64	6.43	14.21	0.04	6.47	14.17	14.20	
RW-5	1/13/2003	20.64	6.48	14.16	0.03	6.51	14.13	14.15	
RW-5	1/14/2003	20.64	6.44	14.20	0.05	6.49	14.15	14.19	
RW-5	1/15/2003	20.64	6.37	14.27	0.04	6.41	14.23	14.26	
RW-5	1/16/2003	20.64	6.40	14.24	0.02	6.42	14.22	14.24	
RW-5	1/17/2003	20.64	6.37	14.27	0.04	6.41	14.23	14.26	
RW-5	1/20/2003	20.64	6.57	14.07	0.05	6.62	14.02	14.06	
RW-5	1/22/2003	20.64	6.60	14.04	0.08	6.68	13.96	14.02	
RW-5	1/23/2003	20.64	6.83	13.81	0.07	6.90	13.74	13.79	
RW-5	1/24/2003	20.64	6.69	13.95	0.03	6.72	13.92	13.94	
RW-5	1/27/2003	20.64	5.97	14.67	0.06	6.03	14.61	14.66	
RW-5	1/28/2003	20.64	5.95	14.69	0.09	6.04	14.60	14.67	
RW-5	1/29/2003	20.64	5.82	14.82	0.12	5.94	14.70	14.79	
RW-5	1/30/2003	20.64	5.90	14.74	0.10	6.00	14.64	14.72	
RW-5	2/3/2003	20.64	6.34	14.30	0.07	6.41	14.23	14.28	
RW-5	2/6/2003	21.38	7.12	14.26	0.06	7.18	14.20	14.25	
RW-5	2/11/2003	21.38	7.63	13.75	0.07	7.70	13.68	13.73	
RW-5	2/18/2003	21.38	8.11	13.27	0.14	8.25	13.13	13.24	
RW-5	2/21/2003	21.38	7.99	13.39	0.03	8.02	13.36	13.38	
RW-5	2/26/2003	21.38	7.74	13.64	0.01	7.75	13.63	13.64	
RW-5	3/4/2003	21.38	N/A	N/A	N/A	7.59	13.79	13.79	
RW-5	3/12/2003	21.38	8.04	13.34	0.01	8.05	13.33	13.34	
RW-5	3/14/2003	21.38	7.84	13.54	0.01	7.85	13.53	13.54	
RW-5	3/26/2003	21.38	N/A	N/A	N/A	7.19	14.19	14.19	
RW-5	3/28/2003	21.38	N/A	N/A	N/A	7.71	13.67	13.67	
RW-5	4/2/2003	21.38	N/A	N/A	N/A	7.85	13.53	13.53	
RW-5	4/4/2003	21.38	N/A	N/A	N/A	8.16	13.22	13.22	
RW-5	4/8/2003	21.38	7.71	13.67	0.00	7.72	13.67	13.67	
RW-5	4/11/2003	21.38	N/A	N/A	N/A	7.78	13.60	13.60	
RW-5	4/15/2003	21.38	7.44	13.94	0.01	7.45	13.93	13.94	
RW-5	4/17/2003	21.38	N/A	N/A	N/A	7.91	13.47	13.47	
RW-5	4/22/2003	21.38	N/A	N/A	N/A	7.75	13.63	13.63	
RW-5	4/25/2003	21.38	N/A	N/A	N/A	7.84	13.54	13.54	
RW-5	5/2/2003	21.38	N/A	N/A	N/A	8.78	12.60	12.60	
RW-5	5/6/2003	21.38	9.05	12.33	0.01	9.06	12.32	12.33	
RW-5	5/9/2003	21.38	9.06	12.32	0.05	9.11	12.27	12.31	
RW-5	5/23/2003	21.38	9.08	12.30	0.01	9.09	12.29	12.30	
RW-5	5/28/2003	21.38	9.27	12.11	0.01	9.28	12.10	12.11	
RW-5	6/13/2003	21.38	9.85	11.53	0.06	9.91	11.47	11.52	
RW-5	6/18/2003	21.38	9.81	11.57	0.08	9.89	11.49	11.55	
RW-5	6/27/2003	21.38	9.26	12.12	0.22	9.48	11.90	12.07	
RW-5	7/7/2003	21.38	10.51	10.87	0.19	10.70	10.68	10.82	
RW-5	7/16/2003	21.38	10.29	11.09	0.16	10.45	10.93	11.05	
RW-5	7/31/2003	21.38	N/A	N/A	N/A	10.68	10.70	10.70	
RW-5	8/5/2003	21.38	N/A	N/A	N/A	10.68	10.70	10.70	
RW-5	8/11/2003	21.38	N/A	N/A	N/A	11.68	9.70	9.70	
RW-5	8/22/2003	21.38	11.57	9.81	0.08	11.65	9.73	9.79	
RW-5	8/26/2003	21.38	N/A	N/A	N/A	10.68	10.70	10.70	
RW-5	9/2/2003	21.38	N/A	N/A	N/A	10.67	10.71	10.71	
RW-5	9/9/2003	21.38	N/A	N/A	N/A	10.68	10.70	10.70	
RW-5	9/19/2003	21.38	N/A	N/A	N/A	10.68	10.70	10.70	
RW-5	10/14/2003	21.38	N/A	N/A	N/A	10.65	10.73	10.73	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
RW-5	11/20/2003	21.38	N/A	N/A	N/A	8.20	13.18	13.18	
RW-5	12/3/2003	21.38	N/A	N/A	N/A	7.15	14.23	14.23	
RW-5	1/19/2004	21.38	N/A	N/A	N/A	6.71	14.67	14.67	
RW-5	2/24/2004	21.38	N/A	N/A	N/A	7.68	13.70	13.70	
RW-5	3/15/2004	21.38	N/A	N/A	N/A	8.58	12.80	12.80	
RW-5	4/19/2004	21.38	N/A	N/A	N/A	9.47	11.91	11.91	
RW-5	5/17/2004	21.38	N/A	N/A	N/A	10.28	11.10	11.10	
RW-5	6/22/2004	21.38	N/A	N/A	N/A	9.76	11.62	11.62	
RW-6	11/20/2002	20.34	8.05	12.29	2.05	10.1	10.24	11.78	
RW-6	11/21/2002	20.34	8.40	11.94	0.15	8.55	11.79	11.90	
RW-6	11/22/2002	20.34	8.45	11.89	0.24	8.69	11.65	11.83	
RW-6	11/24/2002	20.34	8.65	11.69	0.33	8.98	11.36	11.61	
RW-6	1/2/2003	20.34	6.70	13.64	0.87	7.57	12.77	13.42	
RW-6	1/7/2003	20.34	6.50	13.84	0.26	6.76	13.58	13.78	
RW-6	1/8/2003	20.34	6.09	14.25	0.51	6.6	13.74	14.12	
RW-6	1/9/2003	20.34	6.28	14.06	0.38	6.66	13.68	13.97	
RW-6	1/10/2003	20.34	6.42	13.92	0.23	6.65	13.69	13.86	
RW-6	1/13/2003	20.34	8.16	12.18	0.07	8.23	12.11	12.16	
RW-6	1/14/2003	20.34	6.73	13.61	0.20	6.93	13.41	13.56	
RW-6	1/15/2003	20.34	6.30	14.04	0.60	6.90	13.44	13.89	
RW-6	1/16/2003	20.34	6.28	14.06	0.65	6.93	13.41	13.90	
RW-6	1/17/2003	20.34	6.29	14.05	0.00	6.29	14.05	14.05	
RW-6	1/20/2003	20.34	6.31	14.03	0.63	6.94	13.40	13.87	
RW-6	1/22/2003	20.34	6.41	13.93	0.75	7.16	13.18	13.74	
RW-6	1/23/2003	20.34	6.60	13.74	0.80	7.40	12.94	13.54	
RW-6	1/24/2003	20.34	6.45	13.89	0.76	7.21	13.13	13.70	
RW-6	1/27/2003	20.34	5.82	14.52	0.62	6.44	13.90	14.37	
RW-6	1/28/2003	20.34	5.90	14.44	0.39	6.29	14.05	14.34	
RW-6	1/29/2003	20.34	5.81	14.53	0.35	6.16	14.18	14.44	
RW-6	1/30/2003	20.34	5.92	14.42	0.28	6.20	14.14	14.35	
RW-6	2/3/2003	20.34	6.25	14.09	0.19	6.44	13.90	14.04	
RW-6	2/6/2003	21.09	6.96	14.13	0.18	7.14	13.95	14.09	
RW-6	2/11/2003	21.09	7.44	13.65	0.31	7.75	13.34	13.57	
RW-6	2/18/2003	21.09	7.90	13.19	0.51	8.41	12.68	13.06	
RW-6	2/21/2003	21.09	7.86	13.23	0.47	8.33	12.76	13.11	
RW-6	2/26/2003	21.09	7.76	13.33	0.01	7.77	13.32	13.33	
RW-6	3/4/2003	21.09	N/A	N/A	N/A	7.46	13.63	13.63	
RW-6	3/12/2003	21.09	8.01	13.08	0.01	8.02	13.07	13.08	
RW-6	3/14/2003	21.09	N/A	N/A	N/A	7.81	13.28	13.28	
RW-6	3/26/2003	21.09	N/A	N/A	N/A	7.02	14.07	14.07	
RW-6	3/28/2003	21.09	N/A	N/A	N/A	7.62	13.47	13.47	
RW-6	4/2/2003	21.09	N/A	N/A	N/A	7.74	13.35	13.35	
RW-6	4/4/2003	21.09	N/A	N/A	N/A	8.07	13.02	13.02	
RW-6	4/8/2003	21.09	N/A	N/A	N/A	7.69	13.40	13.40	
RW-6	4/11/2003	21.09	7.61	13.48	0.01	7.62	13.47	13.48	
RW-6	4/15/2003	21.09	N/A	N/A	N/A	7.29	13.80	13.80	
RW-6	4/17/2003	21.09	7.78	13.31	0.01	7.79	13.30	13.31	
RW-6	4/22/2003	21.09	N/A	N/A	N/A	7.81	13.28	13.28	
RW-6	4/25/2003	21.09	N/A	N/A	N/A	7.75	13.34	13.34	
RW-6	5/2/2003	21.09	N/A	N/A	N/A	8.66	12.43	12.43	
RW-6	5/6/2003	21.09	8.84	12.25	0.28	9.12	11.97	12.18	
RW-6	5/9/2003	21.09	8.82	12.27	0.43	9.25	11.84	12.16	
RW-6	5/23/2003	21.09	8.85	12.24	0.86	9.71	11.38	12.03	
RW-6	5/28/2003	21.09	8.93	12.16	1.08	10.01	11.08	11.89	
RW-6	6/13/2003	21.09	9.28	11.81	0.81	10.09	11.00	11.61	
RW-6	6/18/2003	21.09	9.22	11.87	1.53	10.75	10.34	11.49	
RW-6	6/27/2003	21.09	9.60	11.49	1.22	10.82	10.27	11.19	
RW-6	7/7/2003	21.09	9.90	11.19	0.91	10.81	10.28	10.96	
RW-6	7/16/2003	21.09	9.68	11.41	1.08	10.76	10.33	11.14	
RW-6	7/31/2003	21.09	10.34	10.75	0.42	10.76	10.33	10.65	
RW-6	8/5/2003	21.09	10.30	10.79	0.45	10.75	10.34	10.68	
RW-6	8/11/2003	21.09	11.35	9.74	0.39	11.74	9.35	9.64	
RW-6	8/22/2003	21.09	11.10	9.99	0.64	11.74	9.35	9.83	
RW-6	8/26/2003	21.09	10.71	10.38	0.05	10.76	10.33	10.37	
RW-6	9/2/2003	21.09	10.61	10.48	0.14	10.75	10.34	10.45	
RW-6	9/9/2003	21.09	N/A	N/A	N/A	10.76	10.33	10.33	
RW-6	9/19/2003	21.09	N/A	N/A	N/A	10.76	10.33	10.33	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
RW-6	10/14/2003	21.09	N/A	N/A	N/A	10.75	10.34	10.34	
RW-6	11/20/2003	21.09	N/A	N/A	N/A	8.50	12.59	12.59	
RW-6	12/3/2003	21.09	N/A	N/A	N/A	7.08	14.01	14.01	
RW-6	1/19/2004	21.09	N/A	N/A	N/A	6.62	14.47	14.47	
RW-6	2/24/2004	21.09	N/A	N/A	N/A	7.58	13.51	13.51	
RW-6	3/15/2004	21.09	N/A	N/A	N/A	8.57	12.52	12.52	
RW-6	4/19/2004	21.09	N/A	N/A	N/A	9.36	11.73	11.73	
RW-6	5/17/2004	21.09	N/A	N/A	N/A	10.15	10.94	10.94	
RW-6	6/22/2004	21.09	N/A	N/A	N/A	9.91	11.18	11.18	
RW-7	11/20/2002	19.95	7.65	12.30	2.46	10.11	9.84	11.69	
RW-7	11/21/2002	19.95	7.60	12.35	2.51	10.11	9.84	11.72	
RW-7	11/22/2002	19.95	8.03	11.92	1.75	9.78	10.17	11.48	
RW-7	11/24/2002	19.95	8.23	11.72	1.26	9.49	10.46	11.41	
RW-7	1/2/2003	19.95	6.44	13.51	0.40	6.84	13.11	13.41	
RW-7	1/3/2003	19.95	6.28	13.67	0.40	6.68	13.27	13.57	
RW-7	1/6/2003	19.95	5.93	14.02	0.12	6.05	13.90	13.99	
RW-7	1/7/2003	19.95	5.84	14.11	0.20	6.04	13.91	14.06	
RW-7	1/8/2003	19.95	5.66	14.29	0.20	5.86	14.09	14.24	
RW-7	1/9/2003	19.95	5.72	14.23	0.33	6.05	13.90	14.15	
RW-7	1/10/2003	19.95	5.90	14.05	0.25	6.15	13.80	13.99	
RW-7	1/13/2003	19.95	5.98	13.97	0.37	6.35	13.60	13.88	
RW-7	1/14/2003	19.95	5.97	13.98	0.27	6.24	13.71	13.91	
RW-7	1/15/2003	19.95	5.95	14.00	0.30	6.25	13.70	13.93	
RW-7	1/16/2003	19.95	5.84	14.11	0.41	6.25	13.70	14.01	
RW-7	1/17/2003	19.95	5.85	14.10	0.35	6.20	13.75	14.01	
RW-7	1/20/2003	19.95	6.02	13.93	0.53	6.55	13.40	13.80	
RW-7	1/22/2003	19.95	6.11	13.84	0.80	6.91	13.04	13.64	
RW-7	1/23/2003	19.95	6.25	13.70	1.05	7.30	12.65	13.44	
RW-7	1/24/2003	19.95	6.16	13.79	1.03	7.19	12.76	13.53	
RW-7	1/27/2003	19.95	5.60	14.35	0.58	6.18	13.77	14.21	
RW-7	1/28/2003	19.95	5.65	14.30	0.63	6.28	13.67	14.14	
RW-7	1/29/2003	19.95	5.55	14.40	0.65	6.20	13.75	14.24	
RW-7	1/30/2003	19.95	5.65	14.30	0.67	6.32	13.63	14.13	
RW-7	2/3/2003	19.95	5.91	14.04	0.76	6.67	13.28	13.85	
RW-7	2/6/2003	20.72	6.55	14.17	0.79	7.34	13.38	13.97	
RW-7	2/11/2003	20.72	6.99	13.73	1.08	8.07	12.65	13.46	
RW-7	2/21/2003	20.72	7.42	13.30	0.99	8.41	12.31	13.05	
RW-7	2/26/2003	20.72	7.24	13.48	0.04	7.28	13.44	13.47	
RW-7	3/4/2003	20.72	N/A	N/A	N/A	6.96	13.76	13.76	
RW-7	3/12/2003	19.95	Trace	N/A	N/A	7.71	12.24	12.24	
RW-7	3/14/2003	19.95	N/A	N/A	N/A	7.51	12.44	12.44	
RW-7	3/26/2003	19.95	N/A	N/A	N/A	6.68	13.27	13.27	
RW-7	3/28/2003	19.95	N/A	N/A	N/A	7.25	12.70	12.70	
RW-7	4/2/2003	19.95	N/A	N/A	N/A	7.42	12.53	12.53	
RW-7	4/4/2003	19.95	N/A	N/A	N/A	7.64	12.31	12.31	
RW-7	4/8/2003	19.95	N/A	N/A	N/A	7.22	12.73	12.73	
RW-7	4/11/2003	19.95	N/A	N/A	N/A	7.16	12.79	12.79	
RW-7	4/15/2003	19.95	N/A	N/A	N/A	6.81	13.14	13.14	
RW-7	4/17/2003	19.95	N/A	N/A	N/A	7.38	12.57	12.57	
RW-7	4/22/2003	19.95	N/A	N/A	N/A	7.34	12.61	12.61	
RW-7	4/25/2003	19.95	N/A	N/A	N/A	7.21	12.74	12.74	
RW-7	5/2/2003	19.95	8.30	11.65	0.03	8.33	11.62	11.64	
RW-7	5/6/2003	19.95	8.52	11.43	0.08	8.6	11.35	11.41	
RW-7	5/9/2003	19.95	8.54	11.41	0.03	8.57	11.38	11.40	
RW-7	5/23/2003	19.95	8.55	11.40	1.03	9.58	10.37	11.14	
RW-7	5/28/2003	19.95	8.57	11.38	1.55	10.12	9.83	10.99	
RW-7	6/13/2003	19.95	8.92	11.03	1.64	10.56	9.39	10.62	
RW-7	6/18/2003	19.95	8.88	11.07	1.87	10.75	9.20	10.60	
RW-7	6/27/2003	19.95	9.26	10.69	1.55	10.81	9.14	10.30	
RW-7	7/7/2003	19.95	9.54	10.41	1.21	10.75	9.20	10.11	
RW-7	7/16/2003	19.95	9.42	10.53	1.30	10.72	9.23	10.21	
RW-7	7/31/2003	19.95	9.98	9.97	0.76	10.74	9.21	9.78	
RW-7	8/5/2003	19.95	10.88	9.07	0.74	11.62	8.33	8.89	
RW-7	8/11/2003	19.95	11.00	8.95	0.69	11.69	8.26	8.78	
RW-7	8/22/2003	19.95	10.70	9.25	1.01	11.71	8.24	9.00	
RW-7	8/26/2003	19.95	11.28	8.67	0.37	11.65	8.30	8.58	
RW-7	9/2/2003	19.95	10.36	9.59	0.36	10.72	9.23	9.50	

TABLE 2
GROUNDWATER ELEVATION DATA
CONOCOPHILLIPS RENTON TERMINAL

Well	Date	Top of Casing Elevation	Depth to Free Product	Elevation of Free Product	Product Thickness	Depth to Groundwater	Groundwater Elevation	Potentiometric Elevation	Comments
RW-7	9/9/2003	19.95	10.75	9.20	0.01	10.76	9.19	9.20	
RW-7	9/19/2003	19.95	N/A	N/A	N/A	10.76	9.19	9.19	
RW-7	10/14/2003	19.95	N/A	N/A	N/A	10.77	9.18	9.18	
RW-7	11/20/2003	19.95	N/A	N/A	N/A	8.24	11.71	11.71	
RW-7	12/3/2003	19.95	N/A	N/A	N/A	6.79	13.16	13.16	
RW-7	1/19/2004	19.95	N/A	N/A	N/A	6.31	13.64	13.64	
RW-7	2/24/2004	19.95	N/A	N/A	N/A	7.11	12.84	12.84	
RW-7	3/15/2004	19.95	N/A	N/A	N/A	8.20	11.75	11.75	
RW-7	4/19/2004	19.95	N/A	N/A	N/A	8.85	11.10	11.10	
RW-7	5/17/2004	19.96	N/A	N/A	N/A	9.79	10.16	10.16	
RW-7	6/22/2004	19.95	N/A	N/A	N/A	9.57	10.38	10.38	Trace product
HW-1East	11/20/2003	17.93	N/A	N/A	N/A	4.61	13.32	13.32	
HW-1East	12/3/2003	17.93	N/A	N/A	N/A	4.00	13.93	13.93	
HW-1East	1/19/2004	17.93	3.56	14.37	0.005	3.57	14.37	14.37	
HW-1East	2/24/2004	17.93	N/A	N/A	N/A	5.46	12.47	12.47	
HW-1East	3/15/2004	17.93	N/A	N/A	N/A	5.84	12.09	12.09	
HW-1East	4/19/2004	17.93	N/A	N/A	N/A	6.42	11.51	11.51	Slight product smell
HW-1East	5/17/2004	17.93	N/A	N/A	N/A	N/A	N/A	N/A	
HW-1East	6/22/2004	17.93	N/A	N/A	N/A	N/A	N/A	N/A	
HW-1West	11/20/2003	17.40	N/A	N/A	N/A	4.32	13.08	13.08	
HW-1West	12/3/2003	17.40	N/A	N/A	N/A	3.56	13.84	13.84	
HW-1West	1/19/2004	17.40	N/A	N/A	N/A	3.28	14.12	14.12	
HW-1West	2/24/2004	17.40	N/A	N/A	N/A	4.96	12.44	12.44	
HW-1West	3/15/2004	17.40	N/A	N/A	N/A	6.35	11.05	11.05	
HW-1West	4/19/2004	17.40	N/A	N/A	N/A	5.90	11.50	11.50	
HW-1West	5/17/2004	17.40	N/A	N/A	N/A	N/A	N/A	N/A	
HW-1West	6/22/2004	17.40	N/A	N/A	N/A	N/A	N/A	N/A	
W-1	11/24/2002	18.86	N/A	N/A	N/A	7.95	10.91	10.91	
W-2	11/24/2002	18.28	N/A	N/A	N/A	7.39	10.89	10.89	
W-3	11/24/2002	17.10	N/A	N/A	N/A	6.05	11.05	11.05	
W-4	11/24/2002	18.03	7.44	10.59	0.01	7.45	10.58	10.59	
B-1	11/24/2002	18.62	N/A	N/A	N/A	7.85	10.77	10.77	
B-2	11/24/2002	18.60	N/A	N/A	N/A	7.86	10.74	10.74	
B-3	11/24/2002	18.73	8.18	10.55	2.63	10.81	7.92	9.89	
B-4	11/24/2002	18.09	N/A	N/A	N/A	7.22	10.87	10.87	
B-5	11/24/2002	17.97	N/A	N/A	N/A	6.93	11.04	11.04	
B-6	11/24/2002	17.94	N/A	N/A	N/A	7.53	10.41	10.41	
D-1	11/24/2002	18.03	N/A	N/A	N/A	6.27	11.76	11.76	
D-2	11/24/2002	19.14	—	—	—	—	—	—	
D-4	11/24/2002	17.82	—	—	—	—	—	—	
D-5	11/24/2002	18.12	N/A	N/A	N/A	Dry	Dry		
D-6	11/24/2002	17.74	N/A	N/A	N/A	6.55	11.19	11.19	
D-7	11/24/2002	17.69	N/A	N/A	N/A	6.93	10.76	10.76	

N/A Not Applicable. No free product detected.

TABLE 3
WATER ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL

			BETX (µg/L) Method 8021B				NWTPH-Gx (µg/L)	NWTPH-Dx (mg/L)	
Location	Lab ID	Date Collected	Benzene	Toluene	Ethylbenzene	Xylenes (total)	Gasoline	Diesel	Lube Oil
B2	B2K0572-16	11/25/2002	9850	1780	1280	9220	60500	13.2	0.500 U
B3	B2K0572-15	11/25/2002	NA	NA	NA	NA	NA	NA	NA
B4	B2K0572-09	11/25/2002	519	295	2180	10500	41700	5.46	0.500 U
B5	B2K0572-10	11/25/2002	126	4.31	37.4	67.4	2270	1.06	0.500 U
B6	B2K0619-05	11/26/2002	5230	5410	525	5460	43000	5.31 J	2.51 J
Dup of B6 (B17)	B2K0619-06	11/26/2002	4850	5010	464	5430	43500	7.04 J	3.63 J
D1	B2K0619-04	11/26/2002	0.500 U	1.12	0.500 U	2.16	185	0.434	1.01
D6	B2K0619-11	11/26/2002	121	10.7	1.20	5.59	385	0.250 U	0.500 U
D7	B2K0619-07	11/26/2002	2.82	0.614	0.500 U	1.12	50.0 U	0.435	1.26
HA1	B2K0619-08	11/26/2002	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
HA5	B2K0471-01	11/19/2002	3.39	5.63	0.581	5.87	223	NA	NA
HA5	B2K0572-08	11/25/2002	2.94	1.67	0.500 U	4.22	236	0.250 U	0.500 U
Dup of HA5 (HA5-021122)	B2K0572-17	11/25/2002	2.78	1.51	0.500 U	3.81	243	0.250 U	0.500 U
HA5	B3A0300-06	1/14/2003	3380	2870	43.6	151	14300	NA	NA
HA5	B3B0527-01	2/24/2003	8620	17200	685	3260	65000	0.476	0.500 U
HA5	B3C0615-05	3/25/2003	6550	14700	657	2900	54700	0.388	0.500 U
HA5	B3D0437-08	4/18/2003	7550	16800	857	3960	66600	0.250 U	0.500 U
HA5	B3H0266-09	8/11/2003	659	232	26.7	187	2810	0.512	0.500 U
HA5	B4C0493-11	3/15/2004	21.2	1.38	41.5	6.55	708	2.38	0.500 U
HA5	B4F0732-11	6/22/2004	2.85	0.500 U	0.559	1.00 U	178	0.250 U	0.500 U
HA6	B2K0572-07	11/25/2002	637	181	1320	5620	25600	1.43	0.500 U
HA7	B2K0471-02	11/19/2002	587	31.3	259	324	5510	NA	NA
HA7	B2K0572-05	11/25/2002	811	41.1	402	580	7840	2.67	0.500 U
HA7	B3A0300-03	1/14/2003	421	56.2	261	2350	13700	NA	NA
HA8	B2K0471-03	11/19/2002	2.07	4.11	1.76	7.42	135	NA	NA
HA8	B2K0572-04	11/24/2002	5.78	16.9	12.6	57.8	579	0.250 U	0.500 U
HA8	B3A0300-04	1/14/2003	4.02	16.5	16.3	207	633	NA	NA
HA8	B3B0527-02	2/24/2003	14.6	74.5	232	1570	5720	0.767	0.500 U
HA8	B3C0615-06	3/25/2003	6.17	22.0	73.0	445	1950	0.544	0.500 U
HA8	B3D0437-10	4/18/2003	12.1	35.9	160	708	3040	0.250 U	0.500 U
Dup of HA8	B3D0437-06	4/18/2003	11.9	41.1	164	762	3650	0.257	0.500 U
HA9	B2K0619-10	11/26/2002	249	3.55	349	187	6110 J	NA	NA

TABLE 3
WATER ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL

			BETX (µg/L) Method 8021B				NWTPH-Gx (µg/L)	NWTPH-Dx (mg/L)	
Location	Lab ID	Date Collected	Benzene	Toluene	Ethylbenzene	Xylenes (total)	Gasoline	Diesel	Lube Oil
HA12	B2K0572-06	11/25/2002	0.957	3.85	1.52	10.8	93.7	0.250 U	0.500 U
HA13	B2K0572-12/B2K0619-02	11/25/2002	0.569	1.80	0.667	5.74	50.0 U	0.250 U	0.500 U
HA13	B3B0527-03	2/24/2003	0.500 U	0.500 U	0.500 U	1.08	50.0 U	0.250 U	0.500 U
HA13	B3C0615-07	3/25/2003	0.500 U	0.580	0.500 U	1.00 U	98.4	0.250 U	0.500 U
HA13	B3D0437-07	4/18/2003	0.500 U	0.500 U	0.500	1.00 U	50.0 U	0.250 U	0.500 U
HA13	B3I0408-03	9/11/2003	3.38	28.9	7.87	60.6	498	NA	NA
HA13	B3K0600-11	11/21/2003	0.500 U	0.877	0.500 U	1.15	50 U	0.250 U	0.500 U
HA13	B4C0493-12	3/15/2004	0.500 U	0.500 U	0.500 U	1.00 U	50 U	0.250 U	0.500 U
HA13	B4F0732-12	6/22/2004	0.500 U	0.500 U	0.500 U	1.00 U	50 U	0.250 U	0.500 U
HA14	B2K0572-13/B2K0619-03	11/25/2002	141	15.7	169	48.1	939	0.250 U	0.500 U
HA14	B3D0437-13	4/18/2003	133	8.87	228	23.7	1190	0.250 U	0.500 U
HA15	B3A0300-05	1/14/2003	3.34	0.672	0.500 U	2.51	344	NA	NA
HA15	B3B0527-04	2/24/2003	12.9	5.57	9.80	69.6	1250	0.481	0.500 U
HA15	B3C0615-08	3/25/2003	7.47	1.55	1.12	3.99	910	0.486	0.500 U
HA15	B3D0437-09	4/18/2003	7.21	1.88	0.716	6.47	658	0.250 U	0.500 U
HA15	B4C0493-13	3/15/2004	5.85	0.765	0.500 U	1.34	336	1.22	0.500 U
HA17	B3A0300-02	1/14/2003	10.2	1.25 U	1.55	2.61	548	NA	NA
HA17	B3E0729-10	5/29/2003	50.0	129	80.1	322	2090	0.250 UJ	0.500 UJ
HA17	B3K0600-02	11/20/2003	8.9	0.500 U	0.500 U	1.00 U	585	0.620	0.500 U
HA17	B4C0493-14	3/15/2004	0.500 U	0.500 U	0.500 U	1.00 U	50 U	0.250 UJ	0.500 UJ
HA18	B3A0300-01	1/14/2003	40.3	75.9	810	2220	11400	NA	NA
HA18	B3E0729-11	5/29/2003	95.0	157	2440	7840	31000	7.51	0.500 U
HA18	B3K0600-01	11/20/2003	284.0	178	1950	6400	28000	6.87	0.500 U
LAI-1	B3A0300-07	1/15/2003	728	935	22.8	120	4120	NA	NA
LAI-1	B3B0527-05	2/26/2003	2150	3680	116	979	15100	1.02	0.500 U
LAI-1	B3C0577-01	3/24/2003	7970	15000	739	4250	47500	1.49	0.500 U

TABLE 3
WATER ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL

			BETX (µg/L) Method 8021B				NWTPH-Gx (µg/L)	NWTPH-Dx (mg/L)	
Location	Lab ID	Date Collected	Benzene	Toluene	Ethylbenzene	Xylenes (total)	Gasoline	Diesel	Lube Oil
LAI-2	B3A0300-08	1/15/2003	2.78	2.20 J	1.10 J	9.33 J	72.6 J	NA	NA
Dup of LAI-2 (LAI-12)	B3A0300-10	1/15/2003	3.39	3.36 J	1.68 J	15.1 J	103 J	NA	NA
LAI-2	B3E0729-12	5/29/2003	2940	6100	235	1680	18100	0.250 U	0.500 U
Dup of LAI-2 (LAI-20)	B3E0729-09	5/29/2003	2840	6320	235	1680	18800	0.299 J	0.500 U
LAI-2	B3H0266-06	8/11/2003	1880	2150 J	135	907	8950 J	0.516	0.562 U
Dup of LAI-2 (LAI-21)	B3H0266-01	8/11/2003	1750	1340 J	104	678	6620 J	0.550	0.500 U
LAI-2	B3K0600-09	11/20/2003	580	1.98	35.3	235	1330	0.304	0.500 U
LAI-2	B4C0493-01	3/16/2004	23600	27700	2370	11300	120000	1.95	0.500 U
LAI-2	B4F0732-01	6/22/2004	4390	53.3	889	1190	17600	0.283 (a)	0.500 U
Dup of LAI-2 (LAI-22)	B4F0732-10	6/22/2004	4960	51.4	1020	1340	20400	0.250 U	0.500 U
LAI-3	B3A0300-09	1/15/2003	0.500 U	3.19	1.36	8.45	66.6	NA	NA
LAI-3	B3B0527-06	2/26/2003	70.1	159	6.42	32.6	558	0.250 U	0.500 U
LAI-3	B3C0615-01	3/25/2003	61.6	176	8.43	39.5	573	0.250 U	0.500 U
LAI-3	B3D0437-05	4/17/2003	7.56	24.5	4.00	29.4	154	0.250 U	0.500 U
LAI-3	B3E0729-13	5/29/2003	151	40.7	0.951	4.6	301	0.250 U	0.500 U
LAI-3	B3H0266-07	8/11/2003	329	18.4	2.470	7.27	985	0.250 U	0.500 U
LAI-3	B3K0600-10	11/20/2003	9.2	0.500 U	0.500 U	1.00 U	50 U	0.250 U	0.500 U
LAI-3	B4C0493-02	3/16/2004	2030	94.9	113	225	4670	0.272	0.500 U
LAI-3	B4F0732-02	6/22/2004	1580	5.00 U	50.7	69.4	2880	0.250 U	0.500 U
LAI-10	B3B0527-07	2/26/2003	0.500 U	0.991	0.500 U	1.37	50.0 U	0.250 U	0.500 U
Dup of LAI-10 (LAI-17)	B3B0527-12	2/26/2003	0.500 U	0.757	0.500 U	1.18	50.0 U	0.250 U	0.500 U
LAI-10	B3C0577-02	3/24/2003	1.35	2.67	0.500 U	1.36	50.0 U	0.250 UJ	0.500 U
LAI-10	B3D0437-02	4/17/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-10	B3E0729-08	5/28/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-10	B3H0266-08	8/11/2003	0.500 U	1.75	0.757	4.54	50.0 U	0.250 U	0.500 U
LAI-10	B3K0600-06	11/20/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	1.95	0.500 U
LAI-10	B4C0493-03	3/16/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-10	B4F0732-03	6/22/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-11	B3B0527-08	2/26/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.401	0.500 U
LAI-11	B3C0577-03	3/24/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.429	0.500 U
LAI-11	B3D0437-03	4/17/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-11	B3E0729-02	5/28/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-11	B3K0600-07	11/20/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-11	B4C0493-04	3/16/2004	0.500 U	0.634	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-11	B4F0732-04	6/22/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U

TABLE 3
WATER ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL

			BETX (µg/L) Method 8021B				NWTPH-Gx (µg/L)	NWTPH-Dx (mg/L)	
Location	Lab ID	Date Collected	Benzene	Toluene	Ethylbenzene	Xylenes (total)	Gasoline	Diesel	Lube Oil
LAI-12	B3E0729-03	5/28/2003	0.500 U	0.500 U	0.500 U	1.81	50.0 U	0.250 U	0.500 U
LAI-12	B3H0266-02	8/11/2003	0.500 U	0.500 U	0.500 U	2.21	50.0 U	0.354	0.500 U
LAI-12	B3K0600-08	11/20/2003	0.500 U	0.500 U	0.500 U	1.00 U	60.7	0.250 U	0.500 U
LAI-12	B4C0493-05	3/16/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-12	B4F0732-05	6/22/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-13	B3E0729-06	5/28/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-13	B3H0266-05	8/11/2003	0.500 U	0.647	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-13	B3K0600-03	11/20/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-13	B4C0493-06	3/15/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-13	B4F0732-06	6/22/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-14	B3B0527-09	2/25/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0	0.269	0.500 U
LAI-14	B3C0615-02	3/25/2003	0.500 U	0.500 U	0.500 U	1.00 U	66.3	0.250 U	0.500 U
LAI-14	B3D0437-11	4/18/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-14	B3E0729-05	5/28/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-14	B3H0266-04	8/11/2003	0.500 U	0.631	0.500 U	1.00 U	50.0 U	0.278	0.500 U
LAI-14	B3K0600-04	11/20/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-14	B4C0493-07	3/15/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-14	B4F0732-07	6/22/2004	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-15	B3E0729-04	5/28/2003	0.500 U	0.500 U	0.500 U	1.00 U	104	0.250 U	0.500 U
LAI-15	B3H0266-03	8/11/2003	0.500 U	0.641	0.500 U	1.95	158	0.334	0.500 U
LAI-15	B3K0600-05	11/20/2003	0.500 U	0.500 U	0.500 U	1.00 U	53.9	0.250 U	0.500 U
LAI-15	B4C0493-08	3/15/2004	0.500 U	0.500 U	0.500 U	1.00 U	154	0.250 U	0.500 U
LAI-15	B4F0732-08	6/22/2004	0.500 U	0.500 U	0.500 U	1.00 U	135	0.250 U	0.500 U
LAI-16	B3B0527-10	2/25/2003	0.500 U	0.679	0.500 U	1.09	50.0 U	0.250 U	0.500 U
LAI-16	B3C0615-03	3/25/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.288	0.500 U
Dup of LAI-16 (LAI-26)	B3C0615-04	3/25/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.330	0.500 U
LAI-16	B3D0437-04	4/17/2003	3.51	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-16	B3E0729-07	5/28/2003	523	14.9	1.00 U	2.25	705 J	0.250 U	0.500 U
LAI-16	B3K0600-12	11/21/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
Dup of LAI-16 (LAI-25)	B3K0600-13	11/21/2003	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-16	B4C0493-09	3/16/2004	2.70 J	0.796	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
Dup of LAI-16 (LAI-17)	B4C0493-10	3/16/2004	4.76 J	0.630	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U
LAI-16	B4F0732-09	6/22/2004	8.52	0.500 U	0.500 U	1.00 U	50.0 U	0.250 U	0.500 U

TABLE 3
WATER ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL

			BETX (µg/L) Method 8021B				NWTPH-Gx (µg/L)	NWTPH-Dx (mg/L)	
Location	Lab ID	Date Collected	Benzene	Toluene	Ethylbenzene	Xylenes (total)	Gasoline	Diesel	Lube Oil
W1	B2K0572-14	11/25/2002	17600	24800	2950	19500	155000	16.7	0.500 U
W2	B2K0572-11	11/25/2002	15300	15800	1960	11700	104000	14.7	1.91
W3	B2K0619-09	11/26/2002	455	156	463	1570	14100	4.89	0.500 U
W4	B2K0619-01	11/25/2002	1830	38.2	2550	4220	39900	19.2	0.648

(a) Results in the diesel organics range are primarily due to overlap from a gasoline range product.
NA = Not analyzed.
U = Not detected above reporting limit.
J = Indicates that the analyte was positively identified; the associated numercial value is the approximate concentration of the analyte in the sample.

TABLE 4
INFLUENT AND EFFLUENT VAPOR ANALYTICAL RESULTS - REMEDIATION SYSTEM
CONOCOPHILLIPS RENTON TERMINAL

	Influent 203134-01 2/13/2003	Effluent 203134-02 2/13/2003	Influent 203145-01 2/24/2003	Effluent 203145-02 2/24/2003	Influent 203249-01 4/8/2003	Effluent 203249-02 4/8/2003	Influent 203284-01 4/17/2003	Effluent 203284-02 4/17/2003	Influent B3F0471-01 6/20/2003	Effluent B3F0471-02 6/20/2003	Influent B3G0287-01 7/11/2003	Effluent B3G0287-02 7/11/2003	Influent B3H0121-01 8/7/2003
BTEX EPA Method 8021B (mg/m³)													
Benzene	9.162	0.002 U	62.322	NA	28.845	0.002 U	34.874	0.002 U	84	0.064	80.5	0.641	63.5
Toluene	14.379	0.002	226.045	NA	106.648	0.001 U	153.375	0.001 U	189.000	0.026 U	101.000	0.086	111.000
Ethylbenzene	0.598	0.001 U	17.387	NA	10.811	0.001 U	16.712	0.001 U	17.100	0.023 U	17.500	0.023 U	6.510
m-xylene (p-xylene)	1.869	0.003	61.785	NA	44.347	0.002 U	73.891	0.002 U	NA	NA	NA	NA	NA
o-Xylene	0.595	0.002 U	22.02	NA	17.856	0.002 U	30.883	0.003 U	NA	NA	NA	NA	NA
Xylenes, total	NA	NA	NA	NA	NA	NA	NA	NA	93.500	0.045 U	81.600	0.045 U	31.400
TPH as Gasoline	708.443	0.023	1859.64	NA	1124.34	0.022	1551.2	NA	1860	2.36 U	1900	2.36 U	1170
TPH as Diesel	NA	NA	867.833	NA	524.692	0.013 U	723.893	NA	NA	NA	NA	NA	NA
BTEX EPA Method 8021B (ppmV)													
Metyl tert butyl ether	NA	NA	NA	0.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
m & p-Xylene	NA	NA	NA	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	2.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetraethyl Lead	NA	NA	NA	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isooctane	NA	NA	NA	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methanol	NA	NA	NA	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cumene	NA	NA	NA	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexane	NA	NA	NA	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4
INFLUENT AND EFFLUENT VAPOR ANALYTICAL RESULTS - REMEDIATION SYSTEM
CONOCOPHILLIPS RENTON TERMINAL

	Effluent B3H0121-02 8/7/2003	Influent B3J0424-01 10/15/2003	Effluent B3J0424-02 10/15/2003	Influent B3L0669-03 12/18/2003	Effluent B3L0669-03 12/18/2003	Influent B3B0139-04 2/5/2004	Effluent B3B0139-05 2/5/2004	Influent B4C0493-15 3/16/2004	Effluent B4C0493-16 3/16/2004	Influent B4G0069-04 7/2/2004	Effluent B4G0563-01 7/21/2004	Influent B4H0533-01 8/20/2004
BTEX EPA Method 8021B (mg/m³)												
Benzene	0.0308 U	43.2	0.0308 U	14.8	0.100 U	3.45	0.100 U	7.81	0.156	23.5	0.358	69.7
Toluene	0.089	91.500	0.026 U	64.4	0.100 U	6.8	0.359	15.5	0.134	68.5	0.436	181
Ethylbenzene	0.023 U	6.510	0.023 U	9.27	0.100 U	0.924	0.100 U	1.96	0.100 U	5.61	0.100 U	13.8
m-xylene (p-xylene)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes, total	0.067	34.100	0.045 U	54.8	0.200 U	6.7	0.338	15.6	0.200 U	57.6	0.397	93.7
TPH as Gasoline	2.36 U	779	2.36 U	497	10 U	45.5	10 U	252	10 U	927	21.2	2130
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BTEX EPA Method 8021B (ppmV)												
Metyl tert butyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m & p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetraethyl Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isooctane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methanol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cumene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Analysis prior to June 2003 completed using TO-14 and TO-15 testing methods.
U = Not detected above the listed reporting limit.
NA = Not analyzed.

TABLE 5
INFLUENT AND EFFLUENT GROUNDWATER TREATMENT ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL

	Effluent Permit Levels	Influent B3G0160-02 7/7/2003	Effluent B3G0160-01 7/7/2003	Influent B3I0408-01 9/11/2003	Effluent B3I0408-02 9/11/2003	Influent (a) B3L0669-01 12/18/2003	Effluent B3L0669-02 12/18/2003	Influent (a) B4A0540-03 1/23/2004	Effluent B4A0540-01 1/23/2004	Stripper Effluent B4A0540-02 1/23/2004	Influent (a) B4B0139-01 2/5/2004
BETX (µg/L)											
Method 8021B											
Benzene	130	45,200	4.87	37,500	11.6	4060	284	389	0.500 U	10.5	3180
Toluene	1500	81,200	18.5	76,700	23.7	14500	1110	3900	0.500 U	28.4	6930
Ethylbenzene	1400	3840	1.63	2,810	5 U	1690	135	68.6	0.500 U	3.38	783
Xylenes (total)		21,700	16.7	22,400	68.7	11800	1080	7140	1.00 U	119	5350
m,p-Xylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NWTPH-Gx (µg/L)											
Gasoline		331,000	345	320,000	2480	73100	7550	34700	50.0 U	4010	40000
NWTPH-Dx (mg/L)											
Diesel Range Hydrocarbons		3.47	2.42	2.74	NA	34.8	22.1	NA	NA	NA	NA
Lube Oil Range Hydrocarbons		0.630	0.500 U	0.500 U	NA	10 U	5 U	NA	NA	NA	NA
CONVENTIONALS											
Oil & Grease (HEM) (mg/L)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (SGT-HEM) (mg/L)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 5
INFLUENT AND EFFLUENT GROUNDWATER TREATMENT ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL

	Effluent Permit Levels	Stripper Effluent B4B0139-02 2/5/2004	Effluent B4B0139-03 2/5/2004	Influent B4C0478-01 3/16/2004	Stripper Effluent B4C0478-02 3/16/2004	Effluent B4C0478-03 3/16/2004
BETX (µg/L)						
Method 8021B						
Benzene	130	24.7	0.500 U	5530	244	0.500 U
Toluene	1500	39.9	0.500 U	9480	483	0.500 U
Ethylbenzene	1400	9.38	0.500 U	520	34.7	0.500 U
Xylenes (total)		76.9	1.00 U	4810	359	1.00 U
m,p-Xylene		NA	NA	NA	NA	NA
o-Xylene		NA	NA	NA	NA	NA
NWTPH-Gx (µg/L)						
Gasoline		2370	50 U	43500	4710	50 U
NWTPH-Dx (mg/L)						
Diesel Range Hydrocarbons		NA	NA	NA	NA	NA
Lube Oil Range Hydrocarbons		NA	NA	NA	NA	NA
CONVENTIONALS						
Oil & Grease (HEM) (mg/L)		NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (SGT-HEM) (mg/L)		NA	NA	NA	NA	NA
pH		NA	NA	NA	NA	NA

Note:

Influent is collected prior to air stripper; effluent is collected at discharge pump from air stripper.

U = Not detected above the method detection limit (MDL).

(a) = Oil water separator is bypassed, influent sample collected from sampling port on air sparge tank

TABLE 6
ESTIMATED DPVE MASS REMOVAL SUMMARY
CONOCOPHILLIPS RENTON TERMINAL

								Removal Rate				Mass Removed			
Date	PID (ppm)	TPH-G&D (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethyl-benzene (ppmv)	Xylenes (b) (ppmv)	Flow Rate (scfm)	TPH (lbs/day)	Benzene (lbs/day)	Panel Hour Meter (hrs)	Duration of Operation (days)	Total TPH (lbs)	Total Benzene (lbs)	Total TPH (Gallons)	Total Benzene (Gallons)
2/12/2003	330	NC	NC	NC	NC	NC	300	NC	NC	21591	0	0			
2/13/2003	200	708.4 (a)	9.16	14.38	0.60	2.46	300	77	1	21610	0.8	0	0	0	0
2/24/2003	942	2727.5	62.32	226.05	17.39	83.81	300	397	6	21875	11.9	4396	61	687	10
4/8/2003	NR	1649.0	28.85	106.65	10.81	62.20	290	232	2	22610	42.5	11506	137	1798	21
4/17/2003	801	2275.1	34.87	153.38	16.71	104.77	290	320	3	22823	51.3	14347	164	2242	26
6/20/2003	1479	1860.0 (a)	84.00	189.00	17.10	93.50	290	206	7	23802	92.1	22751	455	3555	71
7/11/2003	1099	1900.0	80.50	101.00	17.50	81.60	291	211	7	24040	102.0	24842	522	3882	82
8/7/2003	NR	1170.0	63.50	111.00	6.61	31.40	420	188	8	24540	122.9	28767	685	4495	107
10/15/2003	NR	779.0 (a)	43.20	91.50	6.51	34.10	420	125	5	25993	183.4	36342	1005	5678	157
11/21/2003	86	88.7 (a)	3.09	5.68	0.571	4.39	185	6	0.2	26464	203.1	36465	1009	5698	158
12/18/2003	23.8	117.0 (a)	4.57	16.80	2.10	12.40	270	12	0.4	27112 (c)	230.1	36791	1018	5749	159
12/24/2003	NR	NR	NR	NR	NR	NR	270 (c)	12 (c)	0.4 (c)	27289	237.5	36880	1021	5763	160
1/9/2004	NR	NR	NR	NR	NR	NR	290	12 (c)	0.4 (c)	27289	237.5	36880	1021	5762	160
2/5/2004	7.6	10.7 (a)	1.06	1.79	0.21	1.52	270	1.1	0.1	27758	257.0	36902	1023	5766	160
3/17/2004	45	0.70 (a)	2.41	4.04	0.45	3.54	270	6.1	0.2	28563	290.5	37107	1029	5798	161
4/19/2004	58	0.70 (c)	2.41	4.04	0.45	3.54	288	6.5	0.2	29137	314.5	37263	1034	5822	162
5/7/2004	NR	0.70 (c)	2.41	4.04	0.45	3.54	288	6.5	0.2	29137	314.5	37263	1034	5822	162
6/28/2004	NR	0.70 (c)	2.41	4.04	0.45	3.54	316	7.2	0.2	30036	351.9	37532	1042	5864	163

Notes:
TPH-G & D = Gasoline and Diesel Range Total Petroleum Hydrocarbons
ppmv = parts per million by volume
mg/m3 = milligrams per cubic meter (assuming 60 degrees F and 1 atmosphere of pressure)
mg/m3 concentration for TPH based on a molecular weight of 92 g/g-mol

NC = Not Collected
(a) Only TPH-G analyzed
(b) Combined total reported for m, p, and o-xylenes
(c) Extrapolated value
Analytical results prior to June 20, 2003 reported from TO-14/15 analysis using Suma canisters.
Analytical results from June 20, 2003 forward reported from NWTPH Modified Method analysis using tedlar bags.

APPENDIX A

Remedial System Operational Logs

ConocoPhillips

Equipment Maintenance Report

ConocoPhillips Contact: Mr. Tim Johnson
Date: 06/25/04
Consultant & Contact: Landau Associates - Martin Powers
Time: 12:00 PM
Contractor & Contact: H2 Oil Recovery Equipment, Inc. - Scott Wakefield
Weather: 70's & Sunny

1.0 System Description: *Site #3485 , 2423 Lind Ave, Renton WA*

H2-250G Gas Fired Thermal Oxidizer with catalyst plate and DR505 2 hp combustion blower, Sutorbilt 4MP SVE blower with a 10 hp motor (230v, 1 ph, 1725 rpm), 55 gal 3" moisture separator with a Goulds 1/2 hp (230 vac, 1ph) moisture separator pump, all mounted on a trailer; Campbell-Hausfeld (Mod #C1071080VMS, Ser # 020393L 999231) 7.5 hp air compressor (230v, 3480 rpm) and (6) Clean Environment AP3 down well pneumatic pumps

SVE belts - (1) 5VX630
Compressor V-belt - (2) B66

(attach schematic including manufacturer and date of purchase)

3.0 Routine Maintenance Required and Performed:

Description	Interval
Observe complete system operation. Change oil in SVE blower. Check filters,	Monthly
clean or replace, if needed. Change air compressor oil and drain condensation.	
Check belt tension, adjust if needed, and record belt deflection. Record amps	
on blowers, pump and compressor. Calibrate CGM.	

4.0 Equipment Readings and Measurements:

SVE blower (4MP) amps - 41.7/40.8 @ 40" wc
MS pump (Goulds) amps - off - no water in separator
Air compressor amps - 37.0/36.5 @ 110 psi
Fresh air blower amps - 6.5/6.8
T.S. blower amps - 3.5/3.4/3.3 @ 14" wc
Aeration blower amps - 5.5/5.4
OWS thickness - 1/8" product
Product tank volume - 20.5" liquid
Stripper effluent - 2.8/2.5 @ 14 gpm/ stripper influent - 1.5/1.6/1.5

Date
6/25/2004

Temp controller - 551
Burner temp - 542
Cat temp - 601
% LEL - 4.6%
hrs - 29967.0
Stripper Effluent Water Meter - 173770 gal

5.0 Other Repairs Performed, parts needed, etc.:

6.0 Equipment Status and Reasons for Downtime:

System manually off upon arrival. Landau advised to restart system. R-14 in panel found to be faulty, signaling false high level to water treatment system. Replaced air prover switch - original stuck in open position not allowing oxidizer to start.

Individual Completing this form, including company

Scott Wakefield - H2 Oil Recovery Equipment, Inc.

Field Report

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

Project No: 706002
Report No:
Client: Conoco Phillips
Date: Monday June 1, 2004
Project Name: Conoco Phillips- Renton Terminal
Location: Renton, WA
Weather Conditions: Clear
Prepared By: MLR

(Description of work done, locations, equipment used, quantity estimate (indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)

0800 On site

- SVE system was down upon arrival. Checked all panels and tanks to determine reason of shut off. Reason of shut down was undetermined, although noticed that gas delivery was set at 4psi instead of the usual 6psi delivery pressure.
- Attempted to initiate SVE system, but when the system reached nominal temperature, the automatic dilution valve was not closing. Noticed that the burner's panel was not giving any legible numbers either.
- H2Oil was contacted about this issue, and both H2Oil and LAI determined that the burner's reading panel needed to be replaced. H2Oil will send new panel and LAI will replace on next visit.
- Inspected lift station for modification.

1000 Off Site

Water meter reading: **171145.9 gallons**

Visitors:
Unsatisfactory Conditions and Recommended Corrections

Attachments
Distribution
Signed

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLR Date 5/3/04 Time 0835
Weather Conditions Partially Cloudy

Vapor Extraction and Treatment System

Operating Upon Arrival [✓ Yes] No

If No indicate active alarms below and restart system
ACTIVE ALARMS:

Hourmeter Reading 29467.6 hours
Burner Temperature 538 deg F
Catalyst Temperature 548 deg F
LEL % 1.3
4" Valve % Open 100
Total Vacuum Reading 24 in. H2O
Total Flowrate 288 cfm
Total VOCs of thermox influent 59.7 ppm (PID)
Total VOCs of Thermox effluent 0.5 ppm (PID)
Fill level in LP tank 60 % Delivery Pressure 6 psi

Water Treatment System

Operating Upon Arrival [✓ Yes] No

If No please explain why, for how long and what alarms active.

Magnahelic 0.5 in. H_2O
Hour Meter —
Sparge Tank Water Level 1.95 ft.
Transfer Tank Water Level 1.01 ft.
Storage Tank Oil Level 0.07 ft Oil / ft. 1.36 ft H_2O
Flow Meter Reading 269902.5 gallons
Check Pressure Relief Valve [✓ Yes] / No
Leaving System On (Comments) Yes

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	Yes	11	90
RW-3	NO	9	90
RW-4	NO	13	90
LAI-4	Yes	7	90
LAI-5	Yes	11	90
LAI-6	Yes	—	—
LAI-7	Yes	9	70
LAI-8	Yes	11	90
LAI-9	Yes	10	90
HW-1E	Yes	—	—
HW-1W	Yes	—	—

Comments (activities conducted, changes to the systems, general site conditions)

Brought direction flow arrows, will place in water/air lines next visit

PID readings: Air Sparge 158 ppm
Transfer tank 3545 ppm
Storage tank (oil) 4572 ppm

Adjusted weir (product) on O/W separator

update field book (3/6/04) →

Field Report

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

Project No: 706002
Report No:
Client: Conoco Phillips
Date: 5/[illegible]/04
Project Name: Conoco Phillips- Renton Terminal
Location: Renton, WA
Weather Conditions: Clear
Prepared By: MLR

(Description of work done, locations, equipment used, quantity estimate (indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)

1550 - Arrived on site

- Upon arrival, SVE system was off. Proceeded to check all panels to determine the reason of shut down. Light bulbs in all panels were checked to see if any of them were burned out. All light bulbs in main panel are working fine.

- Proceeded to turn system on, but was not able to get any reading at the burner's display panel. It was only reading 8s across the display. The other two display panels (Catalytic, and main temperature) were working fine. The automatic valve that pulls fresh air does not close and therefore does not allow any vacuum on the KO drum. As the burner reaches a set temperature, the valve should automatically shut off and allow a vacuum at the KO drum, but in this case that wasn't happening.

- Proceeded to shut system down for the weekend. No O&M log sheet was filled at this time, but the flow meter reading was collected.

Flow meter: 171,145.8 gallons

1700 - Departed from the site

Visitors:
Unsatisfactory Conditions and Recommended Corrections

Attachments
Distribution
Signed

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLR Date 3/30 Time 1430
Weather Conditions

Vapor Extraction and Treatment System

Operating Upon Arrival Yes / [✓ No]

If No indicate active alarms below and restart system
ACTIVE ALARMS: High alarm on transfer tank

Hourmeter Reading	28788.5	hours
Burner Temperature	541	deg F
Catalyst Temperature	546	deg F
LEL %	1.20	
4" Valve % Open	100	
Total Vacuum Reading	24	in. H2O
Total Flowrate	306	cfm
Total VOCs of thermox influent	NR	ppm (PID)
Total VOCs of Thermox effluent	NR	ppm (PID)

Fill level in LP tank 94 % Delivery Pressure 4.25 psi

Water Treatment System

Operating Upon Arrival Yes / [✓ No]

If No please explain why, for how long and what alarms active.
* High alarm on transfer tank

Magnahelic	15	in. H_2O
Hour Meter	—	
Sparge Tank Water Level	1.84	ft.
Transfer Tank Water Level	0.90	ft.
Storage Tank Oil Level	1.55 H_2O	ft. /
Flow Meter Reading	136691	gallons
Check Pressure Relief Valve	[✓ Yes] / No	
Leaving System On (Comments)	yes	

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	No	9	85
RW-3	No	10	85
RW-4	No	14	85
LAI-4	Yes	9	85
LAI-5	Yes	13	95
LAI-6	Yes	—	85
LAI-7	Yes	10	85
LAI-8	Yes	10	85
LAI-9	Yes	10	18
HW-1E	Yes	—	—
HW-1W	Yes	—	—

Comments (activities conducted, changes to the systems, general site conditions)

* Noticed that the rotation of transfer tank was opposite (electrician may have wired pump incorrectly). After electrician corrected the rotation, system was started and log sheet was filled.

Upon departure, system was ~~operational~~ operating.

S:\SHAREDOCV\05\002\Operation Log\Sheet1

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLR Date 4/2/04 Time 0935
Weather Conditions Clear

Vapor Extraction and Treatment System

Operating Upon Arrival Yes / [✓ No]

If No indicate active alarms below and restart system
ACTIVE ALARMS: No high alarms were noticed

Hourmeter Reading	28826.5	hours
Burner Temperature	544	deg F
Catalyst Temperature	549	deg F
LEL %	0.7	
4" Valve % Open	100	
Total Vacuum Reading	24	in. H2O
Total Flowrate	298	cfm
Total VOCs of thermox influent	NR	ppm (PID)
Total VOCs of Thermox effluent	NR	ppm (PID)

Fill level in LP tank 87 % Delivery Pressure 6.0 psi

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	No	10	85
RW-3	No	10	85
RW-4	No	12	85
LAI-4	Yes	10	85
LAI-5	Yes	14	85
LAI-6	Yes	—	—
LAI-7	Yes	10	85
LAI-8	Yes	10	85
LAI-9	Yes		85
HW-1E	Yes		—
HW-1W	Yes		—

Water Treatment System

Operating Upon Arrival Yes / [✓ No]

If No please explain why, for how long and what alarms active.
Stripper on high alarm

Magnahelic	15+	in. H_2O
Hour Meter	—	
Sparge Tank Water Level		ft.
Transfer Tank Water Level		ft.
Storage Tank Oil Level		ft.
Flow Meter Reading	138393.0	gallons @ 0937

Check Pressure Relief Valve [✓ Yes] / No

Leaving System On (Comments) Yes

Comments (activities conducted, changes to the systems, general site conditions)

- Weir was modified on O/W separator
- Water flow was reduced at manifold to ½ way
- Left site at 0950

Attn: Chris Kimmel 425-778-6409

ConocoPhillips

Equipment Maintenance Report

ConocoPhillips Contact: Mr. Tim Johnson
Date: 04/22/04

Consultant & Contact: Landau Associates - Martin Powers
Time: 4:30 PM

Contractor & Contact: H2 Oil Recovery Equipment, Inc. - Scott Wakefield
Weather: 70's & Sunny

1.0 System Description: *Site #3485 , 2423 Lind Ave, Renton WA*

H2-250G Gas Fired Thermal Oxidizer with catalyst plate and DR505 2 hp combustion blower, Sutorbilt 4MP SVE blower with a 10 hp motor (230v, 1 ph, 1725 rpm), 55 gal 3" moisture separator with a Goulds 1/2 hp (230 vac, 1ph) moisture separator pump, all mounted on a trailer; Campbell-Hausfeld (Mod #C1071080VMS, Ser # 020393L 999231) 7.5 hp air compressor (230v, 3480 rpm) and (6) Clean Environment AP3 down well pneumatic pumps

SVE belts - (1) 5VX630
Compressor V-belt - (2) B66

(attach schematic including manufacturer and date of purchase)

3.0 Routine Maintenance Required and Performed:

Description	Interval
Observe complete system operation. Change oil in SVE blower. Check filters, clean or replace, if needed. Change air compressor oil and drain condensation. Check belt tension, adjust if needed, and record belt deflection. Record amps on blowers, pump and compressor. Calibrate CGM.	Monthly

4.0 Equipment Readings and Measurements:

SVE blower (4MP) amps - 31.0/31.0 @ 21" wc
MS pump (Goulds) amps - 2.0/2.0
Air compressor amps - 36.0/37.0 @ 110 psi
Fresh air blower amps - 6.5/7.0
PID - 60 ppm
T.S. blower amps - 3.5/3.7/3.7 @ 15" wc
Aeration blower amps - 5.5/5.9
OWS thickness - 1/2" product
Product tank volume - 20.75" liquid
Stripper effluent - 2.5/2.5 @ 12 gpm/ stripper influent - 1.5/1.5/1.4

Date
4/22/04

Temp controller - 550
Burner temp - 540
Cat temp - 555
% LEL - 1.8%
cfm - 275 SVE
hrs - 29213.5
Stripper Effluent Water Meter - 162750 gal

5.0 Other Repairs Performed, parts needed, etc.:

Oil water separator is plumbed back into water treatment process. Replaced OWS high level float because of damage.

6.0 Equipment Status and Reasons for Downtime:

System operating upon arrival and departure.

Individual Completing this form, including company

Scott Wakefield - H2 Oil Recovery Equipment, Inc.

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLR Date 4/5/04 Time 1610
Weather Conditions

Vapor Extraction and Treatment System

Operating Upon Arrival [✓ Yes] / No

If No indicate active alarms below and restart system
ACTIVE ALARMS:

Hourmeter Reading	28904.5	hours
Burner Temperature	540	deg F
Catalyst Temperature	551	deg F
LEL %	0.7	
4" Valve % Open	100	
Total Vacuum Reading	24	in. H2O
Total Flowrate	270	cfm
Total VOCs of thermox influent	78.4	ppm (PID)
Total VOCs of Thermox effluent	0.1	ppm (PID)

Fill level in LP tank 60 % Delivery Pressure 6.0 psi

Wells	Extracting (Y/N)	Vacuum (InH2O)	4" manifold opening (%)
RW-2	No	10	85
RW-3	↓	10	85
RW-[illegible]	↓	13	85
LAI-4	Yes	9	85
LAI-5	↓	13	85
LAI-6	↓	—	[illegible]
LAI-7	↓	10	85
LAI-8	↓	10	85
LAI-9	↓	10	85
HW-1E	↓	—	—
HW-1W	↓	—	—

Water Treatment System

Operating Upon Arrival Yes / [✓ No]

If No please explain why, for how long and what alarms active.
Stripper sump on high level

Magnahelic	15+	in. H_2O
Hour Meter	—	
Sparge Tank Water Level	2.41 ft H_2O /	ft. 0.13 ft product
Transfer Tank Water Level	0.81	ft.
Storage Tank Oil Level	1.49 ft H_2O / 0.28 ft product	
Flow Meter Reading	139515.0	gallons @ 1615 ← flow @ 12gpm
Check Pressure Relief Valve	[✓ Yes] / No	
Leaving System On (Comments)	yes	

Comments (activities conducted, changes to the systems, general site conditions)

Checked levels in all tanks, checked air stripper
Reduced water flow at influent pump
(1/8 of turn)

S:\SHAREDOC\...\Operation Log\Sheet1

Field Report

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

Project No: 706002.012
Report No:
Client: Conoco Phillips
Date: 3/17/04
Project Name: Conoco Phillips – Renton Terminal
Location: Renton
Weather Conditions: Cloudy
Prepared By: MLR

(Description of work done, locations, equipment used, quantity estimate (indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)

3/15 – Conducted GW & Product Level Measurements
- Collected GW Samples on LAI-13, 14, 15, HA-5, 13, 15 & 17, (For these samples only 1L amber was collected due to the low water volume in well)

3/16 - Continued collecting GW samples outside farm
- Collected System samples (H_2O & Air)
- Filled O&M Log sheet on system.
- GW System was turned on after GW Sampling

Visitors:
Unsatisfactory Conditions and Recommended Corrections - Transfer pump needs replacement (Casing is cracked since the freeze)

Attachments
Distribution
Signed

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLR Date 3/22/04 Time 1350
Weather Conditions Partly cloudy

Vapor Extraction and Treatment System

Operating Upon Arrival [✓ Yes] / No

If No indicate active alarms below and restart system
ACTIVE ALARMS:

Hourmeter Reading	28702.2	hours
Burner Temperature	536	deg F
Catalyst Temperature	548	deg F
LEL %	1.3	
4" Valve % Open	100	
Total Vacuum Reading	24	in. H2O
Total Flowrate	270	cfm
Total VOCs of thermox influent	NR	ppm (PID)
Total VOCs of Thermox effluent	NR	ppm (PID)

Fill level in LP tank 55 % Delivery Pressure 6.75 psi

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	No	12	85%
RW-3	↓	8	↓
RW-4	↓	12	↓
LAI-4	Yes	9	↓
LAI-5	↓	12	↓
LAI-6	↓	—	↓
LAI-7	↓	9	↓
LAI-8	↓	9	↓
LAI-9	↓	9	↓
HW-1E	↓		
HW-1W	↓	—	

Water Treatment System

Operating Upon Arrival Yes / [✓ No]

If No please explain why, for how long and what alarms active.
Holding tank on high level

Magnahelic	0.5	in. H_2O
Hour Meter	—	
Sparge Tank Water Level	2.98 ft H_2O / 0.12 ft product	ft.
Transfer Tank Water Level	0.50	ft.
Storage Tank Oil Level	1.44 ft H_2O / 0.16 ft product	
Flow Meter Reading	132557.5	gallons
Check Pressure Relief Valve	[✓ Yes] / No	
Leaving System On (Comments)	Yes	

Comments (activities conducted, changes to the systems, general site conditions)

Converted LAI-4 to top-loading
Others were checked and those that had same configuration were LAI-5, 7, 8 and 9

O/W Separator was put online. Gary Maxwell installed new transfer pump.

S:\SHAREDOC\708\002\Operation LogSheet1

REMEDIATION S. . .M OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLR Date 3/16/04 Time 1850
Weather Conditions Cloudy

Vapor Extraction and Treatment System

Operating Upon Arrival [✓ Yes] / No

If No indicate active alarms below and restart system
ACTIVE ALARMS:

Hourmeter Reading	28563.4	hours
Burner Temperature	549	deg F
Catalyst Temperature	542	deg F
LEL %	0.3	
4" Valve % Open	100%	
Total Vacuum Reading	24	in. H2O
Total Flowrate	270	cfm
Total VOCs of thermox influent	44.7	ppm (PID)
Total VOCs of Thermox effluent	0.7	ppm (PID)

Fill level in LP tank 90 % Delivery Pressure 6.0 psi

Water Treatment System

Operating Upon Arrival Yes / [✓ No]

If No please explain why, for how long and what alarms active.
System was off while collecting GW samples
System was turn on after sampling was done

Magnahelic	0.5	in. H_2O
Hour Meter	—	
Sparge Tank Water Level	NR	ft.
Transfer Tank Water Level	NR	ft.
Storage Tank Oil Level	NR	ft.
Flow Meter Reading	130663.2	gallons
Check Pressure Relief Valve	[✓ Yes] / No	
Leaving System On (Comments)	Yes	

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	N	NR	100
RW-3	N		—
RW-4	N		100
LAI-4	Y		100
LAI-5	Y		100
LAI-6	Y		—
LAI-7	Y		100
LAI-8	Y		100
LAI-9	Y		100
HW-1E	Y		—
HW-1W	Y		—

Comments (activities conducted, changes to the systems, general site conditions)

Pump that feeds air sparge (from transfer tank) is broken at the casing.
Needs to be replaced in order to put o/w separator online.

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLP Date 3/2/04 Time 0850
Weather Conditions Clear

Vapor Extraction and Treatment System

Operating Upon Arrival [✓ Yes] No

If No indicate active alarms below and restart system
ACTIVE ALARMS:

Hourmeter Reading	28217.9	hours
Burner Temperature	538	deg F
Catalyst Temperature	545	deg F
LEL %	LL	
4" Valve % Open	100%	
Total Vacuum Reading	24	in. H2O
Total Flowrate	270	cfm
Total VOCs of thermox influent	50.5	ppm (PID)
Total VOCs of Thermox effluent	1.3	ppm (PID)

Fill level in LP tank 55 % Delivery Pressure 7.0 psi

Water Treatment System

Operating Upon Arrival [✓ Yes] / No

If No please explain why, for how long and what alarms active.

Magnahelic	0.5	in. H₂O
Hour Meter	—	
Sparge Tank Water Level	2.65	ft.
Transfer Tank Water Level	4.5 in	
Storage Tank Oil Level	0.7 in oil / 1.61 ft H₂O	
Flow Meter Reading	91069.1	gallons
Check Pressure Relief Valve	[✓ Yes] / No	
Leaving System On (Comments)	Yes	

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	N	5	80
RW-3	N	7	80
RW-4	U	11	80
LAI-4	Y	10	80
LAI-5	Y	10	80
LAI-6	Y	—	—
LAI-7	Y	0	100
LAI-8	Y	9	100
LAI-9	Y	4	80
HW-1E	Y	—	—
HW-1W	Y	—	—

Comments (activities conducted, changes to the systems, general site conditions)

PID reading on Sparge tank = 575 ppm (need resparator to check it)
Added LAI-5 to increase flow into Sparge
tank. Will need a 2" female camlock to
install hosing to manifold for the pump
at RW-2.

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLR Date 2/9/04 Time 1810

Weather Conditions Clear

Vapor Extraction and Treatment System

Operating Upon Arrival Yes / [✓ No]

If No indicate active alarms below and restart system

ACTIVE ALARMS: Power loss Shutdown

Hourmeter Reading	27804.0	hours
Burner Temperature	548	deg F
Catalyst Temperature	597	deg F
LEL %	LL	
4" Valve % Open	100%	
Total Vacuum Reading	22	in. H2O
Total Flowrate	297	cfm
Total VOCs of thermox influent	306	ppm (PID)
Total VOCs of Thermox effluent	0.6	ppm (PID)

Fill level in LP tank 85 % Delivery Pressure 7.0 psi

Water Treatment System

Operating Upon Arrival Yes / [✓ No]

If No please explain why, for how long and what alarms active.

Power loss shut down.

Magnahelic	>15.0	in. H_2O
Hour Meter		
Sparge Tank Water Level	3.5	ft.
Transfer Tank Water Level	NR	ft.
Storage Tank Oil Level	.9 in oil / 1.2 ft H_2O	
Flow Meter Reading	14845.0	gallons @ 1818

Check Pressure Relief Valve [✓ Yes] / No

Leaving System On (Comments) Yes

Left influent valve @ 1 1/4 turn

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2			
RW-3			
RW-6			
LAI-4			
LAI-5			
LAI-6			
LAI-7			
LAI-8			
LAI-9			
HW-1E			
HW-1W			

Comments (activities conducted, changes to the systems, general site conditions)

Upon arrival, System was down (Power loss shut down)

Proceeded to transfer product from air Sparge tank to Product holding tank.

Turned system on and ~~[illegible] [illegible]~~ Stripper would go on high alarm. Modified Influent flow into air stripper to 1 1/4 turn.

Effluent pump turns on every 55 seconds, and processes about 35.5 gallons every ~~[illegible]~~ 12 seconds.

Field Report

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

Project No.: 706002
Report No.:
Client: ConocoPhillips
Date: 2/6/04
Project Name: ConocoPhillips – Renton
Location: Lind Ave., Renton Washington
Weather Conditions: Raining
Prepared By: ERG

Description of work done, locations, equipment used, quantity estimate (indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not).

Arrived onsite to meet Gary Maxwell @ 1600. He had been to the site this morning to check conductivity switches in the AS. Tank. He was asked to check if voltage was continuous in switch, then call me. He arrived ~~at the~~ this m at the sight mistakenly anticipating my arrival. He was unreachable during his site visit (His cellphone did not pick up). Hower, he eventually evaluated conductivity switches and came to the conclusion that the high and low switches were wired oposite from what they should be. So he swapped the wires, and tested the pump and left the sight. I later got in touch with him and discussed these activities. I wanted to turn the system on later so I askes if he could meet me to ensure proper operations. We tested the switches out of the tank. The pump did not behave sporadically like it had the previous day when Mario checked the system. I turned on LA1-7, 8, 9, 4 and Trench –

Visitors:

Unsatisfactory Conditions & Recommended Correction:

Attachments:

Distribution:
Signed

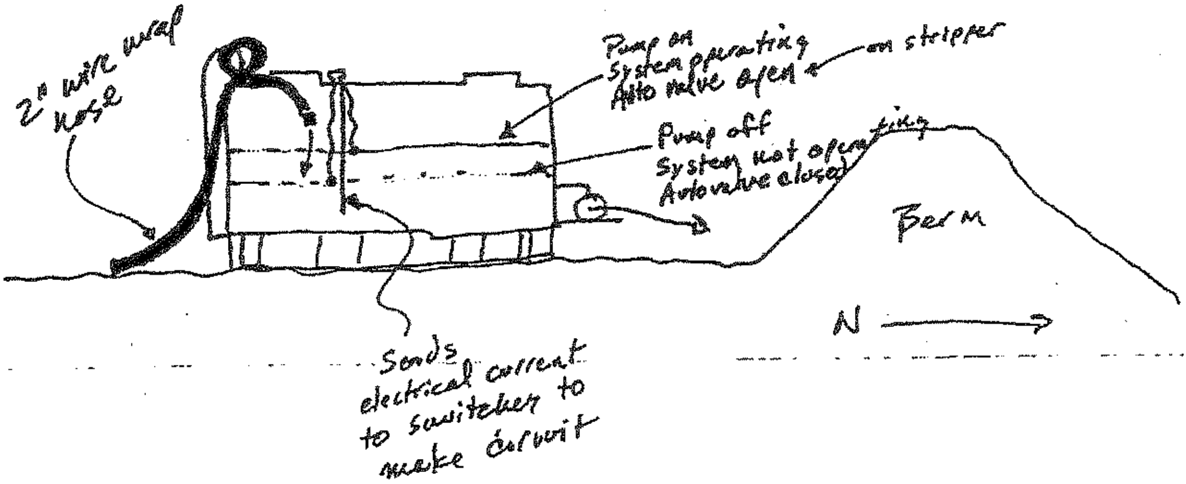
Field Report

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

Project No.: 706002
Report No.:
Client: Conoco Phillips
Date: 2/6/04
Project Name: Renton
Location: Washington
Weather Conditions: Raining
Prepared By: ERG

Description of work done, locations, equipment used, quantity estimate (indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not).

I removed fire hose extension to A.S. tank for uninhibited flow. Now it is just 8" wire wrap hosing to tank. I waited until 1830 for operation. Looks good. Leave site.



Visitors:
Unsatisfactory Conditions & Recommended Correction:
Attachments:
Distribution:
Signed

Landau Associates, Inc.
Edmonds, WA (425) 778-0907
Fax: (425) 778-6409

Field Report

Report No. ____
Page 1 of 1

Project 706002 Job No. ____
Location Renton Client Conoco/Phillips Date 2/5/04
Weather Conditions Overcast Prepared By MLF

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

Arrived on site @ 11:00

Upon arrival, system was running, Compressor was off, thus proceeded to reset it. C

- Conducted O&M on the vapor/water treatment systems.
- Collected air and water samples from the system. Samples were hand-delivered to NCA lab for a 24-hr turn around.
- Noticed that the pump that delivers water to the air stripper was running sporadically. The switch on the control panel would blink on and off continuously. Checked the conductivity switches inside the Sparge tank. Cleaned the filter on the pump and tested the performance of the pump on manual. The pump runs fine on manual, but it doesn't on auto mode. Conductivity switches were taken off and left them out to be replaced/checked by Gary, from Roger
- Turned GW system off. (Solenoid and influent pump only)

- Off site @ 1630.

HW-1E : 6.75 ft
HW-1W : 5.4 ft

Visitors ____

Unsatisfactory Conditions & Recommended Correction ____

Attachments ____

Distribution ____ Signed

ConocoPhillips

Equipment Maintenance Report

ConocoPhillips Contact: Mr. Tim Johnson
Date: 02/17/04
Consultant & Contact: Landau Associates - Martin Powers
Time: 12:10 PM
Contractor & Contact: H2 Oil Recovery Equipment, Inc. - Scott Wakefield
Weather: 50's & Overcast

1.0 System Description: *Site #3485 , 2423 Lind Ave, Renton WA*

H2-250G Gas Fired Thermal Oxidizer with catalyst plate and DR505 2 hp combustion blower, Sutorbilt 4MP SVE blower with a 10 hp motor (230v, 1 ph, 1725 rpm), 55 gal 3" moisture separator with a Goulds 1/2 hp (230 vac, 1ph) moisture separator pump, all mounted on a trailer; Campbell-Hausfeld (Mod #C1071080VMS, Ser # 020393L 999231) 7.5 hp air compressor (230v, 3480 rpm) and (6) Clean Environment AP3 down well pneumatic pumps

SVE belts - (1) 5VX630
Compressor V-belt - (2) B66

(attach schematic including manufacturer and date of purchase)

3.0 Routine Maintenance Required and Performed:

Description	Interval
Observe complete system operation. Change oil in SVE blower. Check filters,	Monthly
clean or replace, if needed. Change air compressor oil and drain condensation.	
Check belt tension, adjust if needed, and record belt deflection. Record amps	
on blowers, pump and compressor. Calibrate CGM.	

4.0 Equipment Readings and Measurements:

	Date 2/17/2004
SVE blower (4MP) amps - 31.6/30.7 @ 22" wc	
MS pump (Goulds) amps - 2.2/2.2	Temp controller - 550
Air compressor amps - 37.0/36.0 @ 110 psi	Burner temp - 551
Fresh air blower amps - 6.9/7.0	Cat temp - 550
PID - 10 ppm	% LEL - .6%
T.S. blower amps - 3.8/3.8/3.6 @ 15" wc	cfm - 270 SVE
Aeration blower amps - 5.9/6.1	hrs - 27895.7
OWS thickness - 1/2" product	Stripper Effluent Water Meter - 44360 gal
Product tank volume - 20" liquid	
Stripper effluent - 2.7/2.4 @ 14.5 gpm/ stripper influent - 1.6/1.6/1.2	

5.0 Other Repairs Performed, parts needed, etc.:

Water meter fouled - cleaned and tested.

Oil water separator and 275 gal batch tank are not in use. Well pumps discharge directly to air sparge tank.

6.0 Equipment Status and Reasons for Downtime:

SVE operating upon arrival. Water treatment in alarm due to stripper sump high level. System operating upon departure.

Individual Completing this form, including company

Scott Wakefield - H2 Oil Recovery Equipment, Inc.

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLK Date 1/10/04 Time 1200

Weather Conditions Clear, sunny

Vapor Extraction and Treatment System

Operating Upon Arrival Yes [✓ No]

If No indicate active alarms below and restart system

ACTIVE ALARMS:
Unable to determine (see comments)

Hourmeter Reading	27818.9	hours
Burner Temperature	557	deg F
Catalyst Temperature	539	deg F
LEL %	UL	
4" Valve % Open	100%	
Total Vacuum Reading	24	in. H2O
Total Flowrate	288	cfm
Total VOCs of thermox influent	15.4	ppm (PID)
Total VOCs of Thermox effluent	0.1	ppm (PID)

Fill level in LP tank 80 % Delivery Pressure 7.0 psi

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	N	7	50
RW-3	N	10	85
RW-4	N	15	85
LAI-4	Y	5 sec 14	50
+ LAI-5	Y	5 sec 14	85
LAI-6	Y	15 sec [illegible]	—
LAI-7	Y	7 sec Under pressure	100
LAI-8	Y	10 sec 5	100
+ LAI-9	Y	18 sec 8	80
HW-1E	Y		—
HW-1W	Y		—

Water Treatment System

Operating Upon Arrival Yes [✓ No]

If No please explain why, for how long and what alarms active.
- Whole system was off @ arrival, no alarms were on

Magnehelic	0.5	in. H_2O
Hour Meter	—	
Sparge Tank Water Level		ft.
Transfer Tank Water Level	Not online	ft.
Storage Tank Oil Level	not online	ft.
Flow Meter Reading	22215.8	gallons
Check Pressure Relief Valve	[✓ Yes] / No	

Leaving System On (Comments) Left LAI4, LAI-6, LAI-7, LAI-8 HW-1E, and HW-1W online
Turned off LAI-5 and LAI-9.

Comments (activities conducted, changes to the systems, general site conditions)

- Upon arrival, system was off, no particular reason why it was off, but noticed dilution valves on air stripper, KO drum and SVE were covered with a layer of ice.
- Ice was removed and system was started at 0900

+ Closed @ departure.

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials MLR Date 2/5/04 Time 1120
Weather Conditions

Vapor Extraction and Treatment System

Operating Upon Arrival [✓ Yes] No

If No indicate active alarms below and restart system
ACTIVE ALARMS:

Hourmeter Reading 27758.1 hours
Burner Temperature 546 deg F
Catalyst Temperature 539 ~~550~~ deg F
LEL % LL
4" Valve % Open 100%
Total Vacuum Reading 23 in. H2O
Total Flowrate 270 scfm
Total VOCs of thermox influent 7.6 ppm (PID)
Total VOCs of Thermox effluent 0.6 ppm (PID)
Fill level in LP tank 75 % Delivery Pressure 7 psi

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	N	10	80
RW-3	N	14	80
~~RW-4~~ RW-7	N	17	80
LAI-4	N	19	80
LAI-5	N	21	80
LAI-6	N	—	—
LAI-7	Y	15	100
LAI-8	N	16	100
LAI-9	N	20	90
HW-1E	Y	NR	—
HW-1W	Y	NR	—

Water Treatment System

Operating Upon Arrival [✓ Yes] No

If No please explain why, for how long and what alarms active.

Magnahelic 14 in. H_2O
Hour Meter NR
Sparge Tank Water Level 25in Oil / 1.74 ft. H2O
Transfer Tank Water Level NR ft.
Storage Tank Oil Level NR ft.
Flow Meter Reading 13912.6 gallons @ 1130
Check Pressure Relief Valve [✓ Yes] No
Leaving System On (Comments) Conductivity Switches are faulty.
Upon departure Flow meter = 14213.6
Water system was turned off

Comments (activities conducted, changes to the systems, general site conditions)

* Noticed that influent pump was not running correctly (switch would go on/off repeatedly)
- Cleaned filter and conductivity switches, but there was no change in performance of the pump.
- Pump runs correctly when it is on manual

† Flow of water into sparge tank was low, thus added LAI-7 to the wells extracting water to the system

LANDAU ASSOCIATES

☒ Seattle (Edmonds) (425) 778-0907
☐ Tacoma (253) 926-2493
☐ Spokane (509) 327-9737
☐ Portland (Tigard) (503) 443-6010
☐ ____________

Date 2/5/04
Page 1 of 1

Chain-of-Custody Record

Project Name ConocoPhillips Project No. 706002
Project Location/Event Renton / System Sampling
Sampler's Name Mario Lopez
Project Contact Martin Powers
Send Results To Martin Powers

Turnaround Time
☐ Standard
☐ Accelerated
☒ 24 hrs

Sample I.D.	Date	Time	Matrix	No. of Containers	NWTPH-Gx	BTEX	Observations/Comments
Influent	2/5/04	1323	H2O	3	X	X	
Stripper Effluent	↓	1319	↓	3	X	X	
Effluent		1315	↓	3	X	X	
Influent		1300	Air	2	X	X	
Effluent	↓	1255	Air	2	X	X	

Special Shipment/Handling or Storage Requirements Hand delivered Water samples in ice

Method of Shipment

Relinquished by	Received by	Relinquished by	Received by
Signature	Signature	Signature	Signature
Printed Name Mario Lopez	Printed Name [illegible] TINTY	Printed Name	Printed Name
Company Landau Inc.	Company NCA	Company	Company
Date 2/5/04 Time 1717	Date 2/5/04 Time 1727	Date Time	Date Time

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

Rev. 6/02

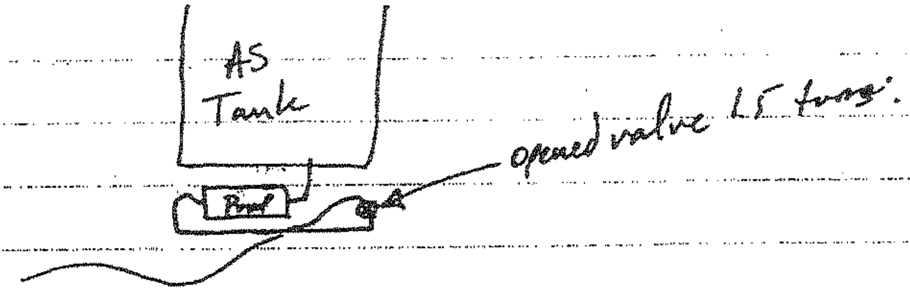
ConocoPhillips - Renton

2/4/04 ERG

Arrived onsite @ 1630
- Vapor system on
- Water system in alarm - Air sparge ~~tank~~ H-L.

Meter upon arrival : 5050

Got system out of alarm and turned watersystem back on - GW pumps (HW-1W and 1E) must have pumped at a higher rate than the ~~effluent~~ Influent pump. So, I opened valve on influent pump to 1.5 turns.



AS Tank on arrival was @ 4/5 full

Meter reading @ 1720 was 6140.0 gal

Mario will be here tomorrow to collect in/eff Treatment samples

* New Flow meter (46810 gal - previous ending meter reading)

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials ERG Date Friday 1/30/04 Time 1700
Weather Conditions Partly Cloudy

Vapor Extraction and Treatment System

Operating Upon Arrival [✓ Yes] No

If No indicate active alarms below and restart system
ACTIVE ALARMS:
NA

Hourmeter Reading	27621.6	hours
Burner Temperature	538	deg F
Catalyst Temperature	534	deg F
LEL %	<LL>	
4" Valve % Open	100	
Total Vacuum Reading	20	In. H2O
Total Flowrate	275	cfm
Total VOCs of thermox influent	NA	ppm (PID)
Total VOCs of Thermox effluent	NA	ppm (PID)

Fill level in LP tank 90 % Delivery Pressure 5 psi

Water Treatment System

Operating Upon Arrival Yes [✓ No]

If No please explain why, for how long and what alarms active.
See notes

Magnahelic	15	In. H_2O
Hour Meter	NA	
Sparge Tank Water Level	3/4	ft.
Transfer Tank Water Level	NA	ft. } Bipassed
Storage Tank Oil Level	NA	ft. } Bipassed
Flow Meter Reading	0.0	gallons @ 1700 = 190 gal
Check Pressure Relief Valve	[✓ Yes] / No	

Leaving System On (Comments) Yes System will run ~~for~~ over the weekend and will be checked Monday

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	N	10	80
RW-3		15	80
RW-~~6~~7		20	80
LAI-4		10	80
LAI-5		10	80
LAI-6		—	~~80~~ 60
LAI-7		~~100~~ 40	100 — must be water in line
LAI-8		7	100
LAI-9	↓	10	100
HW-1E	Y		—
HW-1W	Y		—

Comments (activities conducted, changes to the systems, general site conditions)

Onsite @ 0800 - Checked pump that was serviced by Western Movement (Dave Richmond) - pump still operated sporadically - pump spun continuous however water discharged off and on - After much investigation and trial - discovered crack on flow meter base plate (fig 1.) Called Dave and ordered new meter + attachments - Scott Wakefield indicated the flow meter would be better positioned on the discharge side of the pump so as not to inhibit flow to the pump intake. Meter was same make and model - installed ball valve on discharge side of flow meter for ease of servicing (fig. 2)

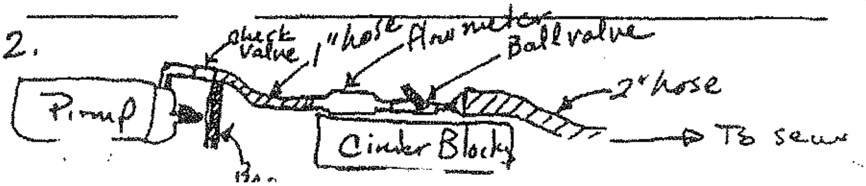
-Began Discharging water through carbon @ 1630

System Configuration:
GW pump → Air Sparge Tank → Stripper → Carbon → Sewer

Fig 1.

Underside of flow meter w/ crack.

Fig. 2.



REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials ERG Date 1/29/04 Time 0700
Weather Conditions Raining

Vapor Extraction and Treatment System

Operating Upon Arrival Yes / No

If No indicate active alarms below and restart system
ACTIVE ALARMS:

Hourmeter Reading ________ hours
Burner Temperature ________ deg F
Catalyst Temperature ________ deg F
LEL % ________
4" Valve % Open ________
Total Vacuum Reading ________ in. H2O
Total Flowrate ________ cfm
Total VOCs of thermox influent ________ ppm (PID)
Total VOCs of Thermox effluent ________ ppm (PID)
Fill level in LP tank ________ % Delivery Pressure ________ psi

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2			
RW-3			
RW-6			
LAI-4			
LAI-5			
LAI-6			
LAI-7			
LAI-8			
LAI-9			
HW-1E			
HW-1W			

Water Treatment System

Operating Upon Arrival Yes / No

If No please explain why, for how long and what alarms active.

Magnahelic ________ in. H2O
Hour Meter ________
Sparge Tank Water Level ________ ft.
Transfer Tank Water Level ________ ft.
Storage Tank Oil Level ________ ft.
Flow Meter Reading ________ gallons
Check Pressure Relief Valve Yes / No
Leaving System On (Comments) ________

Comments (activities conducted, changes to the systems, general site conditions)

Met w/ Dave Richmond to show him pump and discuss what should be done. He suggested his shop could reassemble it and garentee that it is is in good operating condition. Called Gary Maxwell w/ DW Close to disconnect electrical - he was in the area and swung by @ 0730 while Dave was still onsite. He disconnected it w/in 15 minutes → Gave the pump to Dave → Both Gary and Dave will meet back @ 4:00 this afternoon to reconnect the pump

REMEDIATION SYSTEM OPERATION LOG
ConocoPhillip Renton Terminal

Operator Initials ERG Date 1/27/04 Time 1100
Weather Conditions Clear

Vapor Extraction and Treatment System

Operating Upon Arrival Yes [✓ No]

If No indicate active alarms below and restart system
ACTIVE ALARMS:
NA

Hourmeter Reading	27550.7	hours
Burner Temperature	553	deg F
Catalyst Temperature	539	deg F
LEL %	<LL7	
4" Valve % Open	100	
Total Vacuum Reading	20	in. H2O
Total Flowrate	270	cfm
Total VOCs of thermox influent	NA	ppm (PID)
Total VOCs of Thermox effluent	NA	ppm (PID)

Fill level in LP tank 60 % Delivery Pressure 5 psi

Water Treatment System

Operating Upon Arrival Yes [✓ No]

If No please explain why, for how long and what alarms active.
high level in stripper sump - Turned back on

Magnahelic	14	in. H_2O
Hour Meter	—	
Sparge Tank Water Level	3/4	ft.
Transfer Tank Water Level	—NA—	ft.
Storage Tank Oil Level	—NA—	ft.
Flow Meter Reading	46710	gallons

> Bipassed

Check Pressure Relief Valve Yes [✓ No]

Leaving System On (Comments) No

46710
44500
2210.0

Wells	Extracting (Y/N)	Vacuum (inH2O)	4" manifold opening (%)
RW-2	N		
RW-3	↓		
RW-6	↓		
LAI-4	↓		
LAI-5	↓		
LAI-6	↓		
LAI-7	↓		
LAI-8	↓		
LAI-9	↓		
HW-1E	Y		
HW-1W	Y		

Comments (activities conducted, changes to the systems, general site conditions)
When I arrived pump was spinning but no flow was discharging. ?? Processed 2210 gal last night. Turned back on but began discharging H_2O again → pump returned to sporadic activity after short period of time. Took pump apart and noticed that a seal had broken but (most likely from the spinning). Call Dave Richmond from Western Measurement and discussed problem w/him. He wants to bring the pump to his shop for inspection and repair. We will meet Thurs Morning @ 0700.

Landau Associates, Inc.
Edmonds, WA (425) 778-0907
Fax: (425) 778-6409

Field Report

Report No. ______
Page ______ of ______

Project Renton Terminal 706002 Job No. ______
Location Renton, WA Client Conoco Phillips Date 1/20/04
Weather Conditions Overcast Prepared By MLR

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

Arrived to the site to tend to the effluent pump.

Switches at main panel were turned to the off position to cut any power to the effluent pump. Closed suction and discharge valves and drained the water in the system. Followed instructions to replace mechanical seal, gasket and O-ring with new parts. After reassembling the motor, conected suction hose and reprimed the pump with water. Before starting the pump, the effluent valve near the discharge point was opened.

At startup, noticed that water was still coming out of the sides of the casing. Check that gasket was placed correctly and that all nuts were tight. Tested pump again, but there was water still coming out of the sides of the casing. Notified Martin Powers and was advised to leave it.

Left the system off at departure. (Circuit breakers were left on the off position).

Visitors ______

Unsatisfactory Conditions & Recommended Correction ______

Attachments ______

Distribution ______ Signed

Landau Associates, Inc.
Edmonds, WA (425) 778-0907
Fax: (425) 778-6409

Field Report

Report No. ____
Page 1 of 7

Project Renton Terminal 706002.012 Job No. ____
Location Renton, WA Client Conoco Phillips Date 1/19/04
Weather Conditions Overcast Prepared By MLR

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

Arrived on site @ 1480 to prime GAC cylinder and to conduct water levels.

Summary:

Hooked up hosing to main water line and closed effluent valve next to discharging point. Filled GAC cylinder with tap water and left it overnight for priming.

Proceeded to collect water levels inside/outside terminal. Wells with product were ; HA-8, LAI-4, LAI-5, LAI-6, LAI-7, LAI-8, LAI-9, HA-E RW-3, RW-4.

Inspected Retention dike and made measurements to update report figure. No

* Need to fill sides of dike with soil as the level of water upstream is creeping over through the sides.

Visitors ____

Unsatisfactory Conditions & Recommended Correction ____

Attachments ____

Distribution ____ Signed

Field Report

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

Project No.: 706002.012
Report No.:
Client: Conoco Phillips
Date: 1/16/04
Project Name: Renton Terminal
Location: 2423 Lind Ave. Renton, WA
Weather Conditions: Overcast
Prepared By: ERG

Description of work done, locations, equipment used, quantity estimate (indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not).

MLR & ERG onsite @ 0600 to install Carbon Canister (Associated hosing) and new influent hosing w/ secondary containment.

Summary:

Discussed plan of action w/ both Garys and aquired safe work permit. We cut 3" PVC influent line located on berm into ~30 ft' sections. 2" wire wrapped hosing was then threaded through the 3" PVC. 300' of hosing was used. A new galvanized manifold was installed on top of berm and plumbed into system. 1-3' of 2" hosing was left to stick out of either end of PVC containment for later grouting.

Wesy Cranes checked out the plan @ ~ 1030 prior to actual crane work. He faxed over credentials of crane and crane operator for ConocoPhillips. The Carbon Canister was installed ~1415 by crane. We used existing discharge hosing for influent line to the carbon canister. New 2" wire wrap effluent hosing was installed. The new hose is 100' long, however only ~60' was used. Excess hose was coiled and zip tied near carbon canister.

Visitors:

Unsatisfactory Conditions & Recommended Correction:

Attachments:

Distribution:
Signed

FORM C-1

Field Report

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

Project No.: 706002
Report No.:
Client: ConocoPhillips
Date: 1/16/07
Project Name: Renton Term.
Location: Renton
Weather Conditions: Overcast
Prepared By: ERG

Description of work done, locations, equipment used, quantity estimate (indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not).

After Carbon Vessel and all hosing was installed, the System was turned on and tested. All GW pumps operated fine. Discharge pump to Carbon leaked water from o-ring. determined it was pump failure. Will come back monday to fix. System was left off (entire system).

ERG Leave site @1640
MLR Leave site @ 1730

Visitors:
Unsatisfactory Conditions & Recommended Correction:
Attachments:
Distribution:
Signed

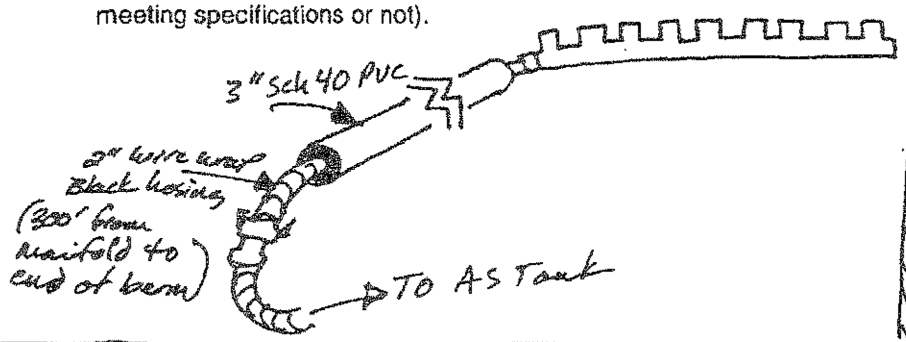
FORM C-1

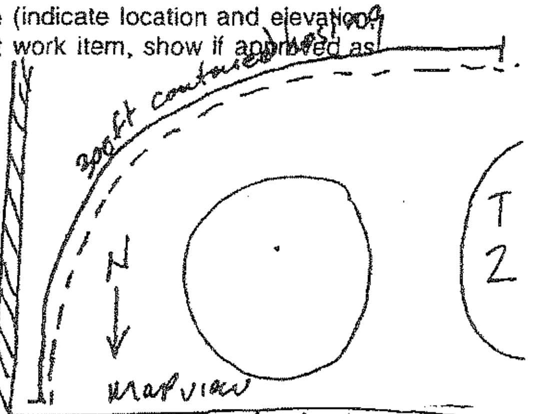
Field Report

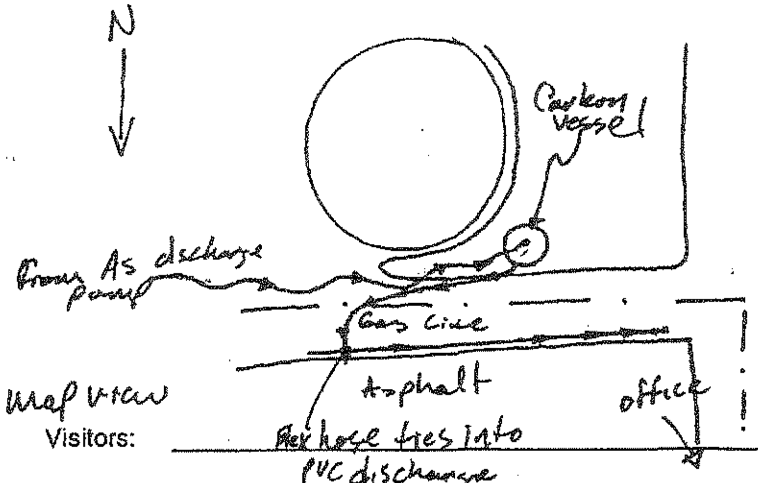
Landau Associates
Environmental | Geotechnical | Natural Resources

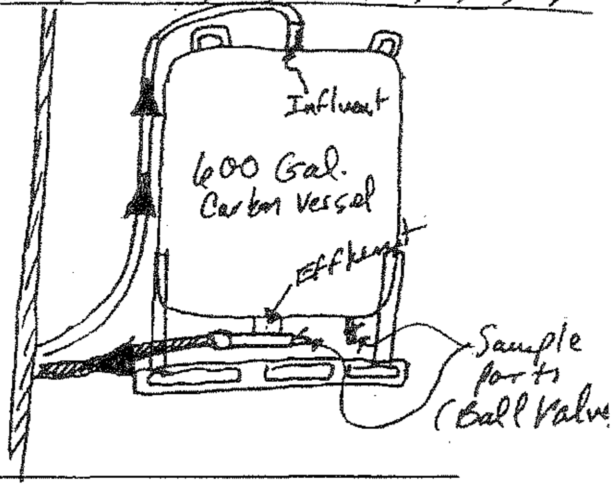
Project No.: 706002.012
Report No.:
Client: C.P.
Date: 1/16/04
Project Name: Renton
Location: Renton
Weather Conditions: Overcast
Prepared By: ERG

Description of work done, locations, equipment used, quantity estimate (indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not).









Visitors:

Unsatisfactory Conditions & Recommended Correction:

Attachments:

Distribution:
Signed

FORM C-1

Landau Associates, Inc.
Edmonds, WA (425) 778-0907
Fax: (425) 778-6409

Field Report

Report No.
Page 1 of 1

Project ConocoPhillips Job No.

Location Renton Client ConocoPhillips Date 1/15/04

Weather Conditions Raining Prepared By MLR

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

2:30 Arrived on site to receive hosing and to drop manifold and fittings for Carbon unit. Lined up 300 ft of the hosing over the vern. Put together the fittings for the GAC cylinder. Assembled connections for the air flow meter.

Discussed with Jim the plan of action for the GAC cylinder delivery and lining of hose over the vern to replace PVC piping.

SVE system was running, GW system was off.

Left site @ 1800.

Visitors

Unsatisfactory Conditions & Recommended Correction

Attachments

Distribution Signed

ConocoPhillips Renton Terminal
Operator Log Sheet
Dual Phase Vacuum Extraction System
2423 Lind Ave. SW
Renton, Washington

Operator Initials ERG

Date of Readings 1/9/04

Time of Readings 1410 ← Started System @ 1355

Weather Conditions Overcast

Is system currently operating? (circle one) YES NO

If No indicate active alarms below and restart system
ACTIVE ALARMS:
System was turned off by ConocoPh. & thismorning @ ~0530 - They used Response guide to do so. The water return Line had fractured due to ice formation. However, the H2O system has been off for ~3 weeks (?) - Because of freezing

Hourmeter Reading 27289.3 hours

4" System Manifold (% Open) 100

Burner ~~Thermox~~ Temperature ~~Catalytic~~ 531 deg F

Catalyst Temperature 541 deg F

LEL % <LL>

Total Vacuum Reading 35 in. H2O

Total Flowrate 290 cfm

Total VOCs of thermox influent NA ppm (PID)

Total VOCs of Thermox effluent NA ppm (PID)

Fill level in LP tank 100 % Delivery Pressure 5 psi

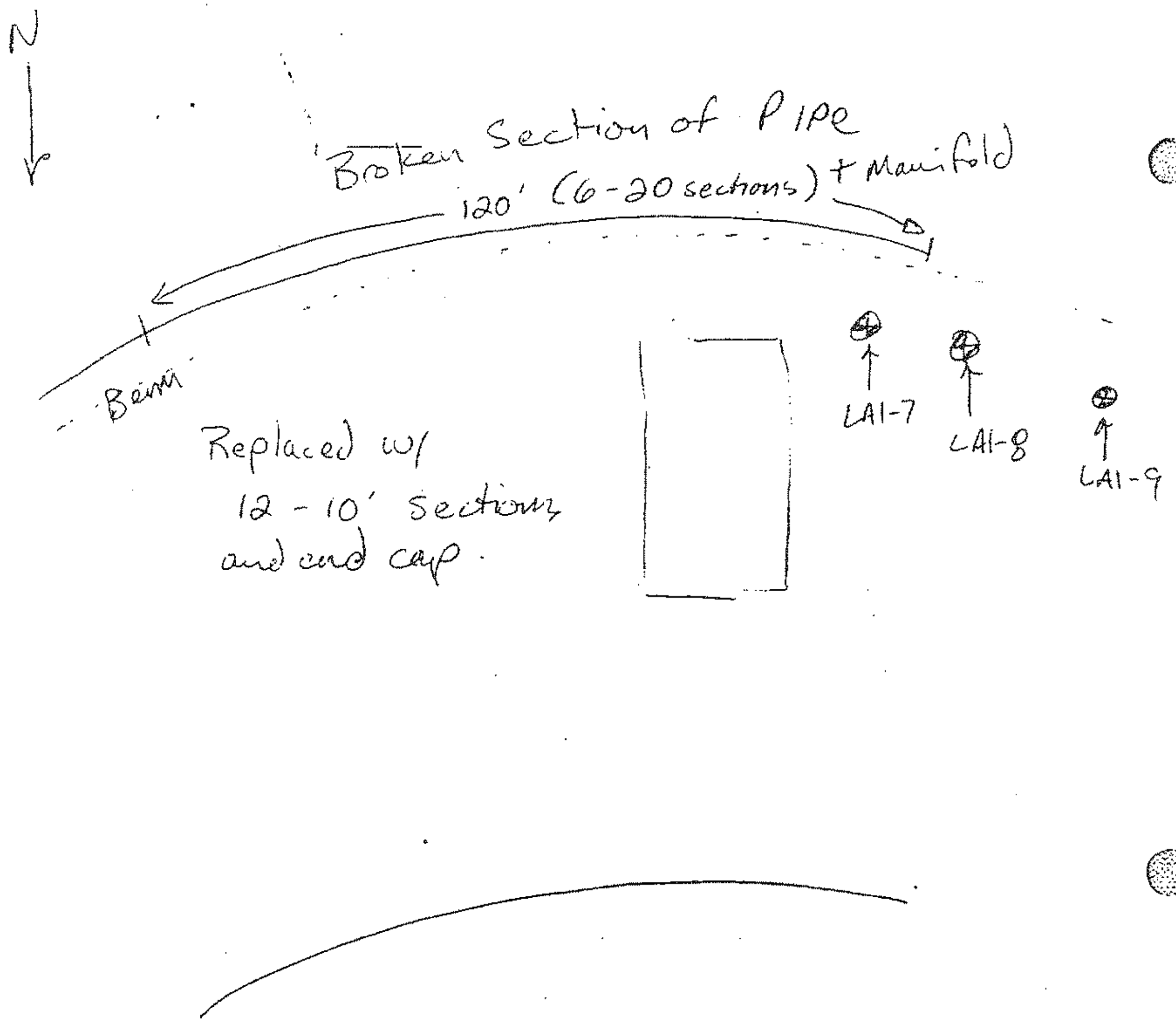
List Wells Currently Being Extracted From and Vacuum Recorded:

Wells	Vacuum in. H_2O	4" manifold opening (%)
LAI-7	0	~~100~~ 85
LAI-8	10	85
LAI-9	11	85
LAI-5	15	85
LAI-4	14	50
RW-2	10	85
RW-3	18	85
RW-7	20	85

Water Treatment

On upon arrival Y / [✓ N]
Magnahelic NA in. H_2O
Water Level in AS TK
Water Level in Transfer TK ft.
Oil Level in Storage TK ft.
Flow Meter Reading gallons
Check Pressure Relief Valve Y / N

As described above - Water return Line on berm including water return manifold had fractured significantly due to ice expansion. Cathy and I cut up broken sections of the 3" PVC (sch 40) and removed the ice cores to dispose in the AS tank.
The old PVC was stored in the well farm - wrapped in visquene - Also stored some near Catox unit near other scraps - wrappe in visquene. 120' of PVC sch. 40 was replaced. The end was capped - The manifold was not reconstructed - we will dispose of the PVC next week after [illegible]


N
Broken Section of Pipe
120' (6-20 sections) + Manifold
Berm
Replaced w/
12 - 10' sections
and end cap.
LAI-7
LAI-8
LAI-9

SECOR

SECOR
INTERNATIONAL
INCORPORATED

www.secor.com
12034 134th Court Northeast
Suite 102
Redmond, WA 98052
425 372 1600 TEL
425 372 1650 FAX

August 19, 2005

Mr. Marty Cramer
ConocoPhillips – Risk Management and Remediation
5528 NW Doane Avenue
Portland, Oregon 97229

RE: Work Plan for System Modifications and Improvements
ConocoPhillips Facility # 3485 (Renton Terminal)
2423 Lind Avenue, Renton, Washington

Dear Mr. Cramer:

SECOR International, Inc. (SECOR) has prepared the following Work Plan for modifications and improvements for the operating remediation system at the ConocoPhillips Renton Terminal in Renton, Washington (site).

The purpose of the work is to improve the effectiveness of ongoing remedial efforts at the site.

Background and Purpose

The remediation system was installed by Landau Associates Inc. (LAI) and activated in February 2003 to address subsurface impacts resulting from a January 2002 release. System components were relocated in early 2005 by LAI to an area outside the above ground storage tanks (AST) containment berm. LAI completed system modifications in conjunction with relocation activities. SECOR assumed management of system in March 2005.

Since the system was installed, approximately 75% of the product initially released to the subsurface has been recovered. The purpose of the system modifications and improvements outlined in this work plan is to improve the remedial efficiency of the system and expedite site closure.

The work outlined in this plan is designed to achieve the following objectives:

- Increase overall system efficiency by increasing the rate of groundwater removal from the subsurface by deepening recovery wells and adding recovery points;
- Reduce system downtime by completing preventative maintenance work on groundwater pumps, replacing the compressor and installing an autodialer.

- Address ConocoPhillip's safety concerns by re-routing the liquid natural gas (LNG) line which runs from the natural gas AST to the oxidizer and modifying system components.

Scope of Work

Deepening the Recovery Wells

The remediation system is designed to recover product and impacted groundwater and mitigate off-site impacts by pumping fluids from the subsurface. The recovery wells approximately encircle Tank No.2 (the source of the January 2003 release) and are situated south of Tank No.2 both on-site and off-site. During first and second quarter 2005 nine recovery wells were operated. The following table indicates water column measured in the operating recovery wells between early June and mid-July 2005. Figure 2, attached, shows the site layout and well locations.

Well	Total Depth of Well	Depth to Water*, Water Column and Date Measured					
		6/01/05	Water Column	6/20/05	Water Column	7/20/05	Water Column
RW-2	11.7	7.6	4.1	10.4	1.3	10.9	0.8
LAI-5	14.7	9.7	5.0	11.4	3.3	11.5	3.2
LAI-4	13.4	8.1	5.3	10.0	3.4	10.4	3.0
LAI-6	12.0	7.7	4.3	9.2	2.8	9.4	2.6
LAI-7	13.6	8.7	4.9	10.4	3.2	10.9	2.7
LAI-8	16.4	8.9	7.5	10.5	5.9	11.0	5.4
LAI-9	13.4	8.1	5.3	9.8	3.6	10.1	3.3
HW-1W	7.9	4.8	3.1	6.3	1.6	6.4	1.5
HW-1E	7.4	4.3	3.1	6.8	0.6	6.9	0.5

* Depth to groundwater measurements measured approximately 30 minutes following shut down of the remediation system

The downhole pneumatic pumps installed in the recovery wells require a minimum water column of 52 inches (4.3 feet) to pump fluids. It is evident based on depth to water readings shown in the above table that the minimum column requirement is not being achieved in eight of nine pumping wells as measured in July 2005. In order to increase the groundwater removal rate the water column in the current pumping wells needs to be the increased. This can be achieved by deepening the wells by between seven and ten feet per well depending on the average lowest water column measurement. The wells can be deepened by removing the current well and re-drilling the wells to the deeper depth. Recovery wells HW-1W and HW-1E can be deepened and doing so will increase recovery from the trench by essentially creating a deeper sump at each end of the recovery trench.

The purpose of the recovery trench is to prevent off-site migration of impacted groundwater to the south. It is anticipated that the effectiveness of the recovery trench will be increased by deepening recovery wells HW-1W and HW-1E (situated at each end of the trench). In addition to deepening HW-1W and HW-1E, wells LAI-2 and LAI-3 (situated just north of the trench) will be deepened and fitted as recovery wells should off-site migration of impacted groundwater continue to be an issue following implementation of the modifications. Should LAI-2 and LAI-3 be fitted as recovery wells, the pneumatic pumps installed should be shorter in length than the pumps currently employed in the existing recovery wells. Shorter length pumps allow groundwater pumping with a water column of 37 inches (3.1 feet) versus 52 inches (4.3 feet) for the longer pumps currently employed.

In addition to deepening the wells cited above, three of the other on-site wells (RW-3, RW-5 and RW-7) should be deepened and used as contingency recovery wells to be employed should groundwater recovery efforts need to be focused in the immediate vicinity of Tank No.2. These wells were initially installed as recovery wells. Should it be necessary to include them in the network of pumping recovery wells, existing pneumatic pumps in currently employed recovery wells can be switched over and used in wells RW-3, RW-5 and/or RW-7.

In summary, a total of fourteen recovery wells will be deepened by between six and nine feet. Two of these wells, LAI-2 and LAI-3, may be subsequently fitted with pneumatic pumps should off-site migration of impacted groundwater continue to be an issue.

Treatment System Upgrades/Modifications

Upgrades and modifications will be completed to the treatment system to reduce system downtime and address ConocoPhillip's safety concerns.

The following will be completed:

- Compressor Replacement

The Campbell Hausfeld compressor currently employed as part of the treatment system has become increasingly unreliable over the past several months. It is likely that the compressor is at the end of its useful life. H2 Oil Recovery Equipment, Inc. (H2 Oil) specified an Ingersoll-Rand 7.5 hp, 230v, single phase 2-stage compressor to replace the current unit.

- Install Gauge Downstream of Surge Tank/Oil Water Separator

A flow meter will be installed on the discharge side of the transfer pump used to pump water from the surge tank to the air stripper. The purpose of this gauge is to measure flow rate into the air stripper and balance the flow into the stripper with the flow out of the stripper. The current configuration (no gauge) does not allow measurement of flow into the stripper and it is not possible to determine the reason for high alarms on the air stripper (i.e. is the high alarm due to an inbalance between inflow and outflow). The gauge will simplify adjustments to the transfer pump's flow rate and balance flow rate through the air stripper.

- Maintenance of existing downhole pumps

The existing downhole pumps are 4-inch diameter QED AP-4TL controllerless total fluids recovery pumps. The pumps were installed in February 2003. The pumps are reliable if

Costs

A spreadsheet outlining costs is provided as an attachment.

Deliverable

A report summarizing system modifications and improvements will be generated following completion of the work. The report and will consist of an explanation of site activities and boring logs detailing construction of the deepened recovery wells.

Sincerely,
SECOR International Incorporated

Marc Sauze, P.E.
Senior Engineer

Attachment 1:

Cost Spreadsheet Work Order Number 3485SEC009

Figure 1: Site Location Map
Figure 2: Site Plan With System Modifications and Wells to be Deepened

ATTACHMENT 1

INSTRUCTIONS:

NOTE! If opened from EDMS, save spreadsheet and close EDMS before using.

ASSIGN A "WORK ORDER NUMBER" USING THE NAMING CONVENTION BELOW.
4-digit "WNO" Project Number + 3-Letter Company Code + sequential 3-digit number starting with 001

FILL IN YELLOW-HIGHLIGHTED AREAS. USE "Hide Unused Prices" BUTTON TO SHRINK FORM*

(IF YOU NEED TO REVISE SPREADSHEET, USE "Unhide Unit Prices" BUTTON.)

* "Hide/Unhide" buttons work only with Excel 2000 or newer versions.
Earlier versions (e.g. Excel97) will calculate totals, but will not hide unused prices.
SAVE COMPLETED FORM IN LIVELINK UNDER "WORK ORDER NUMBER" FILE NAME.

SECOR International Incorporated
12034 134th Court Northeast, Suite 102
Redmond, WA 98052

Western Region

Work Order Number: 3485SEC009

Contractor Project Office Location	Redmond, WA
Contractor Proj. Manager	Marc Sauze
Contractor Proj. Number	01CP.003485.06
ConocoPhillips Site Manager	Marty Cramer
ConocoPhillips WNO Project Number	WNO.3485
ConocoPhillips Facility No.	3485
Facility Address	Renton Terminal
City, State, Zip	Renton, WA
Phase Start Date	08/15/2005
Est. Phase Completion Date	12/31/2005

Place X	ConocoPhillips Action Phases (Check one)		
	PHASE I. Tank Removal	X	PHASE V. Remedial Const./System Installation
	PHASE II (A1). On-site Initial Investigation		PHASE VI. Remedial System Startup
	PHASE II (A2). On-site Supplemental Investigation		PHASE VII. Remedial System O&M
	PHASE II (B1). Off-site Initial Investigation		PHASE VIII. GW Monitoring/Free Product Removal
	PHASE II (B2). Off-site Supplemental Investigation		PHASE IX. Closure/System Decommissioning
	PHASE III. Remedial Testing/CAP/Risk Assessment		PHASE X. Miscellaneous Associated Services
	PHASE IV. Remedial Design, Permitting/Remedial Well Install		

General Description of Work to be Conducted in this AWO:
System Modifications and Improvements
Scope of Work described in Work Plan for System Modifications dated August 11th 2005. Costs based on H2 Oil quote dated 8/3/2005 and Cascade Drilling Quote dated August 19th, 2005
Deepen fourteen wells to increase fluids recovery.
System modifications :
Compressor replacement, install additional guage, maintenance of existing pneumatic pumps, install wireless autodialer, re-route LNG Line.
Professional well survey based on estimate of $350
Autodialer wiring by DW Close Co., Electrical Contractor - costs based on DW Close Co. rate quote dated 3/18/05. Use site visit budgetted in previous work order for regular O&M (3485SEC004)
SECOR to retain Custom Backhoe employee as sub to help with wellhead work. Budget 4 - 8 hr days at $70/hr = $2240 + $500 for materials: Total: $2,740. Costs included in H2Oil's costs in unit 30.02
Structural Survey of Canopy covering for remediation system estimated at $2,000 costs in unit 33.03 (if needed)

NOTE: SIGNATURE BLOCK ONLY NECESSARY WHEN NOT USING ELECTRONIC APPROVAL, i.e. CORE

FOR: ConocoPhillips
BY: Marty Cramer

Appv'd: ______________ Date ______
(Signature)

Appv'd: ______________ Date ______
(Signature)

FOR: SECOR International
BY: Marc Sauze

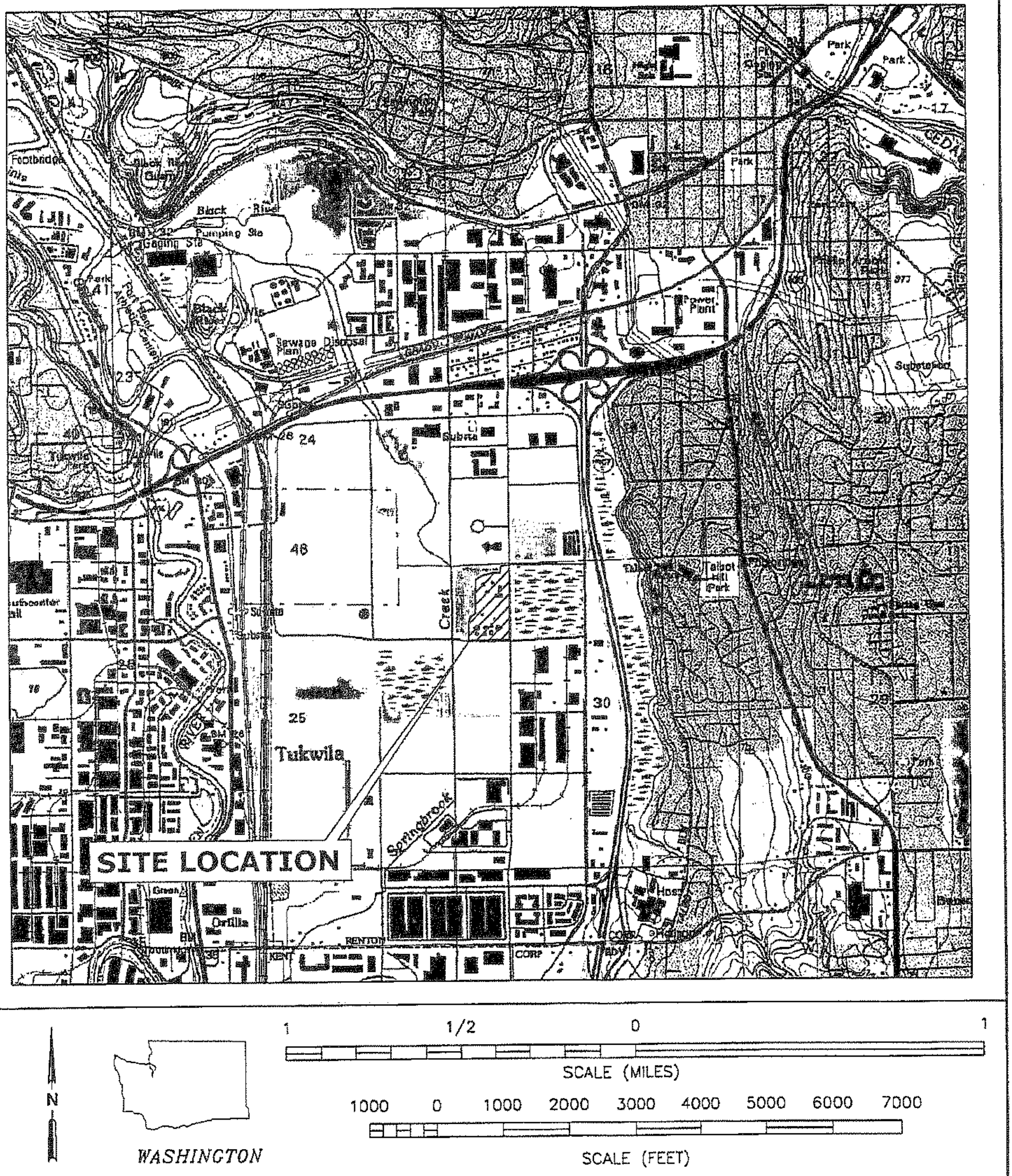
______________ Date ______
(Signature)

______________ Date ______
(Signature)

TASK	DESCRIPTION	UNIT	UNIT PRICE	NO. OF UNITS	Markup (%)	Sub Totals		SECTION TOTAL
	SECTION 01: PUBLIC RELATIONS SERVICES							
								0.00
	SECTION 02: REGULATORY OVERSIGHT SERVICES							
								0.00
	SECTION 03: SPECIAL MEETINGS AND SERVICES							
	EDD - GROUNDWATER MONITORING AND SAMPLING							
	EDD - SOIL BORING ASSESSMENT							
	EDD - GROUNDWATER MONITORING WELL ASSESSMENT							
								0.00
	SECTION 04: TRUST FUND APPLICATION PREPARATION SERVICES							
								0.00
	SECTION 05: PROJECT TRANSITION SERVICES							
								0.00
	SECTION 10: GENERAL CONSULTING SERVICES							
	GENERAL REQUIRED CONSULTING							
	REQUIRED CONSULTANT TRAVEL							
								0.00
	SECTION 11: PRE-DELINEATION ASSESSMENT SERVICES							
	STANDARD PRE-DELINEATION ASSESSMENT SERVICES							
11.02	Site Reconnaissance	per item	$ 280.00	1		280.00		
	PACKAGED PRE-DELINEATION ASSESSMENT SERVICES							
	OTHER PRE-DELINEATION ASSESSMENT SERVICES							
								280.00
	SECTION 12: DELINEATION ASSESSMENT SERVICE							
	DELINEATION ASSESSMENT CONSULTING							
12.02	Delineation Consulting (Well Construction)	per day	$ 836.00	5		4,180.00		
12.04	Delineation Consulting (Well Development 1 - 50' bgs)	per well	$ 140.00	14		1,960.00		
	OTHER DELINEATION ASSESSMENT SERVICES							
12.11	Utility Locator Service	cost plus markup		$ 150.00	3.00	154.50		
12.12	Site Visit	per event	$ 160.00	1		160.00		
12.14	Professional Survey	cost plus markup		$ 350.00	3.00	360.50		
12.15	Traffic Control Plan	per item	$ 200.00	1		200.00		
12.16	Traffic Control	per day	$ 240.00	4		960.00		
	DELINEATION ASSESSMENT REPORTS							
12.22	Delineation Assessment Report (Groundwater)	per item	$ 1,360.00	1		1,360.00		
								9,335.00
	SECTION 13: RISK EVALUATION SERVICES							
	ASTM RISK EVALUATION							
	NON-ASTM RISK EVALUATION							
	OTHER RISK EVALUATION SERVICES							
								0.00
	SECTION 14: FEASIBILITY TESTING AND REMEDIAL PLANS							
	FEASIBILITY TESTING							
	EXTENSION OF FEASIBILITY TESTING							
	OTHER FEASIBILITY SERVICES							

TASK	DESCRIPTION	UNIT	UNIT PRICE	NO. OF UNITS	Markup (%)	Sub Totals		SECTION TOTAL
	FEASIBILITY AND REMEDIAL STUDIES AND PLANS							
								0.00
	SECTION 15: REMEDIAL DESIGN SERVICES							
								0.00
	SECTION 18: CONSTRUCTION RELATED SERVICES							
								0.00
	SECTION 19: REAL ESTATE-RELATED SERVICES							
								0.00
	SECTION 20: DRILLING ACTIVITIES							
	DELINEATION ASSESSMENT METHODOLOGIES							
20.02	Well Installation	cost plus markup or lump sum per project		$ 35,202.24	3	36,258.31		
								36,258.31
	SECTION 30: REMEDIAL SYSTEM INSTALLATION SERVICES							
30.02	Field Installation Supplies	cost plus markup		$ 12,106.00	3.00	12,469.18		
30.03	Remedial Installation Oversight	per hour	$ 65.60	40		2,624.00		
								15,093.18
	SECTION 31: REMEDIAL SYSTEM START-UP SERVICES							
								0.00
	SECTION 32: REMEDIAL OVER-EXCAVATION SERVICES							
								0.00
	SECTION 33: REMEDIAL OPERATION AND MAINTENANCE SERVICES							
33.03	Operation and Maintenance Supplies	cost plus markup		$ 2,000.00	3.00	2,060.00		
								2,060.00
	SECTION 34: REMEDIAL UTILITY COSTS							
								0.00
	SECTION 39: REMEDIAL SYSTEM CLOSURE SERVICES							
								0.00
	SECTION 40: WASTE DISPOSAL SERVICES							
40.01	Non-Hazardous Water Disposal	cost plus markup		$ 750.00	3.00	772.50		
40.02	Non- Hazardous Soil Disposal	cost plus markup		$ 1,000.00	3.00	1,030.00		
40.05	Disposal Coordination and Supervising	per hour	$ 88.00	4		352.00		
								2,154.50
	SECTION 45: WASTE TREATMENT SERVICES							
								0.00
	SECTION 49: WASTE TRANSPORTATION SERVICES							
								0.00
	SECTION 50: PERMIT SERVICES							
								0.00
	SECTION 60: ANALYTICAL SERVICES							
								0.00
	SECTION 70: REMEDIATION EQUIPMENT SERVICES							
	REMEDIATION EQUIPMENT PROCUREMENT							
								0.00
	SECTION 85: SITE SPECIFIC MONITORING AND SAMPLING SERVICES							
	GROUNDWATER WELL GAUGING AND SAMPLING							
	ADDITIONAL SOIL, WATER, AND AIR SAMPLING							
	MONITORING REPORTS							
								0.00
	SECTION 90: SOIL BORINGS WITH ABANDONMENT							
	WELL INSTALLATION							
	WELL ABANDONMENT							
	MOBILIZATION / DEMOBILIZATION							
	ADDITIONAL SERVICES							
								0.00
	Work Order Total	$65,180.99						

FIGURES



REFERENCE: USGS 7.5 MINUTE QUADRANGLE; RENTON, WA; 1973

SECOR
12034 134th AVE NE
REDMOND, WA
Phone: 425.372.1600 / FAX: 425.372.1650

FOR:
FACILITY #3485
2423 LIND AVE SW
RENTON, WASHINGTON

SITE LOCATION MAP

FIGURE: 1

JOB NUMBER: 01CP.03485.05
DRAWN BY: RPE
CHECKED BY:
APPROVED BY:
DATE: 3/15/2005

FILEPATH:

FILE PATH ON LEFT

Table 1

Well	Total Depth From Ground Surface (feet)	Height of Casing Above Ground Surface(inches)	Top of Casing Elevations(feet)
LAIx-2	19.0	NA	18.73
LAIx-3	19.0	NA	18.80
LAIx-4	17.0	54	22.65
LAIx-5	15.0	59	22.51
LAIx-6	17.0	48	22.17
LAIx-7	17.0	56	22.18
LAIx-8	17.0	56	22.53
LAIx-9	17.0	58	22.39
HWx-1E	18.6	NA	18.02
HWx-1W	19.0	NA	18.50
RWx-2	17.0	59	23.11
RWx-5	17.0	60	21.91
RWx-7	17.0	45	21.65

PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:

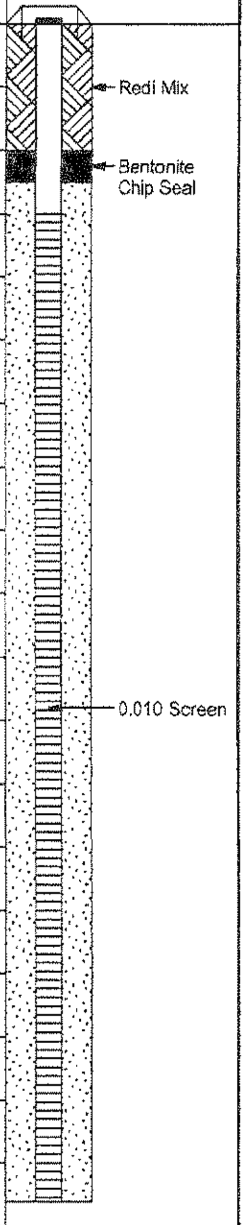
HWx-1E PAGE 1 OF 1

SECOR

DRILLING: STARTED **9/1/05** COMPLETED: **9/1/05**
INSTALLATION: STARTED **9/1/05** COMPLETED: **9/1/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **11.3 9/2/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **18.02**
BOREHOLE DEPTH (ft): **18.6**
WELL DEPTH (ft): **18.6**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
									▽	
15									15	
1400			Hole terminated at 18.6 feet.							
20									20	

GEO FORM 304 3485 RENTON.GPJ SECOR INTL.GDT 10/28/05

PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
HWx-1W PAGE 1 OF 1

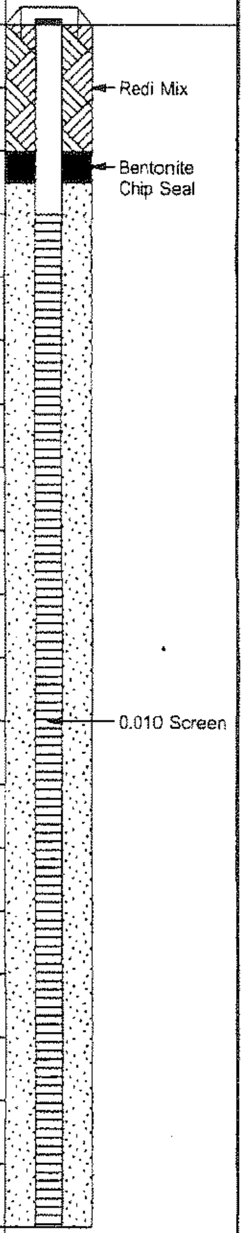
SECOR

DRILLING: STARTED **9/2/05** COMPLETED: **9/2/05**
INSTALLATION: STARTED **9/2/05** COMPLETED: **9/2/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft): **18.50**
INITIAL DTW (ft): **10.4 9/2/05**
BOREHOLE DEPTH (ft): **19.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **19.0**
WELL CASING DIAMETER (in): **4**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **MR**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)
			No Sampling						
5									5
10									10
15									15
1430			Hole terminated at 19 feet.						
20									20

Well Construction



GEO FORM 304 3485 RENTON.GPJ SECOR INTL.GDT 10/28/05

PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
LAIx-2 PAGE 1 OF 1

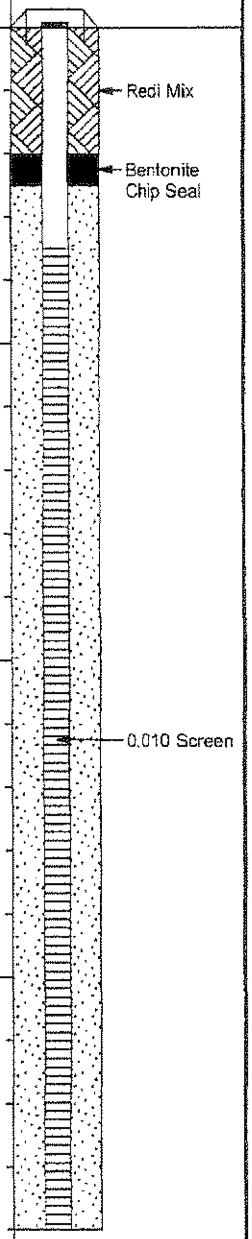
SECOR

DRILLING: STARTED **9/2/05** COMPLETED: **9/2/05**
INSTALLATION: STARTED **9/2/05** COMPLETED: **9/2/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **10.45 9/2/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **18.73**
BOREHOLE DEPTH (ft): **19.0**
WELL DEPTH (ft): **19.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10 ▽	
15									15	
8:30			Hole terminated at 19 feet.							
20									20	



PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
LAIx-3 PAGE 1 OF 1

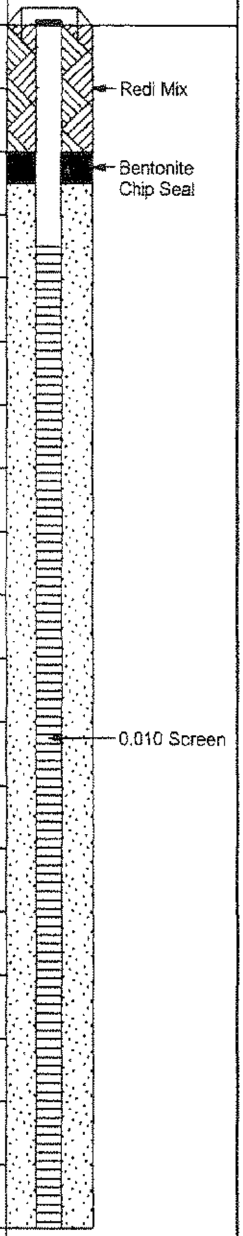
SECOR

DRILLING: STARTED **9/2/05** COMPLETED: **9/2/05**
INSTALLATION: STARTED **9/2/05** COMPLETED: **9/2/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **10.6** **9/2/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **18.80**
BOREHOLE DEPTH (ft): **19.0**
WELL DEPTH (ft): **19.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
									▽	
15									15	
9:00			Hole terminated at 19 feet.							
20									20	



PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
LAIx-4 PAGE 1 OF 1

SECOR

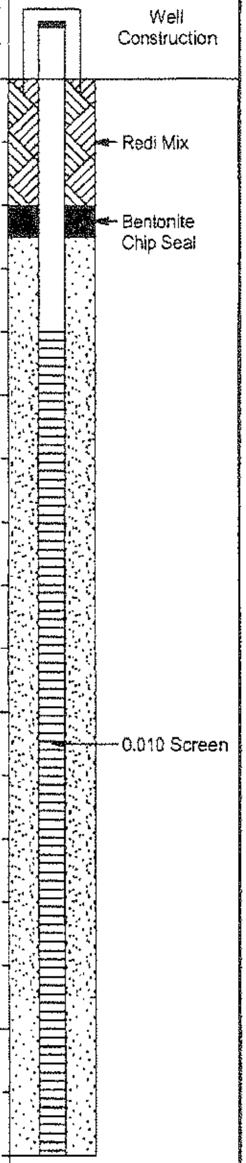
DRILLING: STARTED **8/30/05** COMPLETED: **8/30/05**
INSTALLATION: STARTED **8/30/05** COMPLETED: **8/30/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **14.3** **8/30/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **22.65**
BOREHOLE DEPTH (ft): **17.0**
WELL DEPTH (ft): **17.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)
			No sampling						
5									5
10									10
								▽	
15									15
1000			Hole terminated at 17 feet.						
20									20

Well Construction



PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
LAIx-5 PAGE 1 OF 1

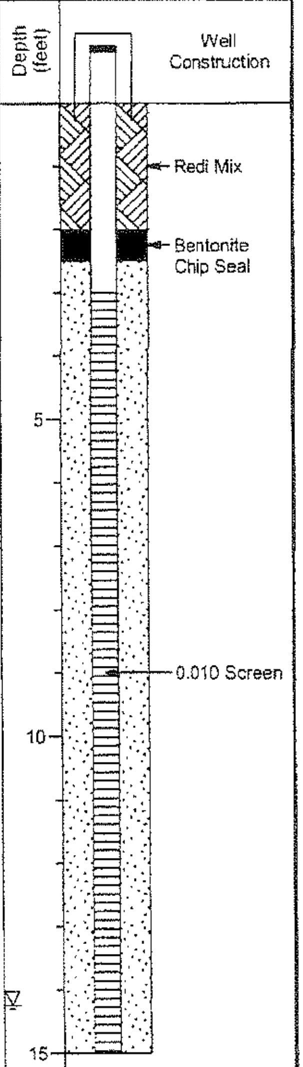
SECOR

DRILLING:	STARTED **8/30/05**	COMPLETED: **8/30/05**	
INSTALLATION:	STARTED **8/30/05**	COMPLETED: **8/30/05**	

DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):	EASTING (ft):
LATITUDE:	LONGITUDE:
GROUND ELEV (ft):	TOC ELEV (ft): **22.51**
INITIAL DTW (ft): **14.25 8/30/05**	BOREHOLE DEPTH (ft): **15.0**
STATIC DTW (ft): **NE**	WELL DEPTH (ft): **15.0**
WELL CASING DIAMETER (in): **4**	BOREHOLE DIAMETER (in): **8**
LOGGED BY: **MR**	CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
									∇	
1100 15			Hole terminated at 15 feet.						15	
20									20	



PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
LAIx-6 PAGE 1 OF 1

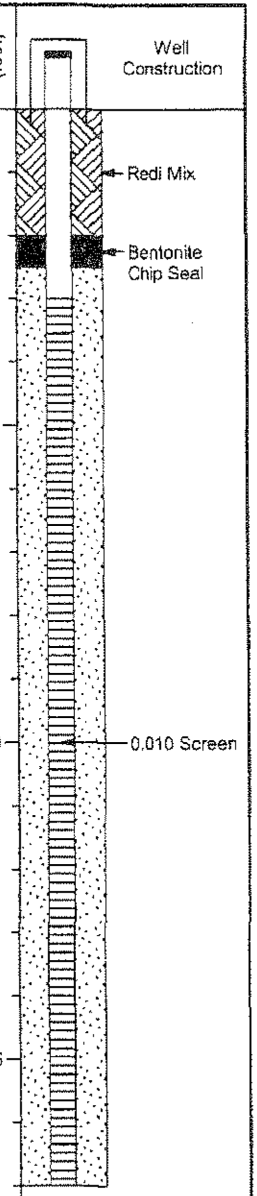
SECOR

DRILLING: STARTED **8/30/05** COMPLETED: **8/30/05**
INSTALLATION: STARTED **8/30/05** COMPLETED: **8/30/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **11.35** **8/30/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **22.17**
BOREHOLE DEPTH (ft): **17.0**
WELL DEPTH (ft): **17.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
									∇	
15									15	
1200			Hole terminated at 17 feet.							
20									20	



PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
LAIx-7 PAGE 1 OF 1
SECOR

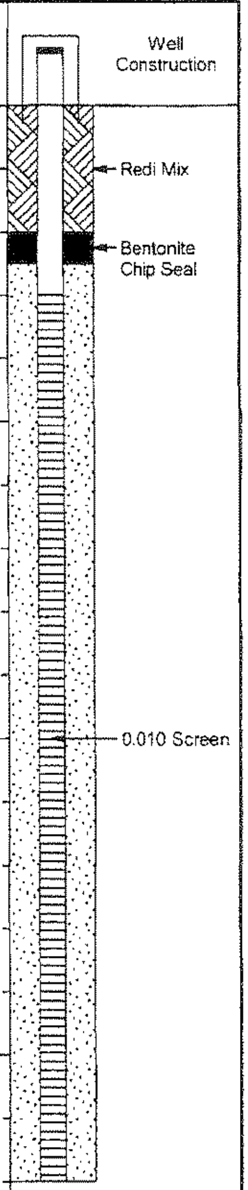
DRILLING: STARTED **8/30/05** COMPLETED: **8/30/05**
INSTALLATION: STARTED **8/30/05** COMPLETED: **8/30/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **13.94 8/30/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **22.18**
BOREHOLE DEPTH (ft): **17.0**
WELL DEPTH (ft): **17.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)
			No Sampling						
5									5
10									10
									∇
15									15
1230			Hole terminated at 17 feet.						
20									20

Well Construction



PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

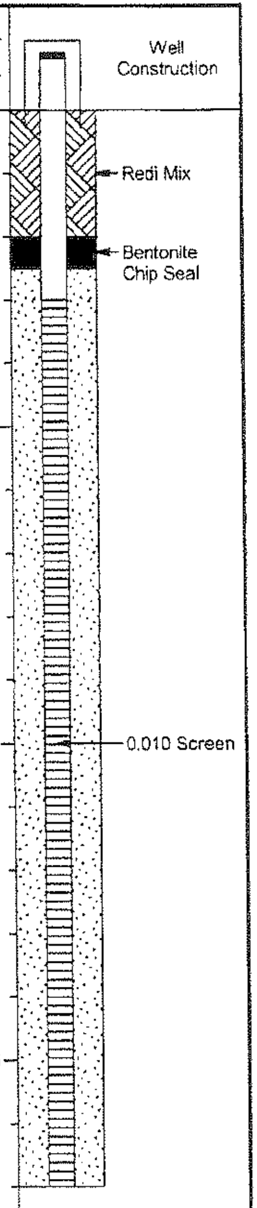
WELL / PROBEHOLE / BOREHOLE NO:
LAIx-8 PAGE 1 OF 1

SECOR

DRILLING: STARTED **8/30/05** COMPLETED: **8/30/05**
INSTALLATION: STARTED **8/30/05** COMPLETED: **8/30/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **11.85** **8/30/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **22.53**
BOREHOLE DEPTH (ft): **17.0**
WELL DEPTH (ft): **17.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
									∇	
15									15	
1300			Hole terminated at 17 feet.							
20									20	

PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
LAIx-9 PAGE 1 OF 1

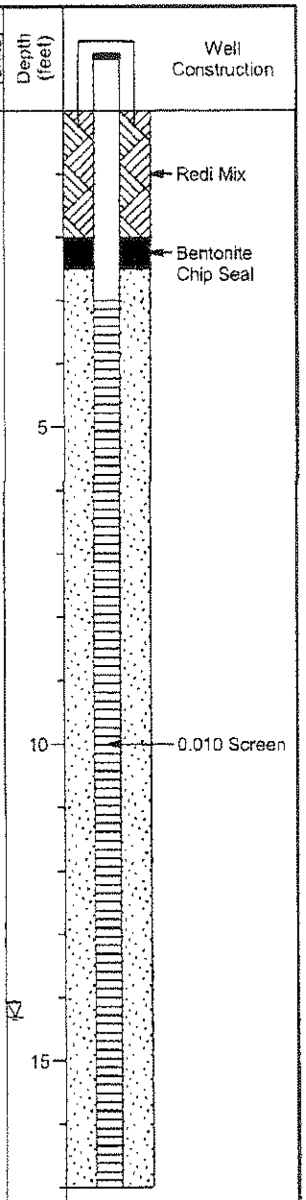
SECOR

DRILLING: STARTED **8/30/05** COMPLETED: **8/30/05**
INSTALLATION: STARTED **8/30/05** COMPLETED: **8/30/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **14.3 8/30/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **22.39**
BOREHOLE DEPTH (ft): **17.0**
WELL DEPTH (ft): **17.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
15									15	
1340			Hole terminated at 17 feet.							
20									20	



PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

WELL / PROBEHOLE / BOREHOLE NO:
RWx-2 PAGE 1 OF 1

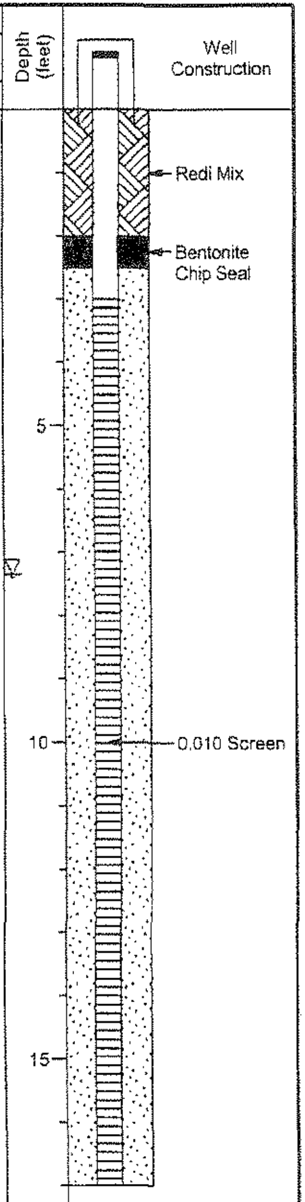
SECOR

DRILLING: STARTED **9/1/05** COMPLETED: **9/1/05**
INSTALLATION: STARTED **9/1/05** COMPLETED: **9/1/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

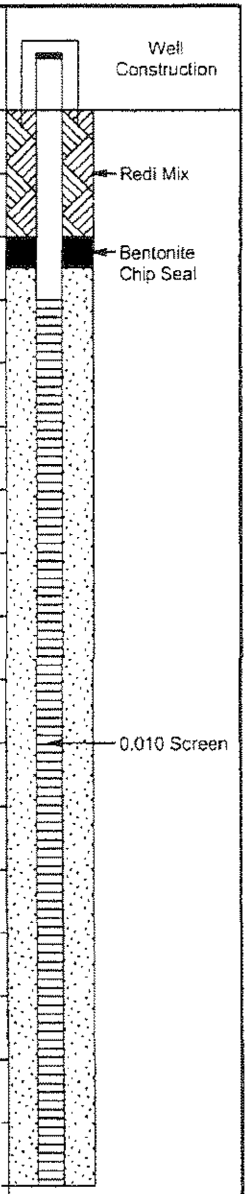
NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **7.35 9/1/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **23.11**
BOREHOLE DEPTH (ft): **17.0**
WELL DEPTH (ft): **17.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
15									15	
1500			Hole terminated at 17 feet.							
20									20	



PROJECT: **3485 Renton** LOCATION: PROJECT NUMBER: **01CP.03485.09**	WELL / PROBEHOLE / BOREHOLE NO: **RWx-5** PAGE 1 OF 1 SECOR
DRILLING: STARTED **8/31/05** COMPLETED: **8/31/05** INSTALLATION: STARTED **8/31/05** COMPLETED: **8/31/05** DRILLING COMPANY: **CDI** DRILLING EQUIPMENT: DRILLING METHOD: **HSA** SAMPLING EQUIPMENT:	NORTHING (ft): LATITUDE: GROUND ELEV (ft): INITIAL DTW (ft): **14.3** **8/31/05** STATIC DTW (ft): **NE** WELL CASING DIAMETER (in): **4** LOGGED BY: **MR**
	EASTING (ft): LONGITUDE: TOC ELEV (ft): **21.91** BOREHOLE DEPTH (ft): **17.0** WELL DEPTH (ft): **17.0** BOREHOLE DIAMETER (in): **8** CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
									∇	
15									15	
1530			Hole terminated at 17 feet.							
20									20	

PROJECT: **3485 Renton**
LOCATION:
PROJECT NUMBER: **01CP.03485.09**

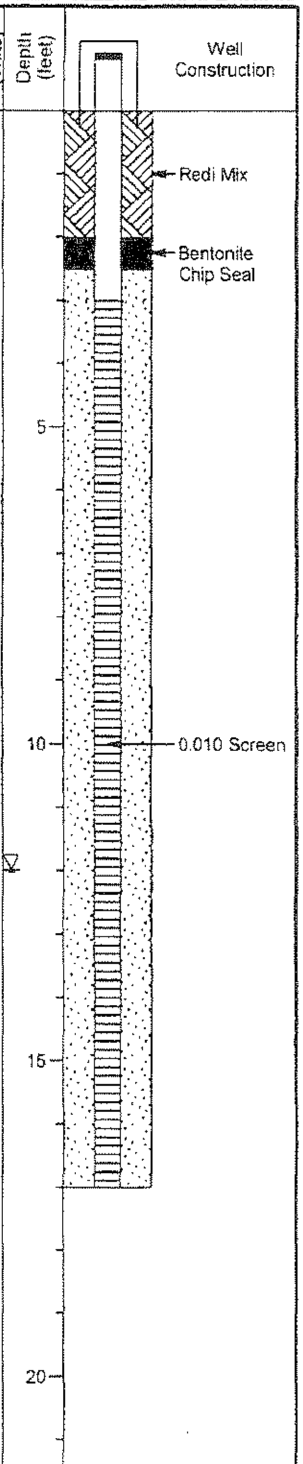
WELL / PROBEHOLE / BOREHOLE NO:
RWx-7 PAGE 1 OF 1

DRILLING: STARTED **8/31/05** COMPLETED: **8/31/05**
INSTALLATION: STARTED **8/31/05** COMPLETED: **8/31/05**
DRILLING COMPANY: **CDI**
DRILLING EQUIPMENT:
DRILLING METHOD: **HSA**
SAMPLING EQUIPMENT:

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **11.99** **8/31/05**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **4**
LOGGED BY: **MR**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft): **21.65**
BOREHOLE DEPTH (ft): **17.0**
WELL DEPTH (ft): **17.0**
BOREHOLE DIAMETER (in): **8**
CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			No Sampling							
5									5	
10									10	
15									15	
1600			Hole terminated at 17 feet.							
20									20	



TAILGATE MEETING SIGN-IN SHEETS

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date: 8·29·05

Start Time: 8:30

Issues Discussed:

1. TRAFFIC	6.
2. PPE	7.
3. HASD	8.
4. HOSP. LOCATION	9.
5. SCOPE OF WORK	10.

Attendees

Print Name and Company	Signature
MEREDITH REDMON / SECOR	
MARTY CRAMER / COP	
FELIPE J. MACIAS	
DAVE GOSS	
ZACH NEWKIRK	
Frank Scott	
Marc Saure	
RUSSELL MUELLER	
Nick Lundell	

Meeting Conducted by:	**Signature:**
Marc Saure + Meredith Redmon	

Name (Site Health and Safety Coordinator):	**Signature:**
Meredith Redmon	

ATTACHMENT 6

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date: 8/30/05

Start Time: 8:00

Issues Discussed:

1. HOSP. LOCATION	6.
2. PPE	7.
3. SLIPS / TRIPS / FALLS	8.
4. CHEMICALS OF CONCERN	9.
5. UNEVEN Footing.	10.

Attendees

Print Name and Company	Signature
MEREDITH REDMON / SECOR	MK
ZACH NEWKIRK / CDI	
Frank Scott / CDI	F Scott
MARTY CRAMER	
Marc Saure / SECOR	
GARY ANDERSON / COP	
DAVE GOSE / CASCADE	

Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

ATTACHMENT 6

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date: 8/31/05

Start Time: 7:40

Issues Discussed:

1. HOSP. LOCATION	6.
2. PPE	7.
3. CRANE OP.	8.
4. SLIPS / TRIPS / FALLS	9.
5. CHEMICALS OF CONCERN	10.

Attendees

Print Name and Company	Signature
Frank Scott CDI	
Brian Gose CDI	
Kurt Wilson NESS	
Andrew Middendorf Ness	
FELIPE J. MACIAS, TCS	
GARY ANDERSON	
DAVE GOSE	
Max Saure	

Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

ATTACHMENT 6

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date: 9/1

Start Time: 7:30

Issues Discussed:

1. HOSP LOCATION
2. PPE
3. HASP
4. TRAFFIC
5. SLIPS / TRIPS / FALLS
6.
7.
8.
9.
10.

Attendees

Print Name and Company	Signature
Frank Scott CDI	
Kurt J. Wilson Ness	
Andrew P. Middendorf Ness	
FELIPE J. MACIAS TCS	
GARY ANDERSON DOP	
DAVE GOSE CASCADE DRILLING	
MEREDITH REDMON / SECOR	

Meeting Conducted by: MEREDITH REDMON **Signature:**

Name (Site Health and Safety Coordinator): MR **Signature:**

ATTACHMENT 6

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date: 9/2

Start Time: 7:30

Issues Discussed:

1. HOSP. LOCATION	6.
2. PPE	7.
3. STOP WORK	8.
4. HASP.	9.
5.	10.

Attendees

Print Name and Company	Signature
DAVE GOSE CASCADE DRILLING	
FELIPE J. MACIAS	
Bob Terlotta CDI	
Frank Scott CDI	F.
MEREDITH REDMON / SECOR	Meredith Redmon
August Wolth / SECOR	
Kattie Hansen	Katie Hansen
Richard W Pearl / CDI	Richard W Pearl

Meeting Conducted by: MK	**Signature:** MK
Name (Site Health and Safety Coordinator): MK	**Signature:** MK

ATTACHMENT 7

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

(All SECOR and subcontractor personnel must sign.)

"Zero Tolerance for Incident of ANY Kind. Work Together to Ensure A SAFE and High Quality Project

This Health and Safety Plan has been developed for the purpose of informing SECOR employees of the hazards they are likely to encounter on the project site, and the precautions they should take to avoid those hazards. Sub-contractors and other contractors at the site must develop their own Health and Safety Plan to address the hazards faced by their own employees. SECOR has provided a copy of this Plan to contractors in the interest of full disclosure of hazards of which we may be aware, and to satisfy SECOR's responsibilities under the Occupational Safety and Health Administration (OSHA) Hazard Communication standard. Similarly, contractors are required to inform SECOR of any hazards of which they are aware or that the contractor's work on site might possibly pose to SECOR employees, including (but not limited to) the Material Safety Data Sheets for chemicals the contractor may bring on-site. This plan should NOT be understood by contractors to provide information on all of the hazards to which a contractor's employees may be exposed as a result of their work.

I further certify that I have received training and medical surveillance according to the Health and Safety Plan and the OSHA Standard on Hazardous Waste Operations and Emergency Response (29 CFR 1910.120):

All parties conducting site activities are required to coordinate their activities and practices with the project Site Health and Safety Officer. Your signature below confirms that you have read and understand the hazards discussed in this Plan, and understand that sub-contractors and contractors must develop their own Health and Safety Plan for their employees. You also understand you could be prohibited by the Site Health and Safety Officer or other SECOR personnel from working on this project for not complying with any aspect of this Health and Safety Plan.

Name	Title	Signature	Company	Date
Mar Sare	ENGINEER		SECOR. International	8/29/2005
MEREDITH REDMON	STAFF		SECOR	8/29/05
Frank Scott	Driller		CDI	8/29/05
ZACH NEWKIRK	LABORER		CDI	8/29/05
DAVE GOSE	DRILLER		CASCADE	8-29-05
FELIPE J. MACIAS	FLAGGER		TCS	8-29-5

Name	Title	Signature	Company	Date
MARTY CRAMER	SITE MAN		COP	8-29-05
RUSSELL MUELLER	OILER		NESS CRANE	8-29-05
Nick Lundell	Driver	Nick Lundell	NESS CRANE	8-29-05
Kurt J. Wilson	operater		NESS crane	8-29-05
August Welch	Consulting Staff		SECOR	9/2/05
Kaitlin Hansen	Staff		SECOR	9-2-05
Richard W Pearl	Vac Operator	Richard W Pearl	CDI	9-2-05

APPENDIX F

CONOCOPHILLIPS OPERATIONS AND MAINTENANCE REPORT
(STANTEC, 1/15/09)

Stantec Consulting Corporation
12034 134th CT NE Suite 102
Redmond, WA 98052
Tel: (425) 372-1600
Fax: (425) 372-1688

DATE: January 15, 2009

CONOCOPHILLIPS OPERATIONS AND MAINTENANCE REPORT

ConocoPhillips Facility No.: 3485 Address: 2423 Lind Avenue, Renton, Washington
ConocoPhillips Project Manager: Edward Ralston (RM&R 3485)
Consulting Co. / Contact Person: Stantec / Joseph Rounds
Consultant Project No.: 01CP.03485.67
Primary Agency / Regulatory ID No.: Ecology Identifier No. 2070

System Type: Dual Phase Extraction and Groundwater Pump & Treat

WORK PERFORMED THIS QUARTER [Fourth– 2008]:

Introduction

This status report provides a summary of remediation activities conducted from October through December 2008, at the ConocoPhillips bulk petroleum distribution terminal in Renton, Washington (site). Remediation activities conducted at the site and documented in this report are related to the 14,800-gallon petroleum product release, which occurred in November 2002. The petroleum release was reported to the Washington State Department of Ecology (Ecology) on November 14, 2002. Washington Ecology's file number for this site is 2070.

Site Description

The site is an active bulk petroleum distribution terminal located at 2423 Lind Avenue SW in Renton, Washington (Figure 1). There are currently seven above ground product storage tanks located in the tank farm at the site (Figure 2), which store premium and regular unleaded gasoline, diesel fuel, and ethanol. Smaller gasoline and diesel additive tanks are also located in the tank farm. Each product tank is surrounded by concrete block walls which are approximately 3 feet high. The entire tank area is surrounded by an earthen containment berm which provides secondary surface spill containment. Surface drainage in the tank area is controlled by a series of gate valves in the concrete containment walls, which are capable of directing flow to a sump in the western portion of the tank area. A large portion of the surface drainage water infiltrates through the earthen material surrounding the tanks and recharges the shallow groundwater table.

Summary of Routine Operations and Maintenance Activities

- On October 2, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. Vapor readings were within permit parameters. The system was operational upon arrival and departure.

- On October 6, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. The system was down upon arrival due to OWS/batch tank high level alarm. The system was inspected, changes made, then restarted. Vapor readings were taken and within permit parameters. The system was operational upon departure.

- On October 10, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. Vapor readings were within permit parameters. The system was operational upon arrival and departure.

- On October 13, 2008, Stantec personnel were onsite to perform monthly operations and maintenance activities. The monthly maintenance activities included recording operation parameters, checking filter on knock out drum, collection of SVE Influent, Total influent, Mid 1, Mid 2, and Total Effluent vapor samples and collection of Influent, Air Stripper Effluent, Mid 1, and Effluent water samples. The system was operational upon arrival and departure.

- On October 16, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. Additional duties included replacing malfunctioning gauges, adding sampling port to carbon vessels, and replacing particulate filters in the water treatment system. Vapor readings were within permit parameters. The system was operational upon arrival and departure.

- On October 20, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. Vapor readings were within permit parameters. The system was operational upon arrival and departure.

- On October 23, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. Vapor readings were within permit parameters. The system was operational upon arrival and departure.

- On October 27, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. Vapor readings were within permit parameters. The system was operational upon arrival and departure.

- On October 30, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. First vapor phase carbon vessel was spent and removed from service. Carbon vessels 2 and 3 were rotated up in line and a vessel with fresh vapor phase carbon placed in the third position. Liquid particulate filters were replaced in the groundwater treatment system. Vapor readings were within permit parameters. The system was operational upon arrival and departure.

- On November 3, 2008, Stantec personnel were onsite to replace site tubes and pressure wash the air stripper and particulate filter housings to remove particulate build up and improve efficiency.

- On November 10, 2008, Stantec personnel were onsite to perform monthly operations and maintenance activities. The monthly maintenance activities included recording operation parameters, checking filter on knock out drum, collection of SVE Influent, Total influent, Mid 1, Mid 2, and Total Effluent vapor samples and collection of Influent, Air Stripper Effluent, Mid 1, and Effluent water samples. The system was down upon arrival due to OWS/product tank high level alarm. The system was inspected, changes made, then restarted. The system was operational upon departure.

- On November 18, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. The system was down upon arrival due to an air stripper or settling tank high level alarm. The system was inspected, changes made, then restarted. Vapor readings were taken and found to be within permit parameters. The system was operational upon departure.

- On November 24, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. The system was down upon arrival due to an air stripper or settling tank high level alarm. The system was inspected, changes made, then restarted. Vapor readings were taken and found to be within permit parameters. The system was operational upon departure.

- On December 8, 2008, Stantec personnel were onsite to perform a remediation system vapor check and record operational parameters. The system was down upon arrival due to the drive belt failure on the air compressor. Stantec personnel reattached and properly tightened the drive belt. The system was restarted and monitored to ensure proper operation. Vapor readings were taken and found to be within permit parameters. The system was operational upon departure.

- On December 15, 2008, Stantec personnel were onsite to perform the monthly operations and maintenance activities. The monthly maintenance activities include recording operation parameters, collecting vapor and water samples. The remediation system was down upon arrival due to an air stripper high level alarm. This alarm was caused by below freezing temperature conditions that froze the entire groundwater treatment system solid. Stantec personnel were unable to collect any vapor or water samples or record any operational parameters. Due to the freezing conditions, several components of the system failed. Stantec personnel disconnected hoses to try to minimize any further damage to system components and pumps. Stantec personnel followed all lines to tank farm area to visually inspect for damage within that area. No visual damage was witnessed in the tank farm. The system was left off upon departure until the repairs can be made.

- On December 29, 2008, Stantec personnel were onsite to evaluate the damage to the remediation system from the freezing weather conditions. Several hoses, valves, and pipe fittings were found compromised. The containment compound has standing water in it that will need to be removed before repairs can be made. The system was left off upon departure.

Remedial Components

Remediation of the November 2002 gasoline release was initiated on November 17, 2002. Since the initiation of remedial efforts, a combination of methods: surface water and groundwater/LPH pumping using diaphragm pumps; LPH removal using hand bailing methods; groundwater/LPH pumping using down hole pneumatic pumps; and soil vapor extraction/LPH volatilization using a dual phase vacuum extraction (DPVE) system have been utilized in the vicinity of Tank 2. The groundwater treatment components of the remediation system were initially situated inside the tank farm containment area and were relocated to a location outside the tank farm containment area during first quarter 2005. System modifications and improvements were completed and coincided with the system relocation. The current process and instrumentation diagram configuration of the remediation system at the site is provided in Figure 3.

Dual Phase Vacuum Extraction System

The DPVE component was installed and activated in February 2003. The oxidizer unit was modified from thermal mode to catalytic mode in November 2003 since the catalytic oxidizer would operate with greater efficiency at a lower combustion temperature and require less supplemental fuel (propane).

Based on influent concentrations, the catalytic oxidizer was removed and replaced with a positive displacement blower and three 2,000 pound vapor phase carbon vessels in series in November 2006. The DPVE system utilizes a positive displacement blower to apply a vacuum to six vertical recovery wells (labeled LAIx-4, LAIx-5, LAIx-7, LAIx-8, LAIx-9, and RWx-2).

The treated vapors from the DPVE and the air stripper are discharged in accordance with the modified Notice of Construction (NOC) No. 9648 issued by the Puget Sound Clean Air Agency (PSCAA).

The DPVE system was in operation from October through December 15, 2008. The DPVE system was turned off in December due to freezing weather conditions. DPVE system operation parameters are included in Table 1. Field notes are provided in Appendix A.

Groundwater Extraction System

During the reporting period, dedicated downhole pneumatic pumps were operating at wells LAIx-4, LAIx-5, LAIx-6, LAIx-7, LAIx-8, LAIx-9, RWx-2, HWx-1E, and HWx-1W. The groundwater extraction (GWE) system consists of an oil/water separator, product holding tank, batch tank, air stripper, settling tank, particulate filter, and two 1000 lb. granular activated carbon filtration vessels in series. Treated groundwater is discharged to the sanitary sewer under the limits of King County Wastewater Discharge Authorization No. 4057-02.

The GWE system operated consistently from October through December 15, 2008. During the operational period, the GWE system was shut down only periodically for equipment repair and carbon change outs.

The GWE system was in operation for approximately 1,273 hours from October to December, 2008. GWE system operational parameters are included in Table 1. Field notes are provided in Appendix A.

Vapor System Sampling

Air samples were collected by Stantec from the DPVE influent and air stripper effluent as well as the total influent, mid 1, mid 2, and effluent sampling ports of the vapor phase carbon vessels on October 13 and November 10, 2008.

Samples were collected in 1-liter Tedlar™ bags. Samples were screened for volatile organic compounds (VOCs) using a portable photoionization detector (PID) meter. Samples were taken to Test America in Bothell, WA under chain-of-custody documentation. Vapor samples were analyzed for BTEX by EPA Method 8021B and TPH-G by NWTPH-g modified. Influent and effluent analytical results are summarized in Table 2. Analytical reports are provided in Appendix B.

Groundwater Treatment System Sampling

The wastewater discharge permit in effect for the treatment system requires that semiannual samples be collected and results reported annually. Water samples were collected on October 13 and November 10, 2008 from the oil water separator effluent, the air stripper effluent, between the water treatment carbon vessels, and at the system effluent.

Samples when taken, are submitted to Lancaster Laboratories for analysis of gasoline range hydrocarbons (TPH-g) per Ecology Method NWTPH-Gx, diesel (TPH-d) and heavy-oil (TPH-o) range hydrocarbons per Ecology Method NWTPH-Dx with an acid/silica gel cleanup and benzene, toluene, ethyl benzene, and total xylenes (BTEX) per United States Environmental Protection Agency (USEPA) Method 8021B. Analytical results are summarized in Table 3. The laboratory analytical reports are provided in Appendix B.

LPH Removal

Approximately 0 gallons of product was removed by the oil water separator between October and December 2008.

Dissolved Phase Gasoline Removal

Between October and December 2008, approximately 161,780 gallons of groundwater were treated and discharged to the sanitary sewer. This estimate is based on totalizer meter readings taken on September 29, 2008 (1,806,350 gallons) and December 8, 2008 (1,968,130 gallons).

Analytical results from the influent sampling port after the oil water separator indicate a TPH-g concentration of 80 milligrams per liter (mg/l) on October 13, 2008 and 26 mg/l on November 10, 2008 sampling events. Based on a total volume of 161,780 gallons of water, it is estimated that 73.8 lbs of gasoline were removed by the groundwater recovery system between September 29, 2008 and December 8, 2008. Assuming a conversion rate of 6.17 lbs of gasoline per gallon, an estimated 11 gallons of gasoline were removed between October and December, 2008

Vapor Phase Gasoline Removal

Hour-meter readings for the DPVE system indicate that the system operated approximately 1,221.1 hours (50.9 days) between October and December, 2008 and a total of 29,124.3 hours (1,213.5 days) since system start up on February 12, 2003. Periodic influence vapor sampling of the DPVE system indicates that the DPVE system has removed approximately 139 lbs (22 gallons) of gasoline between October and December, 2008 (Table 4).

Total Volume of Gasoline Removed

Based on the above information, approximately 12,807.92 gallons of gasoline have been recovered since the initial release of 14,800 gallons of super-unleaded gasoline on November 13, 2002. The total volume of gasoline recovered is comprised of the following:

RECOVERY METHOD	GALLONS OF RECOVERED GASOLINE
Recovery Efforts Prior to October 2008: (as reported in previous status reports)	12,774.92
LPH Recovery (Oct. – Dec., 2008)	0
Dissolved Phase Recovery (Oct. – Dec., 2008)	11
Vapor Phase Recovery (Oct. – Dec., 2008)	22
Estimated Total Gasoline Recovered	12,807.92

Remediation System Effectiveness

The DPVE remediation system has continued to be effective in removing mass from the recovery wells around Tank 2. The influent benzene and TPH-g water levels are plotted in attached Graph 1 and 2, respectively, and show a consistent influent concentration level. The influent benzene and TPH-g vapor levels are plotted in attached Graph 3 and 4, respectively, and show a consistent influent concentration level.

Permit Compliance

A wastewater discharge authorization (No. 4057-02) was issued on June 1, 2008 by King County Wastewater Treatment Division. The permit limits the daily water discharge from the remediation system to 8,000 gallons per day and requires that the discharged water meet concentration limits of 130 ug/L for benzene, 1,500 ug/L for toluene and 1,400 ug/L for ethylbenzene. Water sampling was conducted on October 13 and November 10, 2008. The results of the sampling (Table 3) indicates that the system has not exceeded any of the regulatory threshold limits for any of the constituents during the reporting period.

An air discharge Notice of Construction (NC # 9648) was issued on June 29, 2007 by Puget Sound Clean Air Agency. The permit limits the air flow to 400 cubic feet per minute (CFM) and requires that the discharged air meet concentration limits of 30 parts per million by volume (ppmV) of TPH-g. Vapor sampling of the treatment system was conducted on October 13 and November 10, 2008. The results of the sampling (Table 2) indicates that the system has not exceeded any of the regulatory threshold limits for any of the constituents during the reporting period.

Based on the results for both the water and vapor sampling, the DPVE system operated within compliance of the water and air discharge permits.

WORK PROPOSED FOR NEXT QUARTER [First – 2009]:

- Repair the damages system components from the December 2008 freezing weather conditions.
- Continue to monitor the system operational performance and perform routine operations and maintenance activities on a weekly basis.
- Collect influent and effluent vapor and water samples.

ATTACHMENTS:

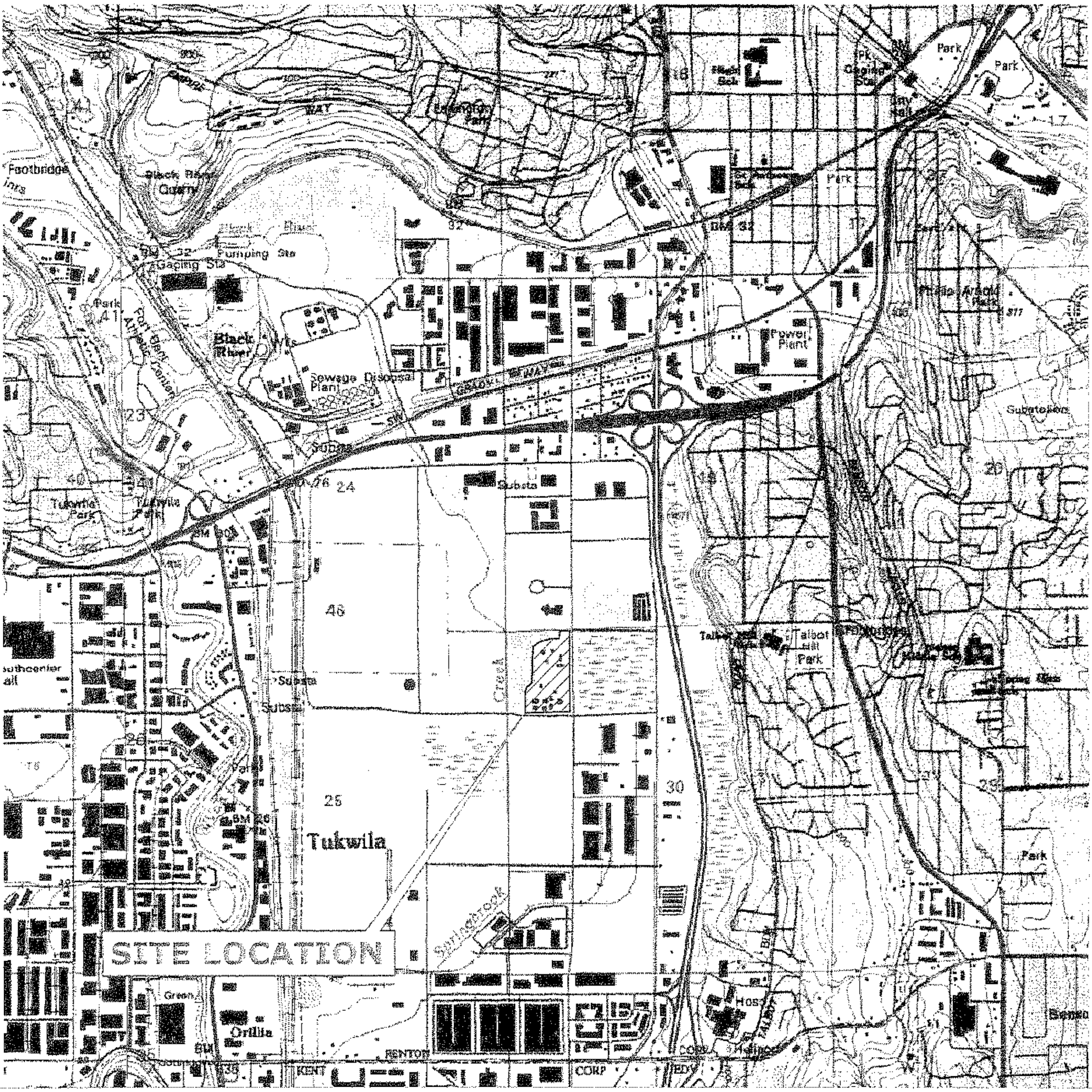
Prepared By:

Linda Rawlins
Staff Engineer

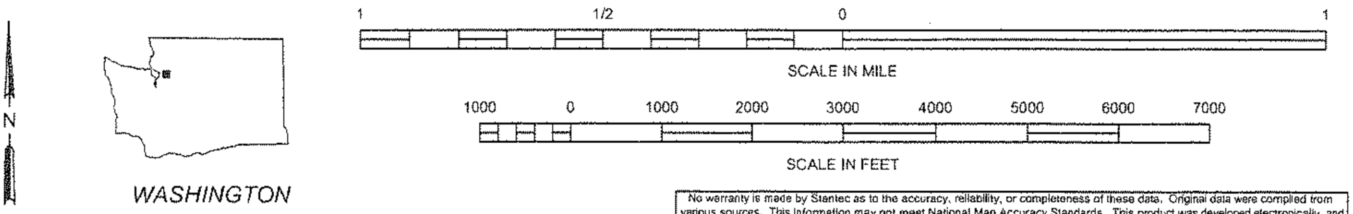
Reviewed By:

Joseph Rounds
Senior Project Manager

FIGURES



REFERENCE: USGS 7.5 MINUTE QUADRANGLE; RENTON, WA; 1973



Stantec
12034 134th AVE NE
REDMOND, WASHINGTON
PHONE: 425.372.1600 / FAX: 425.372.1650

FOR:
ConocoPhillips
FACILITY #3485 (RM & R 3485)
2423 LIND AVE SW
RENTON, WASHINGTON

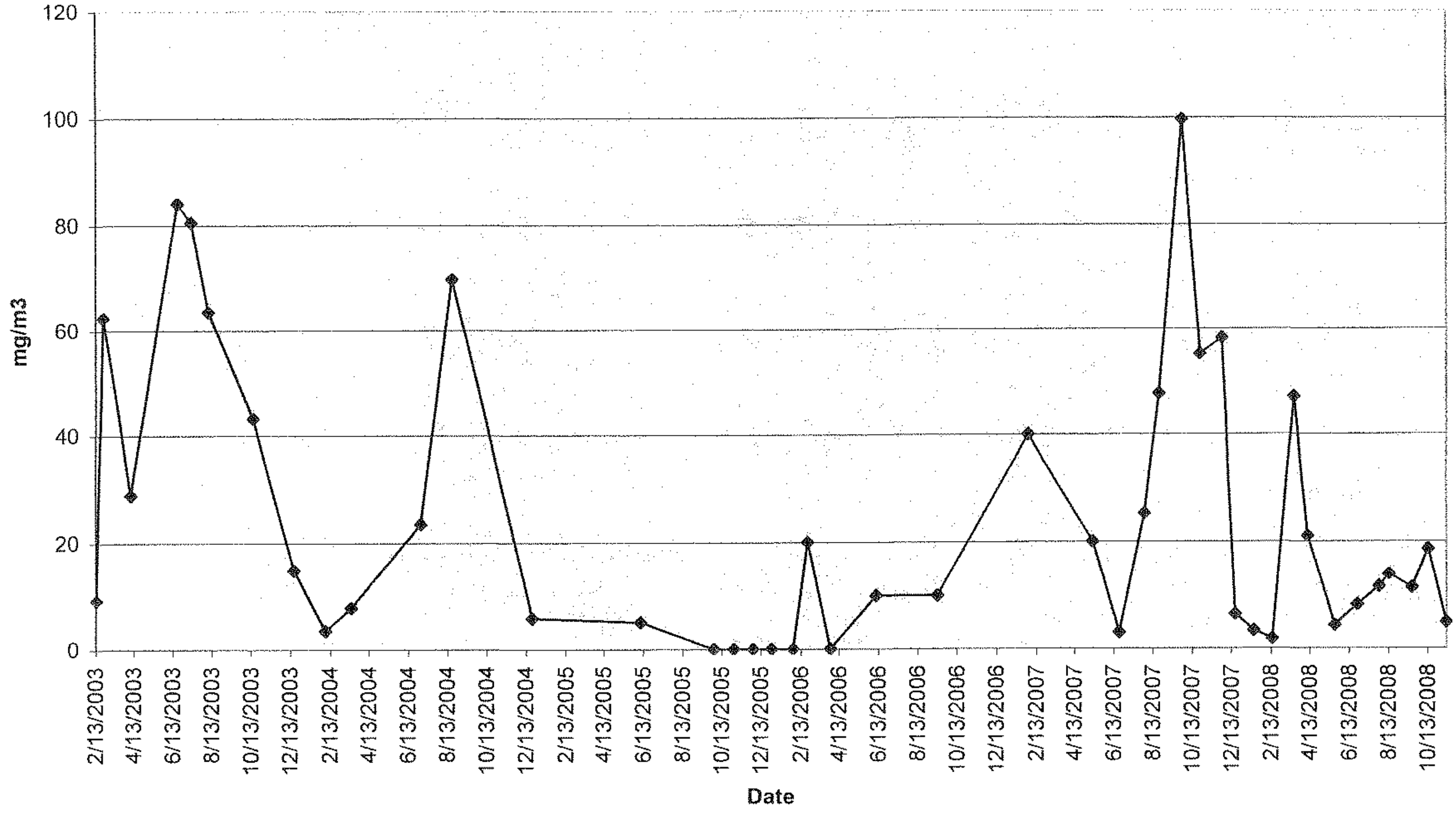
SITE LOCATION MAP

FIGURE:
1

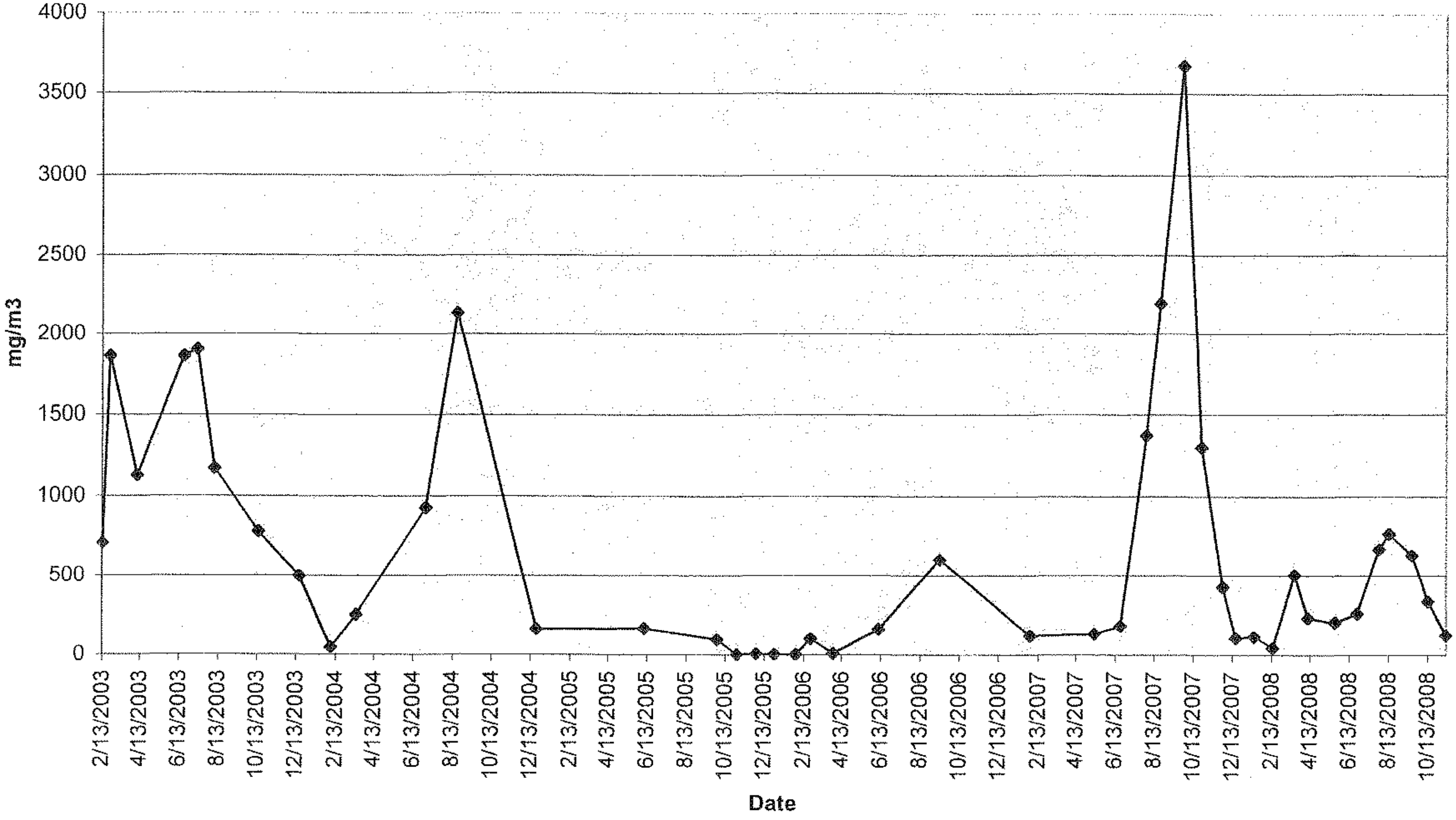
JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
01CP.03485.03	JCR			07/13/07

GRAPHS

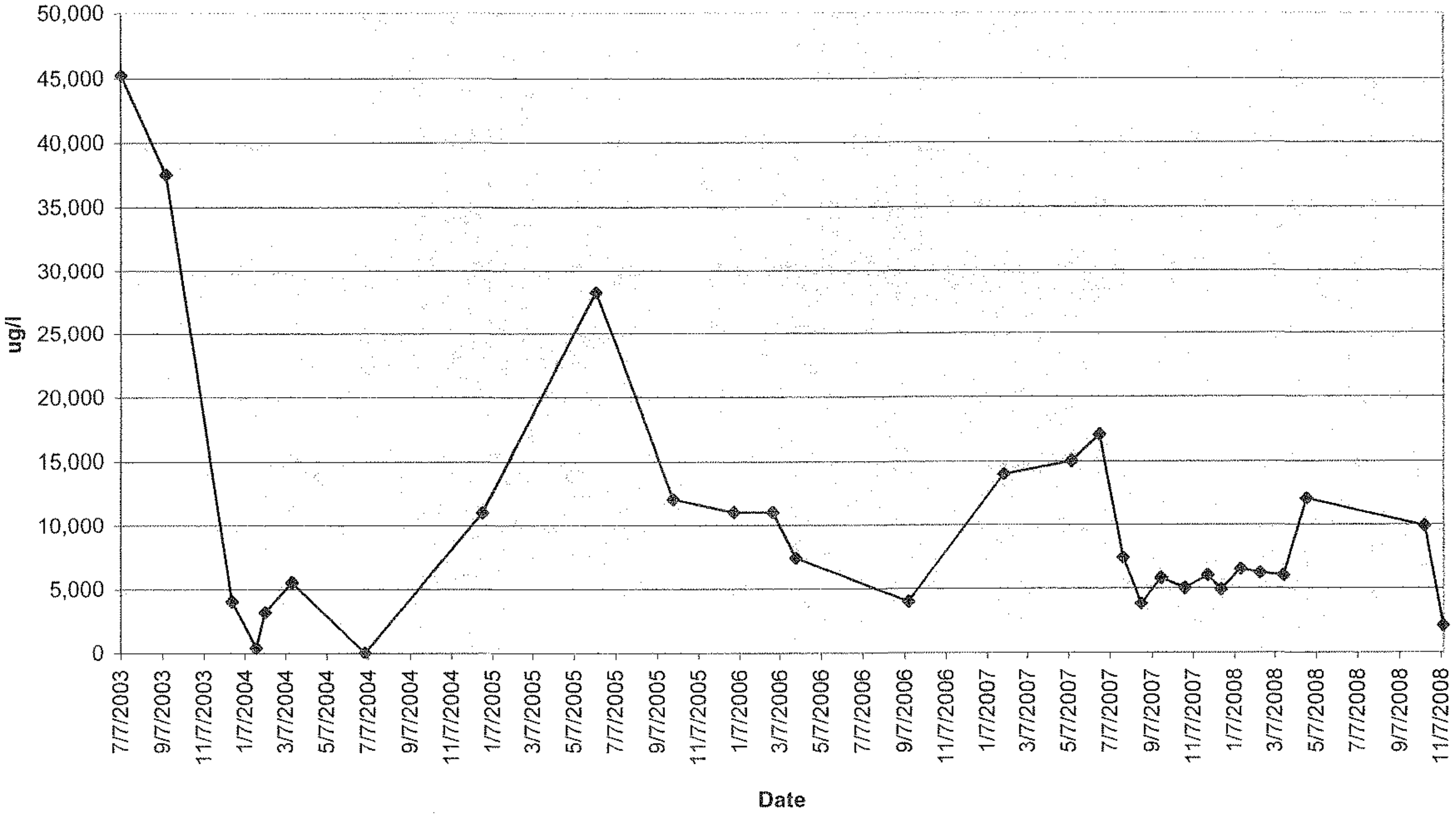
GRAPH 1
Benzene Influent Vapor Levels
ConocoPhillips Renton Terminal RM&R 3485



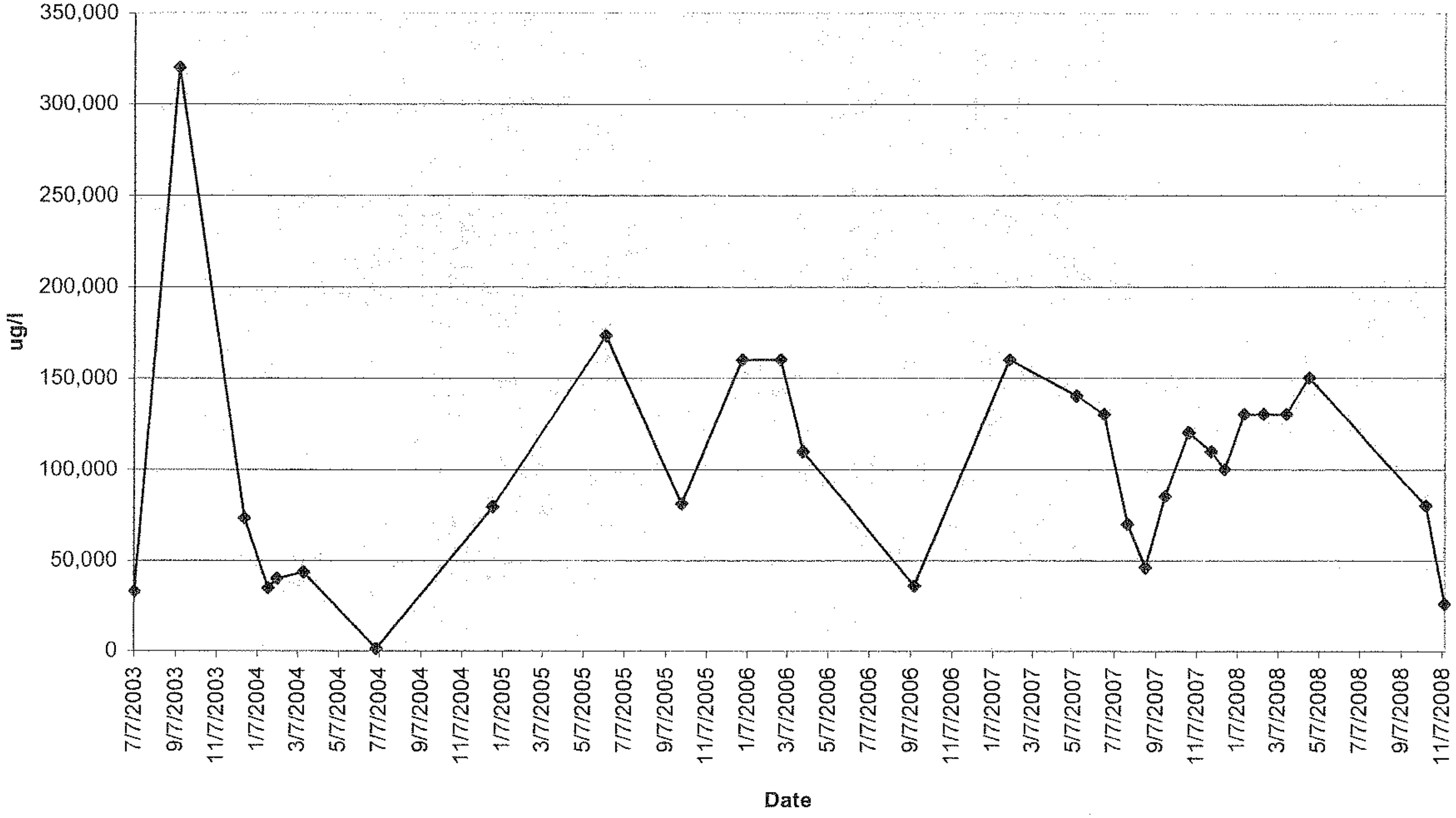
GRAPH 2
TPH-g Influent Vapor Levels
ConocoPhillips Renton Terminal RM&R 3485

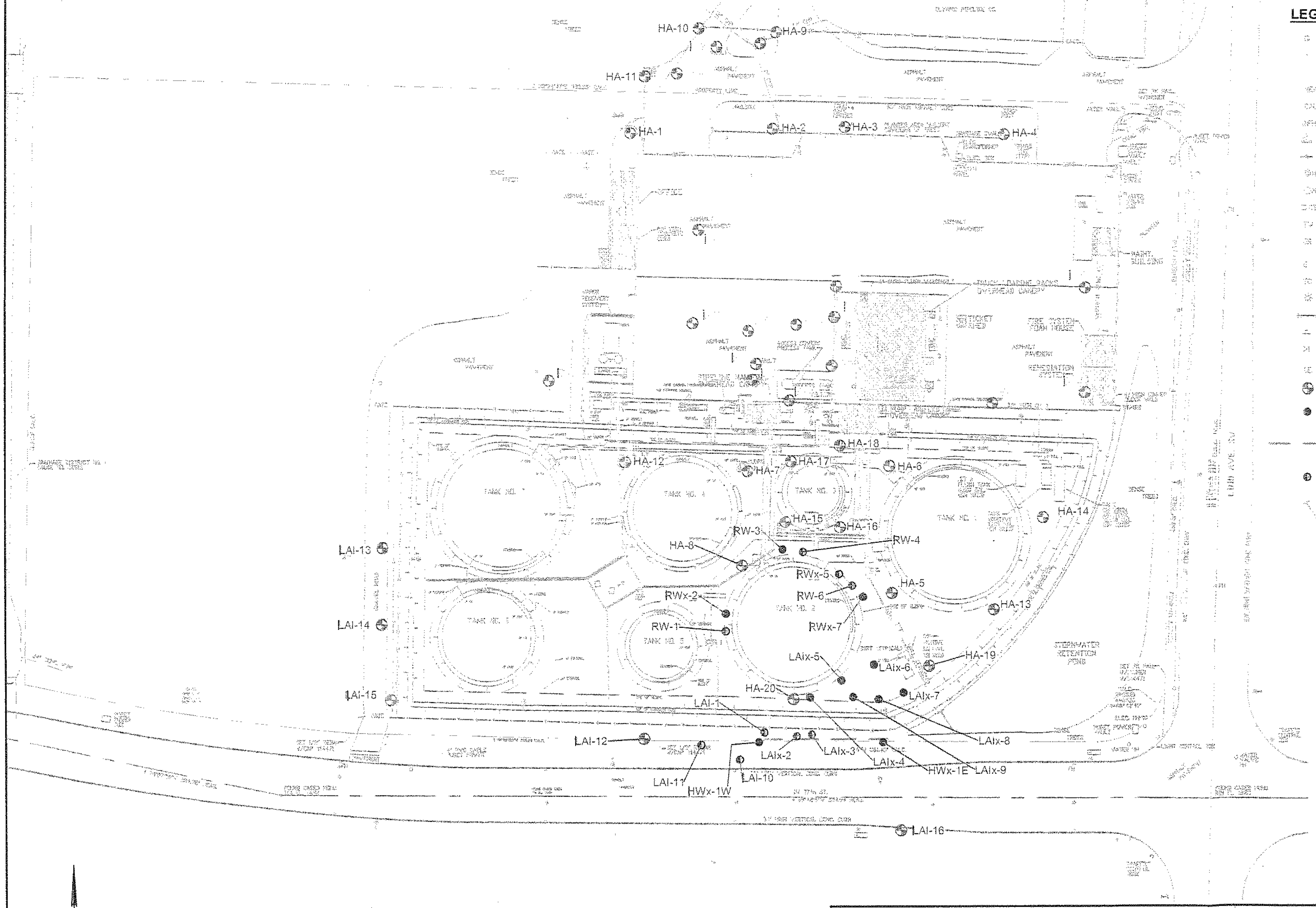


GRAPH 3
Benzene Influent Water Levels
ConocoPhillips Renton Terminal RM&R 3485



GRAPH 4
TPH-g Influent Water Levels
ConocoPhillips Renton Terminal RM&R 3485





N

0 80 160

Scale in Feet

LEGEND

- FOUND CASED MONU. OR MONU. AS NOTE
- SET 1/2" REBAR W/CAP #14471 OR AS NOTE
- SET TACK IN LEAD PLUG
- MEASURED
- CALCULATED
- FIRE HYDRANT
- AERIAL PANEL POINT
- UTILITY POLE
- STORM DRAIN MANHOLE
- MANHOLE
- CATCH BASIN
- TOP WALL
- GRADE
- GUTTER
- TOP CURB
- LIGHT
- FENCE LINE
- SIGN
- WATER VALVE
- INVERT ELEVATION
- MONITORING WELL
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- HORIZONTAL GROUNDWATER EXTRACTION TRENCH
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- STORMWATER RETENTION CONTAINMENT BERM

Note

1. Updated from Matrix Technologies, Inc Drawing 10015-P-15, Dated 11/01/91.

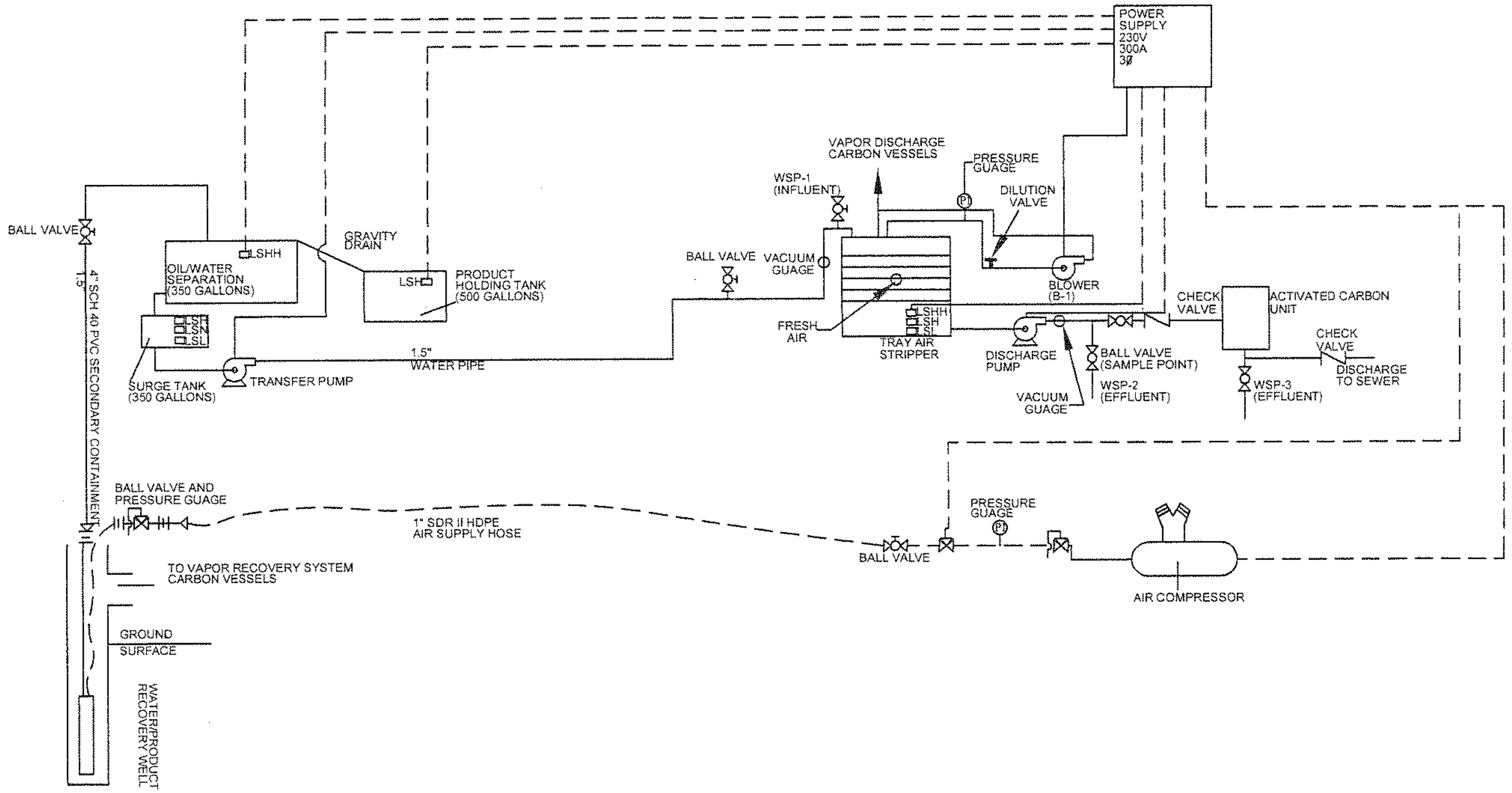
Stantec
12034 134th AVE NE
REDMOND, WASHINGTON

FOR:
ConocoPhillips
FACILITY #3485 (RM & R 3485)
2423 LIND AVE SW
RENTON, WASHINGTON

SITE PLAN

FIGURE:
2

JOB NUMBER:
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:



NOT TO SCALE

Stantec
12034 134th AVE NE
REDMOND, WASHINGTON

FOR:
ConocoPhillips
FACILITY #3485 (RM & R 3485)
2423 LIND AVE SW
RENTON, WASHINGTON

GROUNDWATER TREATMENT SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM

FIGURE:
3

JOB NUMBER:
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

TABLE 1
DUAL PHASE EXTRACTION SYSTEM
OPERATOR LOG SHEET SUMMARY
CONOCOPHILLIPS RENTON TERMINAL

Soil Vapor System							Groundwater Treatment System						
				Total VOCs (ppm w/ PID)									
Date	Vapor Hourmeter	Total Vacuum Reading (in. H2O)	Total Flowrate (cfm)	Influent	Effluent	Laboratory Sample Collected? (Y/N)	Water Discharge Flowmeter (gallons)	Monthly Gallons Discharged	Cummulative Gallons	GW System Operational on Arrival	GW System Operational on Departure	Sample Collected	GW Comments
02/12/03	21593.5	94	300	NA	NA	N		0	0				
02/13/03	21609.5	96	270	200	0.0	Y		0	0				
02/19/03	21758.2	22	300	NA	NA	N		0	0				
02/20/03	21781.8	23.8	306	690	0.0	N		0	0				
02/21/02	21804.1	18	330	823	0.0	N		0	0				
02/22/03	21835.1	18	318	NA	NA	N		0	0				
02/23/03	21841.4	18	306	NA	NA	N		0	0				
02/24/03	21875.0	22	306	942	0.0	Y		0	0				
02/25/03	21899.4	26	305	1628	0.0	N		0	0				
02/26/03	21915.8	23	300	2000	0.0	N		0	0				
02/27/03	21926.1	20	300	2000	17.0	N		0	0				
02/28/03	21949.6	25	300	2000	0.0	N		0	0				
03/02/03	21994.2	27	306	1975	0.0	N		0	0				
03/02/03	22010.4	26	310	1029	1.9	N		0	0				
03/03/03	22022.1	26	300	988	0.0	N		0	0				
03/04/03	22047.8	32	300	1220	0.0	N		0	0				
03/05/03	22073.7	35	300	1062	0.0	N		0	0				
03/06/03	22096.6	35	300	844	0.0	N		0	0				
03/07/03	22118.4	36	300	831	0.0	N		0	0				
03/08/03	22148.8	38	300	740	0.0	N		0	0				
03/18/03	22187.2	52	290	NA	NA	N		0	0				
03/19/03	22211.3	38	290	1046	0.0	N		0	0				
03/20/03	22234.5	43	290	NA	NA	N		0	0				
03/26/03	22309.8	35	290	625	0.0	N		0	0				
03/27/03	22325.7	34	310	NA	NA	N		0	0				
03/28/03	22355.0	30	310	NA	NA	N		0	0				
03/31/03	22428.0	30	290	NA	NA	N		0	0				
04/01/03	22452.8	32	290	NA	NA	N		0	0				
04/02/03	22474.2	30	290	NA	NA	N		0	0				
04/03/03	22496.3	32	290	NA	NA	N		0	0				
04/04/03	22512.0	32	290	462	0.0	N		0	0				
04/08/03	22609.8	46	288	NA	NA	N		0	0				
04/11/03	22678.5	44	290	745	0.0	N		0	0				
04/15/03	22773.8	40	290	NA	NA	N		0	0				
04/17/03	22822.6	40	290	801	0.0	Y		0	0				
04/22/03	22941.8	42	295	1065	0.0	N		0	0				
04/25/03	23012.3	42	290	877	0.0	N		0	0				
04/29/03	23109.6	38	284	NA	NA	N		0	0				
05/02/03	23155.0	NO	NO	NO	NO	NO		0	0				
05/09/03	23200.7	27	285	1140	0.0	N		0	0				
05/13/03	23286.8	24	290	NA	NA	N		0	0				
05/16/03	23361.1	34	290	1192	0.0	N		0	0				
05/19/03	23389.1	30	290	NA	NA	N		0	0				
05/20/03	23407.9	30	290	NA	NA	N		0	0				
05/22/03	23464.7	40	260	4860	0.0	N		0	0				
05/23/03	23483.9	40	285	NA	NA	N		0	0				
05/28/03	23598.4	26	290	NA	NA	N	0	0	0				
06/13/03	23694.4	30	290	NA	NA	N	0	0	0	Yes			
06/18/03	23753.6	20	280	NA	NA	N	0	0	0	Yes			
06/20/03	23802.0	39	290	1479	0.0	Y	0	0	0	No			Shut off pumps for 2 days
06/27/03								0	0	No			High level alarm
07/03/03	24020.1	28	270	NA	NA	N	0	0	0	Yes			
07/07/03	NA	26	290	1099	0-2.5	N	3,340	0	3,340	No			High level alarm
07/11/03	24039.5	24	270	1099	0.0	N	6,440	0	6,440	Yes			

TABLE 1
DUAL PHASE EXTRACTION SYSTEM
OPERATOR LOG SHEET SUMMARY
CONOCOPHILLIPS RENTON TERMINAL

Soil Vapor System								Groundwater Treatment System						
				Total VOCs (ppm w/ PID)										
Date	Vapor Hourmeter	Total Vacuum Reading (in. H2O)	Total Flowrate (cfm)	Influent	Effluent	Laboratory Sample Collected? (Y/N)	Water Discharge Flowmeter (gallons)	Monthly Gallons Discharged	Cummulative Gallons	GW System Operational on Arrival	GW System Operational on Departure	Sample Collected	GW Comments
07/14/03	24111.8	27	270	NA	NA	N	6,440	0	6,440	Yes			
07/16/03	24157.6	32	270	NA	NA	N	6,440	0	6,440	No			Need new flow meter
07/18/03	24196.4	34	270	NA	NA	N	0	0	6,440	No			High level alarm
07/21/03	24272.1	33	270	1115	0.0	N	2,509	0	8,949	Yes			
07/24/03	24279.3	26	270	977	0.6	N	2,509	0	8,949	No			High level alarm
07/28/03	24372.9	33	270	NA	NA	N	2,509	0	8,949	Yes			
07/31/03	24375.5	28	270	1215	0.0	N	2,509	0	8,949	No			High level alarm
08/05/03	24493.9	40	270	NA	NA	N	2,509	0	8,949	No			
08/07/03	24539.9	44	270	NA	NA	Y	3,576	0	10,016	Yes			
08/11/03	24632.5	46	270	NA	NA	N	4,642	0	11,082				
08/15/03	24733.4	42	270	967	0.0	N	4,840	0	11,280	No			
08/22/03	24894.7	47	270	NA	NA	N	9,279	0	15,719	Yes			
08/26/03	24894.7	47	270	NA	NA	N	9,279	0	15,719	No			Restarted that day
09/02/03	25102.3	32	270	NA	NA	N	12,535	0	18,975	No			
09/05/03	25170.1	47	270	NA	NA	N	12,535	0	18,975	Yes			
09/11/03	25312.7	75	270	NA	NA	N	14,197	0	20,637	Yes			
09/18/03	25484.4	60	270	1943	0.0	N	14,197	0	20,637	No			
09/28/03							2,850	0	20,637	Yes			
10/01/03	25687.1	26	280	1300-1350	0.0	N	2,858	0	23,495	Yes			
10/17/03	26041.6	35	280	779	0.0	N	2,858	0	23,495	No			High level alarm
10/22/03								0	23,495	No			Release from batch tank, down for 10 days
10/24/03	26198.6	NO	NO	NO	NO	N	8,020	0	28,657	No			High level alarm, sytem down until 10/24
10/28/03	26201.9	20	270	>250	1.0	N	9,524	0	30,161	No			
10/29/03	26225.0	20	270	NA	NA	N	11,278	0	31,915	No			Down for 24 hrs to replace pump
11/04/03	26325.7	20	270	107	1.5	N	11,278	0	31,915	No			
11/21/03	26464.2	26	185	85.9	5.0	Y	12,851	0	33,488	No			
11/25/03	26482.2	5	190	NA	NA	N	15,260	0	35,897	No			Down for 1 week
12/01/03								0	35,897	No			
12/03/03	26486.8	27	185	NA	NA	N	17,357	0	37,994	No			
12/12/03	26696.3	24	216	38	30.0	N	20,471	0	41,108	Yes			
12/15/03								0	41,108	No			Bipass OW separator, GW pumped directly to sparge tank
12/16/03	26789.8	25	180	NA	NA	N	20,673	0	41,310	Yes			
12/17/03								0	41,310	Yes			
12/18/03			270	23.8	3.9	Yes	30,124	0	50,761	Yes			
12/19/03								0	50,761	No			Shut down for 4 days
12/23/03	27000.0						39,668	0	60,305	No			Down from 23 to 31st
01/09/04	27289.3	35	290	NA	NA	No	39,668	0	60,305	No			Frozen PVC pipe repair. System down since 12/19
01/16/04							39,668	0	60,305	No			GW system still off, install Active Carbon Vessels, failed pump
01/23/04	27460.1	20	270	NA	NA	No	44,350	0	64,987	Yes		Yes	Turned GW system on after repairs to pump
01/26/04	27531.1	20	270	NA	NA	No	44,500	0	65,137	Yes		No	Trouble with influentpump
01/27/04	27550.7	20	270	NA	NA	No	46,710	0	67,347	No		No	Trouble with influent pump
01/30/04	27621.6	20	270	NA	NA	No	46,810	0	67,447	No		No	replaced flow meter and started system
02/04/04							6,140	6,140	73,587	No	Yes	No	High level alarm in sparge tank, but system was restarted
02/05/04	27758.1	23	270.0	7.6	0.6	Yes	13,113	6,973	80,559	Yes	Yes	Yes	
02/09/04	27804.0	22	270	306	0.6	No	14,845	1,732	82,292	No	Yes	No	Power shutdown
02/10/04	27818.9	24	288	15.4	0.1	No	22,216	7,371	89,663	No	Yes	No	
02/16/04	27877.5	24	279	NA	NA	No	41,032	18,816	108,479	No	Yes	No	High level alarm in sparge tank
02/24/04	28062.7	24	270	90.8	40.3	No	67,156	26,124	134,603	Yes	Yes	No	
03/02/04	28217.9	24	270	50.5	1.3	No	91,069	23,913	158,516	Yes	Yes	No	Attempted to route GW thru oil/h2o separator but pump cracked during freeze in
03/16/04	28563.4	24	270	44.7	0.7	Yes	130,663	39,594	198,110	No	Yes	Yes	
03/22/04	28702.2	24	270	NA	NA	No	132,558	1,894	200,004	No	Yes	No	shut down to convert to boh loader LAI-4. Start OW separator. New transfer pu
03/30/04	28788.5	24	306	NA	NA	No	136,691	4,134	204,138	No	Yes	No	High alarm on transfer tank. Incorrect rotation wiring, electrician fixed
04/02/04	28826.5	24	298	NA	NA	No	138,393	1,702	205,840	No	Yes	No	High alarm on stripper
04/05/04	28904.5	24	270	73.4	0.1	No	139,515	1,122	206,962	No	Yes	No	High alarm on stripper
04/12/04	29037.6	24	270	104	1.4	No	152,600	13,085	220,047	Yes	Yes	No	
04/19/04	29137.3	24	288	58.4	3.2	No	159,037	6,437	226,484	Yes	Yes	No	
05/03/04	29467.6	24	288	59.7	0.5	No	169,903	10,866	237,349	Yes	Yes	No	

TABLE 1
DUAL PHASE EXTRACTION SYSTEM
OPERATOR LOG SHEET SUMMARY
CONOCOPHILLIPS RENTON TERMINAL

Soil Vapor System							Groundwater Treatment System						
				Total VOCs (ppm w/ PID)									
Date	Vapor Hourmeter	Total Vacuum Reading (in. H2O)	Total Flowrate (cfm)	Influent	Effluent	Laboratory Sample Collected? (Y/N)	Water Discharge Flowmeter (gallons)	Monthly Gallons Discharged	Cummulative Gallons	GW System Operational on Arrival	GW System Operational on Departure	Sample Collected	GW Comments
05/07/04							171,146	1,244	238,593	N	N	N	Bad indicator light
05/17/04	29470.0								238,593	N	Y	N	System has been down for 10 days. Both systems turned on.
06/22/04				NA	NA	No		0	238,593	No	No	No	Both system down on arrival. Bad high level alarm in OW separator
06/28/04	30035.8	24	316	NA	NA	No	176,120	4,974	243,566	Yes	Yes	No	
07/01/04							176,145	25	243,592	No	Yes	No	
07/02/04	30131.1	24	290	206	10.7	Yes	176,930	785	244,377				
07/08/04	30233.8	30	316	NA	NA	No	178,473	1,543	245,920	No	Yes	No	High alarm, convert pumps to bottom load on LAI-4,7,8,9
07/14/04	30260.9	24	290	NA	NA	No	178,863	390	246,310	No	Yes	No	High Level alarm
07/21/04	30428.4	26	290	247	0.0	No	179,658	795	247,105	No	Yes	No	High level alarm
08/16/04	30465.7	26	290	NA	NA	No	179,756	98	247,203	No	Yes	No	loss of power, change Warrick switch
08/18/04	30502.4	26	290	503	33.6	No	182,626	2,870	250,073	No	Yes	No	High level alarm in project tank - purged water in tank
08/20/04	30510.5	27	290	633	20.3	Yes	184,399	1,773	251,846	No	Yes	No	Burner would not activate, entire system shut down
08/23/04	30511.2	24	288	180	2.7	No	184,410	11	251,857	No	Yes	No	Drained water in product holding tank, burner down.
08/25/04	30525.3	26	290	NA	NA	No	185,860	1,450	253,307	No	Yes	No	H2Oil onsite, replace actuator on propane line
09/02/04	30721.2	28	290	121	3.7	No	194,495	8,635	261,942	No	Yes	No	High level alarm at stripper sump
09/08/04	30859.4	26	290	298	0.8	No	199,688	5,193	267,135	Yes	Yes	No	
09/16/04	31051.1	31	290	430	0.0	nO	206,632	6,944	274,079	nO	Yes	No	
09/21/04	31065.2						208,543	1,911	275,990				Release from batch tank, GW and SVE systems down
10/19/04	31065.2	24	288	77.6	0.7	No	208,543	1,911	275,990	No	No	No	Turn SVE system on
10/21/04	31112.4	24	288	NA	NA	No	208,660	117	276,107	No	Yes	No	Turn GW system on (down since release)
11/05/04	31326.5	24	288	NA	NA	No	215,444	6,784	282,891	No	Yes	No	Both systems down for 3 days, no propane
11/08/04	31344.9	24	288	NA	NA	No	215,488	44	282,935	No	Yes	No	
11/12/04	31389.5	28	279	NA	NA	No	215,488	0	282,935	No	Yes		
11/18/04							215,488		282,935				H2Oil onsite to determine low effluent water volume
12/22/04	31818.3	24	310	62.5	0.0	Yes	245,010	29,521	544,353	No	Yes	Yes	High level alarm in sparge tank, manually lower level. Change to top loaders on pumps, system down first 2 weeks of month
12/30/04	31958.6	24	322	NA	NA	No	246,520	1,511	784,903	No	Yes	No	change carbon in filter
01/03/05	31958.6						246,520	0	784,903	No	No	No	Shut both systems down due to freezing weather
01/13/05		20	203	NA	NA	No	246,770	250	785,153	No	Yes	No	Turn system on after temperatures drop (system down for 10 days)
01/18/05	32099.2	20	310	NA	NA	No	251,276	4,506	789,659	Yes	Yes	No	
01/29/05	32340.2	20	NA	NA	NA	Yes	254,476	3,200	792,859	No	Yes	No	Compressor shut down.
01/31/05	32371.8	20	NA	NA	NA	Yes	258,600	4,124	796,983	Yes	Yes	No	High level alarm in sparge tank
02/02/05	32379.2	20	NA	NA	NA	No	259,860	1,260	798,243	No	Yes	No	Both system down on arrival. Bad high level alarm in sparge tank
02/07/05							261,880	2,020	800,263				Both systems down on arrival. Shut systems down for relocation
03/15/05	32608.1	24	168	NA	NA	No	273,012	11,132	811,395	No	Yes	No	Complete system relocation, start both systems up
03/31/05	32992.0						303,837	30,825	842,220				
04/20/05	33562.0	22	150	NA	NA	No	342,370	38,533	880,753	Yes	Yes	No	
05/05/05	33749.0	24	140	NA	NA	No	347,230	4,860	885,613	No	Yes	No	
06/08/05	34145.0	30	30	NA	NA	No	397,300	50,070	935,683	No	Yes	No	
07/29/05	34930.0	20	50	NA	NA	No	430,825	33,525	969,208	No	Yes	No	
09/12/05	35499.8	NA	NA	NA	NA	No	436,900	6,075	975,283	No	No	No	System shutdown between August 22 and beginning of September for maintenance. System has not operated since.
09/27/05	35627.2	15	NA	NA	NA	No	448,560	11,660	986,943	No	Yes	No (collected	System operates for a short amount of time after alarms are reset, due to air stripper high level
10/31/05	36078.5	27	200 (est)	166	10.3	Yes	490,300	41,740	1,028,683	Yes	Yes	No	System operating intermittenly due to air stripper high level alarm (resolved on 1
11/30/05	36713.4	28	200 (est)	NA	NA	Yes	567,212	76,912	1,105,595	No	No	No	SVE system is operating and GW ext. system down due to iron fouling in AS.
12/29/05	37148.4	28	170	NA	NA	Yes	668,000	100,788	1,206,383	No	Yes	Yes	Air Stripper sump high level
01/31/06	37336.7	30	170	0.4	1.8	Yes	688,017	20,017	1,226,400	No	Yes	No	Iron sediment in carbon vessel prevents operation of system. Cleaned some carbon and restarted, operating intermittently . GWET system was not
02/23/06	37662.0	27	168	90	2.5	Yes	721,540	33,523	1,259,923	Yes	Yes	Yes	
03/30/06	38445.3	28	168	5	4.0	No	807,390	85,850	1,345,773	No	No	No	GWET system was not operational for vapor sampling
04/28/06	39078.4	NA	168 (est)	7.2	0.6	No	866,120	58,730	1,404,503	No	Yes	No	
06/07/06	39484.0	NA	168 (est)	42	2.0	No	895,860	29,740	1,434,243	No	Yes	No	
06/22/06	39509.0	NA	162 (est)	42	2.0	No	896,730	870	1,435,113	No	No	No	System is down pending the installation of a chemical feed system.
07/31/06	39552.1	NA	162(est)	42	2.0	No	897,715	985	1,436,098	No	Yes	No	System was restarted after chemical feed system was installed.
08/03/06	39624.1	NA	162(est)	42	2.0	No	912,671	14,956	1,451,054	No	Yes	Yes	VES hour meter malfunctioning. Vapor hour meter estimated to have run 72 hou
09/27/06	39854.6	28	162(est)	414	11.4	Yes	973,184	60,513	1,511,567	No	No	Yes	
10/20/06	39981.2	28	162(est)	414	11.4	No	997,030	23,846	1,535,413	No	No	No	System shut down pending installation of settling tank.

TABLE 1
DUAL PHASE EXTRACTION SYSTEM
OPERATOR LOG SHEET SUMMARY
CONOCOPHILLIPS RENTON TERMINAL

Soil Vapor System							Groundwater Treatment System						
				Total VOCs (ppm w/ PID)									
Date	Vapor Hourmeter	Total Vacuum Reading (in. H2O)	Total Flowrate (cfm)	Influent	Effluent	Laboratory Sample Collected? (Y/N)	Water Discharge Flowmeter (gallons)	Monthly Gallons Discharged	Cummulative Gallons	GW System Operational on Arrival	GW System Operational on Departure	Sample Collected	GW Comments
11/30/06	39981.2	28	162(est)	414	11.4	No	997,030	0	1,535,413	No	No	No	System shut down pending installation of settling tank.
12/31/06	39981.2	28	162(est)	414	11.4	No	997,030	0	1,535,413	No	No	No	System shut down pending installation of settling tank.
01/31/07	40094.2	42	162(est)	230	0.0	Yes	1,024,554	27,524	1,562,937	Yes	Yes	Yes	New settling tank and VES system installed. New hour meter on VES side
02/27/07	40335.4	40	162(est)	230	0.0	No	1,079,212	54,658	1,617,595	No	No	No	System shutdown on February 12, 2007 until carbon changeout is completed
03/31/07	40336.4	40	162(est)	0	0.0	No	1,079,212	0	1,617,595	No	No	No	System shut down pending carbon changeout and polisher vessel installation.
4/31/07	40339.2	40	162(est)	230	0.0	No	1,081,063	1,851	1,619,446	No	No	No	System shut down due to excessive backpressure from polish carbon.
06/01/07	40729.5	40	308	316	0.0	Yes	1,111,144	30,081	1,649,527	Yes	Yes	Yes	Polish carbon, berm extension, and air flow meter installed.
06/29/07	41210.4	40	308	305	0.0	Yes	1,135,256	24,112	1,673,639	No	Yes	Yes	Vapor Phase carbon changed out on 6/29/07 and system restarted
07/31/07	41619.7	40	308	364	0.0	Yes	1,174,767	39,511	1,713,150	Yes	Yes	Yes	Changed out VP carbon on July 30th. Started pulling through carbons
08/30/07	42075.9	30	219	476	11.5	Yes	1,214,892	40,125	1,753,275	Yes	Yes	Yes	Changed out VP carbon on August 25.
09/27/07	42437.9	40	210	2300	2.0	Yes	1,297,272	82,380	1,835,655	Yes	Yes	Yes	Added an additional vapor phase carbon vessel, cleaned OWS and settling tank
10/31/07	42801.9	30	196	300	0.0	Yes	1,343,932	46,660	1,882,315	Yes	Yes	Yes	Changed out VP carbon on Oct. 4th
11/28/07	43185.9	40	190	210	0.1	Yes	1,393,020	49,088	1,931,403	Yes	Yes	Yes	Changed out VP carbon on Nov. 16th
12/18/07	43635.8	40	168	52.2	0.3	Yes	1,492,914	99,894	2,031,297	Yes	Yes	Yes	
01/16/08	44282.8	40	154	20.1	0.0	Yes	1,616,578	123,664	2,154,961	Yes	Yes	Yes	Changed LP carbon 1/15/08
02/27/08	44982.8	25	210	76	0.0	Yes	1,684,448	67,870	2,222,831	Yes	Yes	Yes	Samples taken on 2/14/08
03/19/08	45482.8	25	203	269	0.0	Yes	1,716,265	31,817	2,254,648	Yes	Yes	Yes	Replaced compressor and compressor motor
04/09/08	45914.2	25	210	50.6	0.0	Yes	1,764,596	48,331	2,302,979	Yes	Yes	Yes	
05/21/08	46908.2	58	168	87.4	0.0	Yes	1,805,858	41,262	2,344,241	No	No	No	GW system off
06/25/08	47746.6	80	154	68.7	0.3	Yes	1,805,858	0	2,344,241	No	No	No	GW system off
07/29/08	48561.6	85	175	129	0.1	Yes	NA	NA	2,344,241	No	No	No	GW system off
08/13/08	48920.2	80	182	186	0.4	Yes	NA	NA	2,344,241	No	No	No	GW system off
09/18/08	49496.7	82	182	122	1.5	Yes	NA	NA	2,344,241	No	No	No	GW system off
10/02/08	49515.3	42	210	289	0.0	No	1,817,250	11,392	2,355,633	Yes	Yes	No	GW system back on
10/06/08	49542.7	27	224	320	0.0	No	1,821,420	4,170	2,359,803	No	Yes	No	OWS batch product HL signal from SVE
10/10/08	49636.0	30	224	243	0.0	No	1,832,400	10,980	2,370,783	Yes	Yes	No	
10/13/08	49711.5	30	224	222	0.0	Yes	1,838,250	5,850	2,376,633	Yes	Yes	Yes	
10/16/08	49782.9	30	224	214	0.0	No	1,843,180	4,930	2,381,563	Yes	Yes	No	
10/20/08	49878.5	30	224	252	1.8	No	1,854,610	11,430	2,392,993	Yes	Yes	No	
10/23/08	49947.0	30	224	268	2.1	No	1,861,770	7,160	2,400,153	Yes	Yes	No	
10/27/08	50044.9	30	224	226	2.7	No	1,871,210	9,440	2,409,593	Yes	Yes	No	
10/30/08	50113.3	30	224	222	3.2	No	1,877,730	6,520	2,416,113	Yes	Yes	No	Changed out VP carbon on Oct. 30th
11/10/08	50234.7	30	210	44	0.2	Yes	1,892,230	14,500	2,430,613	No	Yes	Yes	OWS batch product HL signal from SVE
11/18/08	50386.0	30	210	23.4	1.0	No	1,922,290	30,060	2,460,673	No	Yes	No	Stripper or settling tank H/L
11/24/08	50431.8	30	210	13.8	0.2	No	1,930,870	8,580	2,469,253	No	Yes	No	OWS batch product HL signal from SVE; Stripper or settling tank H/L
12/08/08	50717.8	30	210	12.1	4.5	No	1,968,130	37,260	2,506,513	No	Yes	No	Compressor belt failure

TABLE 2
VAPOR ANALYTICAL RESULTS - REMEDIATION SYSTEM
CONOCOPHILLIPS RENTON TERMINAL RM&R #3485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene		Toluene		Ethylbenzene		Xylenes, total		TPH-g		TPH-d	
		mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV
Total Influent	02/13/03	9.162	NA	14.379	NA	0.598	NA	NA	NA	708.44	NA	NA	NA
	02/24/03	62.322	NA	226.05	NA	17.387	NA	NA	NA	1,859.64	NA	867.83	NA
	04/08/03	28.845	NA	106.65	NA	10.811	NA	NA	NA	1,124.3	NA	524.69	NA
	06/20/03	84	NA	189	NA	17.1	NA	93.5	NA	1,860	NA	NA	NA
	07/11/03	80.5	NA	101	NA	17.5	NA	81.6	NA	1,900	NA	NA	NA
	08/07/03	63.5	NA	111	NA	6.61	NA	31.4	NA	1,170	NA	NA	NA
	10/15/03	43.2	NA	91.5	NA	6.51	NA	34.1	NA	779	NA	NA	NA
	12/18/03	14.8	NA	64.4	NA	9.27	NA	54.8	NA	497	NA	NA	NA
	02/05/04	3.45	NA	6.8	NA	0.924	NA	6.7	NA	46	NA	NA	NA
	03/16/04	7.81	NA	15.5	NA	1.96	NA	15.6	NA	252	NA	NA	NA
	07/02/04	23.5	NA	68.5	NA	5.61	NA	57.6	NA	927	NA	NA	NA
	08/20/04	69.7	NA	181	NA	13.8	NA	93.7	NA	2,130	NA	NA	NA
	12/22/04	5.76	1.77	14.3	3.74	1.67	0.378	12.5	2.83	162	**38.2**	NA	NA
	06/08/05	5.08	1.57	11.7	3.05	1.05	0.238	9.96	2.26	167	**39.4**	NA	NA
	09/30/05	<2	NA	<3	NA	<2	NA	<3	NA	94	NA	NA	NA
	10/31/05	NA	8	NA	30	NA	3	NA	20	NA	**190**	NA	NA
	11/30/05	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	3.3	<1.0	NA	NA
	12/29/05	NA	4	NA	9	NA	0.7	NA	6	NA	**30**	NA	NA
	01/31/06	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	<3.5	<1.0	NA	NA
	02/23/06	20	7	50	10	3	0.7	40	9	100	29	NA	NA
	03/30/06	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	7.2	2	NA	NA
	06/09/06	10	4	30	9	2	0.5	30	6	160	**46**	NA	NA
	09/12/06	10	4	90	20	9	2	90	20	600	**170**	NA	NA
	01/31/07	40	10	60	20	2	0.5	10	3	120	**34**	NA	NA
	05/11/07	20	5	30	8	<2	<0.4	10	3	130	**36**	NA	NA
	06/21/07	3	1	20	5	<2	<0.4	9	2	180	**50**	NA	NA
	07/31/07	25.3	7.81	74.3	19.4	7.85	1.78	69	15.6	1,370	**323**	NA	NA
	08/22/07	47.6	14.7	114	29.8	<1	<0.454	84.8	19.2	2,190	**515**	NA	NA
	09/27/07	99.6	30.7	275	72	23	5.21	179	40.5	3,670	**865**	NA	NA

TABLE 2
VAPOR ANALYTICAL RESULTS - REMEDIATION SYSTEM
CONOCOPHILLIPS RENTON TERMINAL RM&R #3485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene		Toluene		Ethylbenzene		Xylenes, total		TPH-g		TPH-d	
		mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV
Total Influent	10/25/07	55.2	17	126	33	7.82	1.77	80.5	18.3	1,300	**306**	NA	NA
	11/28/07	58.2	17.9	98.1	25.6	4.29	0.974	44.8	10.2	426	**100**	NA	NA
	12/18/07	6.43	1.98	8.51	2.22	0.461	0.105	7.49	1.7	104	24.4	NA	NA
	01/16/08	3.33	1.03	8.51	2.22	0.666	0.151	5.93	1.34	113	26.6	NA	NA
	02/14/08	1.79	0.551	4.14	1.08	0.454	0.103	5.35	1.21	42.8	10.1	NA	NA
	03/19/08	47.0	14.5	88.6	23.1	4.77	1.08	42.1	9.54	501	**118**	NA	NA
	04/09/08	21	6.47	34.6	9.05	1.84	0.418	25.5	5.77	232	**54.6**	NA	NA
	05/21/08	4.31	1.33	11.6	3.02	0.889	0.202	11.1	2.52	203	**47.9**	NA	NA
	06/25/08	8.2	2.53	23.1	6.03	1.57	0.356	17.8	4.04	260	**61.4**	NA	NA
	07/29/08	11.5	3.54	43.2	11.3	2.77	0.629	35.2	7.99	667	**157**	NA	NA
	08/13/08	13.8	4.26	60.3	15.8	3.76	0.853	44.3	10	765	**180**	NA	NA
	09/18/08	11.3	3.48	35.4	9.25	2.96	0.672	30.9	7.01	628	**148**	NA	NA
	10/13/08	18.6	5.73	54.1	14.1	4.50	1.02	41.3	9.37	336	**79.3**	NA	NA
	11/10/08	4.88	1.50	14.6	3.82	1.47	0.334	14.6	3.32	123	28.9	NA	NA
Midpoint 1	07/31/07	<0.100	<0.0308	0.736	0.192	0.152	0.0346	1.95	0.442	18	4.13	NA	NA
	08/22/07	166	51.1	3.54	0.926	<1.00	<0.227	4.42	1	3,160	**746**	NA	NA
	08/30/07	0.179	0.055	1.5	0.393	0.276	0.0625	2.86	0.648	5.44	5.44	NA	NA
	10/25/07	<.100	<0.0308	0.591	0.154	0.111	0.0251	1.41	0.319	10.8	2.54	NA	NA
	11/28/07	0.186	0.0573	1.05	0.274	0.129	0.0292	1.56	0.354	10.8	2.55	NA	NA
	12/18/07	<0.100	<0.0308	0.433	0.113	<0.100	<0.0227	1	0.228	<10	<2.36	NA	NA
	01/16/08	<0.100	<0.0308	0.488	0.127	<0.100	<0.0227	0.592	0.134	<10	<2.36	NA	NA
	02/14/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	03/19/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	0.219	0.0496	<10	<2.36	NA	NA
	04/09/08	<0.100	<0.0308	0.4	0.104	<0.100	<0.0227	0.754	0.171	<10	<2.36	NA	NA
	05/21/08	22.5	6.92	0.251	0.0655	<0.100	<0.0227	0.376	0.0853	<10	<2.36	NA	NA
	06/25/08	9.37	2.89	33.5	8.76	<0.100	<0.0227	<0.200	<0.0454	93.3	22	NA	NA
	07/29/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	0.227	0.0515	<10	<2.36	NA	NA
	08/13/08	28.3	8.71	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	148	34.9	NA	NA
	09/18/08	11.3	3.5	39.7	10.4	<0.100	<0.0227	<0.200	<0.0454	388	91.5	NA	NA
	10/13/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	11/10/08	1.86	0.574	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA

TABLE 2
VAPOR ANALYTICAL RESULTS - REMEDIATION SYSTEM
CONOCOPHILLIPS RENTON TERMINAL RM&R #3485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene		Toluene		Ethylbenzene		Xylenes, total		TPH-g		TPH-d	
		mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV
Midpoint 2	11/28/07	0.258	0.0794	0.772	0.202	<0.100	<0.0227	1.62	0.367	12.9	3.05	NA	NA
	12/18/07	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	01/16/08	0.140	0.0433	0.425	0.111	<0.100	<0.0227	0.379	0.0860	<10	<2.36	NA	NA
	02/14/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	03/19/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	04/09/08	<0.100	<0.0308	0.127	0.0332	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	05/21/08	0.198	0.0609	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	06/25/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	07/29/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	0.313	0.071	<10	<2.36	NA	NA
	08/13/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	09/18/08	0.107	0.0329	<0.100	<0.0261	<0.100	<0.0227	0.394	0.0893	<10	<2.36	NA	NA
	10/13/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	11/10/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	0.216	0.0489	<10	<2.36	NA	NA
AS Effluent	11/28/07	<.100	<0.0308	0.206	0.0539	<0.100	<0.0227	0.239	0.0541	<10	<2.36	NA	NA
	12/18/07	82.5	25.4	102	26.8	4.29	0.973	75.8	17.2	765	**180**	NA	NA
	02/14/08	259	79.7	381	99.5	27.3	6.20	246	55.7	3840	**904**	NA	NA
	03/19/08	115	35.3	181	47.3	9.51	2.16	83.0	18.8	933	**220**	NA	NA
	04/09/08	21.8	6.72	35.8	9.36	1.86	0.422	24.3	5.51	205	**48.4**	NA	NA
AS off	05/21/08	--	--	--	--	--	--	--	--	--	--	NA	NA
	06/25/08	--	--	--	--	--	--	--	--	--	--	NA	NA
	07/29/08	--	--	--	--	--	--	--	--	--	--	NA	NA
	08/13/08	--	--	--	--	--	--	--	--	--	--	NA	NA
	09/18/08	--	--	--	--	--	--	--	--	--	--	NA	NA
AS on	10/13/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	11/10/08	46.4	14.3	41.0	10.7	0.870	0.197	69.1	15.7	263	**62.0**	NA	NA

TABLE 2
VAPOR ANALYTICAL RESULTS - REMEDIATION SYSTEM
CONOCOPHILLIPS RENTON TERMINAL RM&R #3485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene		Toluene		Ethylbenzene		Xylenes, total		TPH-g		TPH-d	
		mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV
SVE	08/22/07	210	64.6	418	109	41.2	9.35	332	75.3	10200	**2400**	NA	NA
Influent	12/18/07	8.32	2.57	13.4	3.51	1.17	0.265	13	2.96	323	**76.1**	NA	NA
	01/16/08	8.12	2.50	23.1	6.03	1.42	0.323	12.0	2.71	286	**67.4**	NA	NA
	02/14/08	28.6	8.82	118	30.7	20.4	4.63	222	50.3	1900	**448**	NA	NA
	03/19/08	45.2	13.9	145	38.0	15.3	3.47	169	38.3	2860	**675**	NA	NA
	04/09/08	50.8	15.6	110	28.6	7.36	1.67	97.9	22.2	1840	**433**	NA	NA
	05/21/08	38.9	12	86.7	22.6	6.77	1.53	57.5	13	1870	**441**	NA	NA
	06/25/08	55.2	17	10.7	144	37.6	2.42	130.0	29.5	2680	**632**	NA	NA
	07/29/08	52.6	16.2	311	81.3	25.9	5.88	252.0	57.2	5680	**1340**	NA	NA
	08/13/08	449	139	504	132	164	37.3	393.0	89.2	9330	**2200**	NA	NA
	09/18/08	69.6	21.4	181	47.4	9.95	2.26	134.0	30.4	3030	**713**	NA	NA
	10/13/08	3.88	1.19	11.1	2.90	0.829	0.188	7.23	1.64	1640	**387**	NA	NA
	11/10/08	18.1	5.59	51.2	13.4	5.18	1.17	47.9	10.9	669	**158**	NA	NA
Effluent	02/13/03	<0.002	NA	0.002	NA	<0.001	NA	NA	NA	0.023	NA	NA	NA
	02/24/03	NA	0.3	NA	1.4	NA	0.3	NA	NA	NA	NA	NA	NA
	04/08/03	<0.002	NA	<0.001	NA	<0.001	NA	NA	NA	0.022	NA	<0.013	NA
	06/20/03	0.064	NA	<0.026	NA	<0.023	NA	<0.045	NA	<2.36	NA	NA	NA
	07/11/03	0.641	NA	0.086	NA	<0.023	NA	<0.045	NA	<2.36	NA	NA	NA
	08/07/03	<0.031	NA	0.089	NA	<0.023	NA	0.067	NA	<2.36	NA	NA	NA
	10/15/03	<0.0308	NA	<0.026	NA	<0.023	NA	<0.045	NA	<2.36	NA	NA	NA
	12/18/03	<0.100	NA	<0.100	NA	<0.100	NA	<0.200	NA	<10	NA	NA	NA
	02/05/04	<0.100	NA	0.359	NA	<0.100	NA	0.338	NA	<10	NA	NA	NA
	03/16/04	0.156	NA	0.134	NA	<0.100	NA	<0.200	NA	<10	NA	NA	NA
	07/02/04	0.358	NA	0.436	NA	<0.100	NA	0.397	NA	21.2	NA	NA	NA
	12/22/04	<0.100	<0.031	0.146	0.038	<0.100	<0.023	<0.200	<0.045	<10	2.36	NA	NA
	06/08/05	<0.447	0.138	0.731	0.191	<0.100	<0.023	<0.425	0.096	<11.2	2.63	NA	NA
	09/30/05	<2	NA	<3	NA	<2	NA	<3	NA	9.4	NA	NA	NA
	10/31/05	NA	<0.5	NA	1	NA	<0.4	NA	<0.7	NA	11	NA	NA
	11/30/05	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	18.3	1.8	NA	NA
	12/29/05	NA	<0.5	NA	<0.8	NA	<0.4	NA	<0.7	NA	3.9	NA	NA
	01/31/06	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	<3.5	<1.0	NA	NA
	02/23/06	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	3.8	1.1	NA	NA
	03/30/06	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	13	3.7	NA	NA

TABLE 2
VAPOR ANALYTICAL RESULTS - REMEDIATION SYSTEM
CONOCOPHILLIPS RENTON TERMINAL RM&R #3485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene		Toluene		Ethylbenzene		Xylenes, total		TPH-g		TPH-d	
		mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV	mg/m3	ppmV
Effluent	06/09/06	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	3.8	1.1	NA	NA
	09/12/06	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	35	10	NA	NA
	01/31/07	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	<3.5	<1.0	NA	NA
	05/11/07	<2	<0.5	<3	<0.8	<2	<0.4	<3	<0.7	8.1	2.3	NA	NA
	06/21/07	<2	<0.5	4	1	<2	<0.4	6	1	19	5.5	NA	NA
	07/31/07	<0.1	<0.0308	0.379	0.099	<0.1	<0.0227	0.954	0.216	10.3	2.43	NA	NA
	08/22/07	0.154	0.0475	0.77	0.201	0.149	0.0338	1.69	0.383	15.1	3.55	NA	NA
	09/27/07	0.523	0.161	1.96	0.511	0.167	0.0371	1.32	0.299	19.5	4.6	NA	NA
	10/25/07	<0.100	<0.0308	0.128	0.0344	<0.100	<0.0227	0.233	0.0528	<10.0	<2.36	NA	NA
	11/28/07	0.256	0.0789	1.57	0.41	0.208	0.0471	2.59	0.587	15.3	3.6	NA	NA
	12/18/07	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	01/16/08	<0.100	<0.0308	0.232	0.0607	<0.100	<0.0227	0.244	0.0553	<10	<2.36	NA	NA
	02/14/08	<0.100	<0.0308	0.104	0.0273	<0.100	<0.0227	0.269	0.0610	<10	<2.36	NA	NA
	03/19/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	04/09/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	05/21/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	06/25/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	0.266	0.0603	<10	<2.36	NA	NA
	07/29/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	0.367	0.0832	<10	<2.36	NA	NA
	08/13/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	09/18/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	10/13/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
	11/10/08	<0.100	<0.0308	<0.100	<0.0261	<0.100	<0.0227	<0.200	<0.0454	<10	<2.36	NA	NA
Effluent Permit Limits											30		

TABLE 3
GROUNDWATER TREATMENT SYSTEM ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL RM&R #03485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylenes (total) ug/l	TPH-g ug/l	TPH-d ug/l	TPH-o ug/l	Oil & Grease (HEM) mg/l	TPH (SGT-HEM) mg/l
Influent	07/07/03	**45,200**	**81,200**	**3,840**	21,700	33,100	3.47	0.63	NA	NA
	09/11/03	**37,500**	**76,700**	**2,810**	22,400	**320,000**	2.74	<0.500	NA	NA
	12/18/03	**4,060**	**14,500**	**1,690**	11,800	73,100	34.8	<10	NA	NA
	01/23/04	**389**	**3,900**	69	7,140	34,700	NA	NA	NA	NA
	02/05/04	**3,180**	**6,930**	783	5,350	40,000	NA	NA	NA	NA
	03/16/04	**5,530**	**9,480**	520	4,810	43,500	NA	NA	NA	NA
	07/02/04	3	11	4	104	967	1.37	<0.500	20.2	10.5
	12/22/04	**11,000**	**15,300**	1,100	8,030	79,300	NA	<5.00	<5.00	NA
	06/08/05	**28,300**	**36,500**	1,370	15,300	**173,000**	NA	NA	NA	NA
	09/30/05	**12,000**	**17,000**	720	10,000	81,000	2,800	530	NA	NA
	12/29/05	**11,000**	**26,000**	**2,100**	17,000	**160,000**	3,100	<200	NA	NA
	02/24/06	**11,000**	**25,000**	**1,800**	16,000	**160,000**	3,500	<480	NA	NA
	03/30/06	**7,400**	**16,000**	1,000	1,000	**110,000**	NA	NA	NA	NA
	09/12/06	**4,000**	**5,400**	200	4,100	36,000	NA	NA	NA	NA
	01/31/07	**14,000**	**27,000**	**1,800**	13,000	**160,000**	4,000	<480	NA	NA
	05/11/07	**15,000**	**24,000**	1,300	12,000	**140,000**	7,100	650	NA	NA
	06/21/07	**17,000**	**26,000**	720	13,000	**130,000**	41,000	<4700	NA	NA
	07/26/07	**7,400**	**8,900**	120	6,000	70,000	5,800	<960	NA	NA
	08/22/07	**3,800**	**4,300**	110	5,000	46,000	3,400	<500	NA	NA
	09/20/07	**5,800**	**11,000**	380	8,900	85,000	5,700	1,000	NA	NA
	10/25/07	**5,000**	**14,000**	1,200	13,000	**120,000**	29,000	11,000	NA	NA
	11/28/07	**6,000**	**10,000**	550	14,000	**110,000**	6,800	<940	NA	NA
	12/18/07	**4,900**	**8,900**	450	11,000	**100,000**	22,000	<4,900	NA	NA
	01/16/08	**6,500**	**12,000**	630	15,000	**130,000**	17,000	<4,800	NA	NA
	02/14/08	**6,200**	**12,000**	700	15,000	**130,000**	11,000	<2,400	NA	NA
	03/19/08	**6,000**	**12,000**	690	13,000	**130,000**	16,000	<2,400	NA	NA
	04/22/08	**12,000**	**25,000**	**1,400**	15,000	**150,000**	5,100	<1,900	NA	NA
	10/13/08	**9,900**	**16,000**	480	9,600	80,000	4,800	<470	NA	NA
	11/10/08	**2,100**	**3,200**	78	3,600	26,000	3,200	<330	NA	NA

TABLE 3
GROUNDWATER TREATMENT SYSTEM ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL RM&R #03485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylenes (total) ug/l	TPH-g ug/l	TPH-d ug/l	TPH-o ug/l	Oil & Grease (HEM) mg/l	TPH (SGT-HEM) mg/l
Air Stripper Effluent	01/23/04	10.5	28.4	3.38	119	4,010	NA	NA	NA	NA
	02/05/04	24.7	39.9	9.38	76.9	2,370	NA	NA	NA	NA
	03/16/04	**244**	**483**	34.7	359	4,710	NA	NA	NA	NA
	07/02/04	<0.5	<0.5	0.513	1.57	104	0.324	<0.5	<5	<5
	12/22/04	2.32	5.27	1.54	10.7	529	NA	NA	<5	<5
	06/08/05	16.5	11.5	<5	7.89	97.9	NA	NA	NA	NA
	12/29/05	**280**	**640**	45	480	4,900	2,800	<100	NA	NA
	02/24/06	**210**	**450**	28	350	4,100	3,300	<520	NA	NA
	03/30/06	68	82	1	73	490	NA	NA	NA	NA
	09/12/06	14	16	0.4	20	230	NA	NA	NA	NA
	01/31/07	**510**	**930**	54	580	6,300	4,000	<480	NA	NA
	05/11/07	**1,100**	**1,600**	47	1,100	10,000	3,600	<480	NA	NA
	06/21/07	**4,000**	**5,500**	77	3,200	31,000	3,300	<510	NA	NA
	07/26/07	16	14	1	53	720	2,500	<510	NA	NA
	08/22/07	NA	NA	NA	NA	NA	2,600	<200	NA	NA
	09/20/07	**2,900**	**4,400**	42	4,800	36,000	1,700	<480	NA	NA
	10/25/07	**530**	**1,400**	79	1,300	12,000	2,700	<480	NA	NA
	11/28/07	56	110	3.6	190	2,500	3,800	<1,100	NA	NA
	12/18/08	25	34	0.8	140	1,900	4,000	<490	NA	NA
	01/16/08	**4,500**	**7,200**	120	10,000	82,000	6,700	<990	NA	NA
	02/14/08	**5,600**	**9,200**	140	7,100	64,000	5,200	<2,000	NA	NA
	03/19/08	110	**210**	8.1	150	1,800	3,200	<500	NA	NA
	04/22/08	15	24	0.9	45	630	3,600	<1000	NA	NA
	10/13/08	29	43	0.8	66	340	3,700	<470	NA	NA
	11/10/08	**580**	**780**	22	1,100	620	2,400	<330	NA	NA

TABLE 3
GROUNDWATER TREATMENT SYSTEM ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL RM&R #03485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylenes (total) ug/l	TPH-g ug/l	TPH-d ug/l	TPH-o ug/l	Oil & Grease (HEM) mg/l	TPH (SGT-HEM) mg/l
Carbon Mid Point	06/21/07	<0.2	<0.2	<0.2	<0.6	<50	NA	NA	NA	NA
	07/26/07	<0.5	<0.7	<0.8	<0.8	<50	NA	NA	NA	NA
	08/22/07	<0.2	<0.2	<0.2	<0.6	<50	NA	NA	NA	NA
	09/20/07	0.3	0.6	<0.2	0.7	NA	NA	NA	NA	NA
	10/25/07	<0.2	0.2	<0.2	<0.6	<50	NA	NA	NA	NA
	11/28/07	<0.2	<0.2	<0.2	<0.6	<50	NA	NA	NA	NA
	12/18/07	0.8	0.4	<0.2	1.6	85	NA	NA	NA	NA
	01/16/08	2.8	3.7	<0.2	7.6	120	NA	NA	NA	NA
	02/14/08	0.3	<0.2	<0.2	<0.6	<50	NA	NA	NA	NA
	03/19/08	0.9	0.3	<0.2	<0.6	<50	NA	NA	NA	NA
	04/22/08	1.1	0.3	<0.2	<0.6	<50	NA	NA	NA	NA
	10/13/08	<0.5	<0.7	<0.8	<0.8	<50	<75	<94	NA	NA
	11/10/08	<0.5	<0.7	<0.8	<0.8	<50	3,500	770	NA	NA
Effluent	07/07/03	4.87	18.5	1.63	16.7	345	2.42	<0.500	NA	NA
	09/11/03	11.6	23.7	<5	68.7	2480	NA	NA	NA	NA
	12/18/03	**284**	**1,110**	135	1080	7550	22.1	<5	NA	NA
	01/23/04	<0.500	<0.500	<0.500	<1.00	<50.0	NA	NA	NA	NA
	02/05/04	<0.500	<0.500	<0.500	<1.00	<50.0	NA	NA	NA	NA
	03/16/04	<0.500	<0.500	<0.500	<1.00	<50.0	NA	NA	NA	NA
	07/02/04	<0.500	<0.500	<0.500	<1.00	<50.0	<0.250	<0.500	<5.00	<5.00
	12/22/04	<0.500	<0.500	<0.500	<1.00	<50.0	<0.250	<0.500	<5.00	<5.00
	09/30/05	3.1	0.4	<0.2	<0.6	<48	<75	<94	NA	NA
	12/29/05	93	**170**	7.3	120	1300	900	<100	NA	NA
	02/24/06	<0.5	<0.7	<0.8	<0.8	<48	<79	<98	NA	NA
	03/30/06	<0.5	<0.7	<0.8	<0.8	<48	NA	NA	NA	NA
	09/12/06	<0.2	0.3	<0.2	<0.6	<48	NA	NA	NA	NA
	01/31/07	**370**	**620**	30	500	4900	679	<100	NA	NA
	05/11/07	<0.2	<0.2	<0.2	<0.6	<50	<77	<97	NA	NA
	06/21/07	<0.2	<0.2	<0.2	<0.6	<50	<76	<95	NA	NA

TABLE 3
GROUNDWATER TREATMENT SYSTEM ANALYTICAL RESULTS
CONOCOPHILLIPS RENTON TERMINAL RM&R #03485
2423 Lind Avenue, Renton, Washington

Location	Date	Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylenes (total) ug/l	TPH-g ug/l	TPH-d ug/l	TPH-o ug/l	Oil & Grease (HEM) mg/l	TPH (SGT-HEM) mg/l
Effluent	07/26/07	<0.5	<0.7	<0.8	<0.8	<50	<77	<96	NA	NA
	08/22/07	<0.2	<0.2	<0.2	<0.6	<50	<77	<97	NA	NA
	09/20/07	0.3	0.6	<0.2	0.9	<50	<78	<97	NA	NA
	10/25/07	<0.2	<0.2	<0.2	<0.6	<50	<79	<99	NA	NA
	11/28/07	<0.2	<0.2	<0.2	<0.6	<50	<82	<100	NA	NA
	12/18/07	<0.2	<0.2	<0.2	<0.6	<50	NA	NA	NA	NA
	01/16/08	<0.2	0.3	<0.2	0.7	<50	<78	<98	NA	NA
	02/14/08	<0.2	0.3	<0.2	0.6	<50	120	<96	NA	NA
	03/19/08	0.9	0.7	<0.2	0.9	<50	<77	<97	NA	NA
	04/22/08	<0.2	<0.2	<0.2	<0.6	<50	<78	<98	NA	NA
	10/13/08	<0.5	<0.7	<0.8	<0.8	<50	<75	<94	NA	NA
	11/10/08	<0.5	<0.7	<0.8	<0.8	<50	3,200	1,400	NA	NA
Effluent Permit Limits		**130**	**150**	**1400**		**100,000**	**100,000**	**100,000**		

TABLE 4
ESTIMATED DPVE MASS REMOVAL SUMMARY
CONOCOPHILLIPS RENTON TERMINAL

													Removal Rate						Mass Removed			
Date	Influent PID reading (ppm)	TPH-G&D (ppmv)	TPH-G&D (mg/m3)	Benzene (ppmv)	Benzene (mg/m3)	Toluene (ppmv)	Toluene (mg/m3)	Ethyl-benzene (ppmv)	Ethyl-benzene (mg/m3)	Xylenes (b) (ppmv)	Xylenes (b) (mg/m3)	Flow Rate (scfm)	TPH (lbs/day)	Benzene (lbs/day)	Panel Hour Meter (hrs)	Duration of Operation (days)	TPH Monthly Removed (lbs)	Benzene Monthly Removed (lbs)	Total TPH (lbs)	Total Benzene (lbs)	Total TPH (Gallons)	Total Benzene (Gallons)
February-03	330	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	300	0	NC	21591	0			0			
February-03	200	708.4	2842.15	9.16	30.22	14.38	55.95	0.60	2.68	2.46	11.03	300	77	1	21610	1	61	1	0	0	0	0
February-03	942	2727.5	14716.94	62.32	205.57	226.05	879.55	17.39	77.83	83.81	375.14	300	397	6	21875	12	4396	61	4,396	61	687	10
April-03	NR	1649.0	8897.86	28.85	95.15	106.65	414.97	10.81	48.39	62.20	278.44	290	232	2	22610	42	7110	76	11,506	137	1,798	21
April-03	801	2275.1	12275.96	34.87	115.03	153.38	596.79	16.71	74.81	104.77	469.00	290	320	3	22823	51	2841	27	14,347	164	2,242	26
June-03	1479	1860.0	7890.00	84.00	273.00	189.00	531.00	17.10	75.60	93.50	412.00	290	206	7	23802	92	8404	291	22,751	455	3,555	71
July-03	1099	1900.0	8070.00	80.50	261.00	101.00	387.00	17.50	77.20	81.60	360.00	291	211	7	24040	102	2092	68	24,842	522	3,882	82
August-03	NR	1170.0	4980.00	63.50	206.00	111.00	425.00	6.61	29.10	31.40	138.00	420	188	8	24540	123	3925	162	28,767	685	4,495	107
October-03	NR	779.0	3310.00	43.20	140.00	91.50	350.00	6.51	28.70	34.10	151.00	420	125	5	25993	183	7575	320	36,342	1,005	5,678	157
November-03	86	88.7	376.00	3.09	10.00	5.68	21.7	0.571	2.52	4.39	19.40	185	6	0.2	26464	203	123	3	36,465	1,009	5,698	158
December-03	23.8	117.0	497.00	4.57	14.80	16.80	64.4	2.10	9.27	12.40	54.80	270	12	0.4	27112 (c)	230	326	10	36,791	1,018	5,749	159
December-03	NR	NR		NR		NR		NR		NR		270 (c)	12 (c)	0.4 (c)	27289	237	89	3	36,880	1,021	5,763	160
January-04	NR	NR		NR		NR		NR		NR		290	12 (c)	0.4 (c)	27289	237	0	0	36,880	1,021	5,762	160
February-04	7.6	10.7	45.50	1.06	3.45	1.79	6.8	0.21	0.92	1.52	6.69	270	1.1	0.1	27758	257	22	2	36,902	1,023	5,766	160
March-04	45	0.70	252.00	2.41	7.81	4.04	15.5	0.45	1.96	3.54	15.60	270	6.1	0.2	28563	291	205	6	37,107	1,029	5,798	161
April-04	58	0.70	252.00	2.41	7.81	4.04	15.5	0.45	1.96	3.54	15.60	288	6.5	0.2	29137	314	156	5	37,263	1,034	5,822	162
May-04	NR	0.70	252.00	2.41	7.81	4.04	15.5	0.45	1.96	3.54	15.60	288	6.5	0.2	29137	314	0	0	37,263	1,034	5,822	162
June-04	NR	0.70	252.00	2.41	7.81	4.04	15.5	0.45	1.96	3.54	15.60	316	7.2	0.2	30036	352	268	8	37,532	1,042	5,864	163
July-04	NR	218.0	927.00	7.26	23.50	17.90	68.5	1.27	5.61	13.10	57.60	316	26.4	0.7	30131	356	104	3	37,636	1,045	5,881	163
December-04	63	38.20	162.00	1.77	5.76	3.74	14.3	0.38	1.67	2.83	12.50	310	4.5	0.2	31818	426	318	11	37,954	1,056	5,930	165
April-05	NR	38.20	162.00	1.77	5.76	3.74	14.3	0.38	1.67	2.83	12.50	150	2.2	0.1	33562	499	159	6	38,113	1,062	5,955	166
May-05	287	38.20	162.00	1.77	5.76	3.74	14.3	0.38	1.67	2.83	12.50	140	2.0	0.1	33749	507	16	1	38,129	1,062	5,958	166
June-05	40	39.40	167.00	1.57	5.08	3.05	11.7	0.24	1.05	2.26	9.96	300	4.5	0.1	34146	523	75	2	38,203	1,065	5,969	166
July-05	140	39.40	167.00	1.57	5.08	3.05	11.7	0.24	1.05	2.26	9.96	300	4.5	0.1	34930	556	147	4	38,350	1,069	5,992	167
September-05	140	39.40	167.00	1.57	5.08	3.05	11.7	0.24	1.05	2.26	9.96	300	4.5	0.1	35500	580	107	3	38,457	1,072	6,009	168
September-05	131	16	60	--	<2	--	<3	--	<2	--	<3	300	1.6	0.0	35627	585	9	0	38,466	1,072	6,010	168
October-05	166	190	715	8	26	30	113.0	3	13	20	87	200 est	12.9	0.5	36079	604	242	9	38,708	1,081	6,048	169
November-05	NA	190	715	8	26	30	113.0	3	13	20	87	200 est	12.9	0.5	36713	630	340	12	39,049	1,093	6,101	171
December-05	NA	30	113	4	13	9	33.9	1	3	6	26	170	1.7	0.2	37148	648	31	4	39,080	1,097	6,106	171
January-06	0.4	30	113	4	13	9	33.9	1	3	6	26	170	1.7	0.2	37337	656	14	2	39,093	1,098	6,108	172
February-06	90	29	100	7	20	10	37.7	0.7	3	9	39	168	1.5	0.3	37662	670	20	4	39,114	1,102	6,112	172
March-06	5	29	100	7	20	10	37.7	0.7	3	9	39	168	1.5	0.3	38445	702	49	10	39,163	1,112	6,119	174
April-06	7	29	100	7	20	10	37.7	0.7	3	9	39	168	1.5	0.3	39078	729	40	8	39,203	1,120	6,125	175
June-06	42	46	160	4	10	9	30.0	0.5	2	6	30	168	2.4	0.2	39484	746	41	3	39,244	1,123	6,132	175
June-06	42	29	100	4	20	9	33.9	0.5	2	6	26	168 est	1.5	0.3	39509	747	2	0	39,246	1,123	6,132	175
July-06	42	29	100	4	20	9	33.9	0.5	2	6	26	168 est	1.5	0.3	39552	749	4	1	39,249	1,124	6,133	176
August-06	42	29	100	4	20	9	33.9	0.5	2	6	26	168 est	1.5	0.3	39624	752	5	1	39,254	1,125	6,133	176
September-06	414	170	600	4	10	20	90.0	2.0	9	20	90	168 est	9.1	0.2	39854	762	91	2	39,345	1,126	6,148	176
October-06	414	170	600	4	10	20	90.0	2.0	9	20	90	168 est	9.1	0.2	39981	767	45	1	39,390	1,127	6,155	176
November-06	414	170	600	4	10	20	90.0	2.0	9	20	90	0	0.0	0.0	39981	767	0	0	39,390	1,127	6,155	176
December-06	414	170	600	4	10	20	90.0	2.0	9	20	90	0	0.0	0.0	39981	767	0	0	39,390	1,127	6,155	176
January-07	230	34	120	10	40	20	90.0	0.5	2	3	10	308 est	3.3	1.1	40095.2	772	16	5	39,406	1,132	6,157	177
February-07	230	34	120	10	40	20	90.0	0.5	2	3	10	308 est	3.3	1.1	40335.2	782	33	11	39,439	1,143	6,162	179
March-07	230	34	120	10	40	20	90.0	0.5	2	3	10	0	0.0	0.0	40335.2	782	0	0	39,439	1,143	6,162	179
April-07	230	34	120	10	40	20	90.0	1	2	3	10	308	3.3	1.1	40339.2	782	1	0	39,440	1,143	6,162	179
June-07	316	36	130	5	20	8	30.0	0	0	3	10	308	3.6	0.6	40729.5	798	59	9	39,498	1,153	6,172	180
June-07	305	50	180	1	3	5	20.0	0	0	2	9	308	5.0	0.1	41210.4	818	100	2	39,598	1,154	6,187	180
July-07	364	323	1370	8	25	19	74.3	2	8	16	69	308	38.0	0.7	41619.7	836	648	12	40,246	1,166	6,288	182
August-07	476	650	2760	19.9	64.7	39.2	150.0	2	11	18.1	80.0	219	54.4	1.3	42075.9	855	1034	24	41,280	1,190	6,450	186
September-07	2300	865	3670	30.7	99.6	72.0	275.0	5	23	40.5	179.0	210	69.4	1.9	42437.9	870	1046	28	42,326	1,219	6,613	190
October-07	300	306	1300	17.0	55.2	33.0	126.0	2	8	18.3	80.5	196	22.9	1.0	42801.9	885	348	15	42,674	1,234	6,668	193
November-07	210	100	426	17.9	58.2	25.6	98.1	1	4	10.2	44.8	190	7.3	1.0	43185.9	901	117	16	42,790	1,249	6,686	195
December-07	52.2	24.4	104	2.0	6.4	2.2	8.5	0.1	0.5	1.7	7.5	168	1.6	0.1	43635.8	920	29	2	42,820	1,251	6,691	196

APPENDIX G

COMPLIANCE MONITORING PLAN
(STANTEC, 10/15/09)

Stantec

Compliance Monitoring Plan

ConocoPhillips Facility No. 3485
2423 Lind Avenue Southwest
Renton, Washington 98055

WSDOE Regulatory Site No.:
NW 1259

Stantec Project No.:
212302196

Submitted by:
Stantec Consulting Corporation
12034 134th Court NE Suite 102
Redmond, WA 98052
425-298-1000

Prepared on behalf of:
Mr. Myron Smith, Site Manager
ConocoPhillips Company
Risk Management & Remediation
1230 West Washington, Suite 212
Tempe, AZ 85281

October 15, 2009

PRIVILEGED AND CONFIDENTIAL
Attorney Work Product

INTRODUCTION

Stantec Consulting Corporation (Stantec) is pleased to submit this compliance monitoring plan (Plan) to ConocoPhillips Company (ConocoPhillips) describing the proposed locations, activities and methods that will be performed during compliance monitoring activities at the ConocoPhillips Renton Terminal located at 2423 Lind Avenue Southwest in Renton, Washington (the Site). This Plan was prepared in accordance with Washington Administrative Code (WAC) 173-340-410, "Compliance Monitoring Requirements" (Washington State Department of Ecology [Ecology], November 2007).

Compliance monitoring activities described in subsequent sections of this Plan include protection monitoring for groundwater and performance monitoring for the existing remediation system, which was installed by ConocoPhillips as an interim remedial action to address petroleum concentrations in soil vapor, soil, and groundwater beneath the site.

PROTECTION MONITORING

The purpose of protection monitoring is to confirm that human health and the environment are adequately protected during the operation and maintenance period for the interim remedial action being performed by ConocoPhillips. Protection monitoring activities are described in the Health and Safety Plan (HASP) prepared for the Site and included in Appendix A to this Plan.

PERFORMANCE MONITORING

The purpose of performance monitoring is to confirm that the interim remedial action has attained cleanup standards and that performance standards for the remediation system are being met. Cleanup standards for the Site are Model Toxics Control Act (MTCA) Method A cleanup levels. Performance standards for the remediation system are described in the Puget Sound Clean Air Agency (PSCAA) permit associated with the ConocoPhilips remediation system that was installed as an interim remedial action.

The scope of work for performance monitoring includes:

- Groundwater sampling;
- Remediation system monitoring and sampling; and,
- Data analysis and reporting.

These tasks are described in subsequent sections of this Plan.

GROUNDWATER MONITORING

Groundwater monitoring will be performed on a semi-annual basis and include gauging and sampling of selected wells. Groundwater monitoring wells will be gauged to collect groundwater elevation data to calculate groundwater flow direction and gradient. Representative samples will be collected from select groundwater monitoring wells and submitted to an Ecology-accredited laboratory for chemical analysis of Site-specific constituents of concern (COCs). Analytical results will be compared to MTCA Method A cleanup levels. Groundwater gauging and sampling methods, and laboratory analytical methods are described in the Sampling and Analysis Plan included in Appendix B.

REMEDIATION SYSTEM OPERATION AND MAINTENANCE (O&M) AND SAMPLING

Remediation system operation and maintenance (O&M) activities and sampling activities are performed to optimize and evaluate system performance, and to ensure compliance with the operating parameters set forth in the PSCAA air permit for the ConocoPhillips remediation system. A copy of the air permit is included in Appendix C of this Plan. Remediation system monitoring is performed at least once every two weeks and includes checking operating parameters, fluid levels, gauges, totalizer, and other mechanical components in order to evaluate and optimize system performance and effectiveness. OVM-PID measurements are also recorded to monitor organic vapors in the influent and effluent vapor streams of the soil vapor extraction system. Remediation system sampling is performed on a monthly basis and includes collecting and analyzing influent and effluent vapor samples. Samples are collected in tedlar bags and submitted to an Ecology-accredited laboratory for analyses per the PSCAA air permit. Operation and maintenance (O&M) reports are prepared on a quarterly basis and submitted to ConocoPhillips and Ecology.

Field methods used during remediation system monitoring and sampling, and laboratory analytical methods are described in Appendix D of this Plan.

LIMITATIONS

This Plan was prepared in accordance with the scope of work outlined in Stantec's contract with ConocoPhillips and with generally accepted professional engineering and environmental consulting practices existing at the time this soil sampling plan was prepared and applicable to the location of the site. It was prepared for the exclusive use of ConocoPhillips Company, its Counsel, and its or their consultants and contractors, for the express purpose stated above. Any re-use of this work plan for a different purpose or by others not identified above shall be at the user's sole risk without liability to Stantec. To the extent that this work plan is based on information provided to Stantec by third parties, Stantec may have made efforts to verify this third party information, but Stantec cannot guarantee the completeness or accuracy of this information. The opinions expressed and data collected are based on the conditions of the site existing at the time of the field investigation. No other warranties, expressed or implied are made by Stantec.

If there are any questions regarding the contents of this Plan or other aspects of this project please contact the undersigned at 425-298-1059.

Sincerely,

Stantec Consulting Corporation

Tammy Parise
Staff Scientist

Jeffrey S. Thompson, L.G., L.E.G.
Principal Geologist

APPENDIX A

Health and Safety Plan

Site-Specific
Health & Safety Plan (HASP) for Geoprobe Drilling & Soil and Groundwater Sampling

ConocoPhillips Renton Terminal
2423 Lind Ave SW
Renton, WA 98057

Prepared for: CP Transportation Sites - Washington

Prepared by:

SECOR

001

12034 134th Court Northeast PO Box 230 (98073)
Redmond, WA 98052

10/09/2009

STANTEC
HEALTH AND SAFETY PLAN
REVIEW AND APPROVAL

CLIENT: CP Transportation Sites - Washington

SITE NAME: Renton Terminal

PROJECT NAME: 33.01 Standard Operation & Maintenance

PROJECT NUMBER: 212302196

START DATE: 10/9/2008

END DATE: 10/8/20010

PLAN REVIEW DATE: 10/17/2008 12:00:00 AM
(Last day of expected fieldwork or no longer than 6 months).

Chris Gdak Project Manager	Signature:____________	Date:__________
Matthew Tolley STANTEC office Health and Safety Coordinator	Signature:____________	Date:__________
Tammy Parise Site Health and Safety Officer	Signature:____________	Date:__________
John Bollier STANTEC Business Unit Leader	Signature:____________	Date:__________
Matthew Tolley Peer Reviewer	Signature:____________	Date:__________

This Health and Safety Plan has been written for the use of Stantec and its employees. It may also be used as a guidance document by properly trained and experienced Stantec subcontractors and clients.

Our work can be hazardous, and it is imperative that we never forget that! It is the intent of this document to address our risks. The health and safety guidelines in this Plan were prepared specifically for this site, its conditions, purposes, dates and personnel and must be amended if conditions change. This Plan must not be used on any other site without prior research by trained health and safety specialists.

STANTEC claims no responsibility for its use by others for purposes unrelated to this project. This Plan will provide useful information to subcontractors and will assist them in developing their own HASP. Subcontractors should sign this plan (See **Attachment 12**) as an acknowledgement of hazard information and notice that they must ensure that the risks posed by work on this site are addressed. STANTEC is readily available to assist subcontractors in identifying and addressing their employees' risks.

TABLE OF CONTENTS

ATTACHMENTS

1.0 LOCAL EMERGENCY CONTACT NAMES, PHONE NUMBERS, AND DIRECTIONS TO THE HOSPITAL

The nearest telephone is a: a Regular Phone
The number of the nearest telephone is (425) 228-6142

	NAME	TELEPHONE	VERIFIED
Hospital	**Valley Medical Center** **400 S 43rd st.** **Renton, WA 98055**	**(425) 228-3450**	
Ambulance	**American Medical Response**	**911 OR,** **(206) 243-5622**	
Police	**Renton Police Department**	**911 OR,** **(425) 430-7500**	
Fire Department	**Renton Fire Department**	**911 OR,** **(425) 430-7000**	

DIRECTIONS AND MAP TO THE HOSPITAL – SEE BELOW

2.0 OBJECTIVES, GOALS, PURPOSES AND POLICY OF THIS HASP

Let's be clear about our objectives in this HASP. The purpose of this HASP is to:

- Document a proactive, scientific exposure assessment, which identifies and helps us understand our risks.
- Document proactive precautions we are going to take to avoid the risks.

Let's be clear about our goal in this HASP. Our policy is to:

- Complete our work on this site without incidents of all types; no injuries, no illnesses, no impacts to the environment or to property and equipment. In order to achieve this goal, the project team must work together to perform an effective hazard assessment. The team will then establish appropriate precautions and communicate these daily among project staff. Staff will be responsible for communicating changing field conditions to the project management so these conditions and appropriate precautions may be reevaluated as needed. We expect all subcontractors and project personnel to share this goal.

3.0 SCOPE OF WORK

The scope of work includes delineating the magnitude and extent of reported petroleum hydrocarbon contamination in the soil and groundwater northwest and southeast of the site. The scope of work includes the following:

- Pre-field Activities;
- Geo-Probe 5 to 6 Borings;
- Soil Sampling;
- Documenting Soil Lithology;
- Groundwater Sampling;
- Waste Management; and,
- Data Analysis and Reporting.
- **Perform Operations and Maintenance on the Remediation System**

This HASP was prepared for the use of STANTEC personnel while performing the following tasks:

1. Driving to/from the job Site
2. Private Locate
3. Geo-Probe drilling
4. Soil and groundwater sampling
5. Performing Operations and Maintenance

A general site map is included in **Attachment 2**.

4.0 EMERGENCY RESPONSE

- *Remember this must be specific to the site and discussed with the client/facility manager.*
- *This must be coordinated with other contractors working on the site. This can be done at the initial site meeting, but do not forget to do it.*
- *In addition to injuries and illnesses noted here, this section should also address how the client wants us to respond to: the public or the press, fires, bomb threats, etc.*
- *You must discuss emergency response at the pre-startup meeting with the contractor to make sure that you can act on the response plan in the event of an emergency.*
- *All STANTEC staff on site must have completed CPR and First Aid training.*
- *In the event of an injury or illness, notification of the family of the individual involved shall be made as promptly as possible following the office's emergency action plan.*
- *You must have an eyewash bottle with you on site in case you get something in your eyes.*
- **If there is any type of emergency (injury, spill, etc.), work is to be shut down until the situation that caused the emergency is corrected and work can resume without further risk of a similar incident.**
- **All incidents regardless of severity and all near misses shall be reported immediately, (after stabilizing the victim(s)/site), to the STANTEC Project Manager who will then contact Alice Larsen, Director of IH/H & S, Mary Harris, Human Resources and Michael Philipp, II/NMI Program Manager. The Project Manager together with Alice Larsen (or Michael Philipp if Ms. Larsen is not available) shall then communicate with the client Project Manager in accordance with the client's incident reporting guidelines.**

The **Site Health & Safety Officer (SHSO)** must be familiar with the directions to the hospital given in **Section 1.** *(It has become common to take directions off the Internet. In some cases these directions are no longer correct. It is the* **SHSO's** *responsibility to ensure that the directions stated in the HASP are absolutely accurate. It may be advisable to ask the client or call a local institution for directions.)*

Injury or Illness

If an injury or illness occurs, take the following action:

- Determine if emergency response (fire/ambulance) staff are necessary. If so, dial **911** or **(425) 430-7000** (**Renton Fire Department**) on cell phone or closest available phone. ***(at A cell phone in the possession of the STANTEC SHSO)*** Provide the location of the injured person and other details as requested. If it makes sense to take an individual to the hospital, follow the directions in **Section 1.**

- Get First Aid for the person immediately. Utilize first aid kit in vehicle. Also utilize the bloodborne pathogens kit. *(Make sure you have both kits, or one combined kit).*

- Notify the **SHSO** immediately. The **SHSO** is responsible for contacting the STANTEC Project Manager immediately after stabilizing the victim(s)/site. The STANTEC Project Manager shall then immediately contact Mary Harris in STANTEC's Human Resources, Alice Larsen, Director of IH/H&S and Michael Philipp. The STANTEC Project Manager along with the SHSO, and the Office Health & Safety

Coordinator/Operational Excellence Coordinator (and other witnesses, experts, etc.) are responsible for preparing and submitting the Incident/Near Miss Investigation Report to Mary Harris in STANTEC's Human Resources, Alice Larsen and Michael Philipp of the STANTEC Health & Safety Department within 72 hours of the incident, as well as notifying the employee's supervisor and the Client Manager in accordance with the client's reporting procedure timeline. Use the Incident Investigation / Near Miss Investigation Report in **Attachment 3**.

- The **SHSO** will assume responsibility during a medical emergency until more qualified emergency response personnel arrive at the site.

First Aid Procedures for Minor Cuts, Scratches, Bruises, etc.

- Each occupational illness or injury shall be reported immediately by employees to the **SHSO**. The **SHSO** will complete the Incident Investigation / Near Miss Investigation Report in **Attachment 3** and report the incident to Human Resources.

Medical Cases Not Requiring Ambulance Service

- Medical cases normally not requiring ambulance services are injuries such as minor lacerations, minor sprains, etc.

- The **SHSO** will ensure prompt transportation of the injured person to a physician or hospital following the directions in **Section 1**.

- A representative of STANTEC/sub-contractor should always drive the injured employee to the medical facility and remain at the facility until the employee is ready to return.

- If the driver of the vehicle is not familiar with directions to the hospital, a second person shall accompany the driver and the injured employee to the hospital

- If it is necessary for the **SHSO** to accompany the injured employee, provisions must be made to have another employee, properly trained and certified in first aid, to act as the temporary **SHSO**.

- If the injured employee is able to return to the jobsite the same day, he/she should bring with him/her a statement from the doctor containing such information as:

  - Date
  - Employee's name
  - Diagnosis
  - Date he/she is able to return to work, regular or light duty
  - Date he/she is to return to doctor for follow-up appointment, if necessary
  - Signature and address of doctor

If the injured employee is unable to return to the jobsite the same day, the employee who transported him should bring this information back to the jobsite and report it to Mary Harris in Human Resources at (619) 718-9429 and the Director of Industrial Hygiene and Health & Safety, Alice Larsen at (617) 232-7355.

Emergency Cases Requiring Ambulance Services

- Medical cases requiring ambulance services would be such cases as severe head injuries, amputations, heart attacks, etc.
- Should ambulance service be necessary, the following procedures should be taken immediately.
  - Contact necessary ambulance service and company emergency services by dialing **911 or (206) 243-5622** (**American Medical Response**) and notify the **SHSO** for the site.
  - Administer first aid until ambulance service arrives.
  - While the injured employee is being transported, the **SHSO** should contact the medical facility to be utilized.
  - One designated representative should accompany the injured employee to the medical facility and remain at the facility until final diagnosis and other relevant information is obtained.

Death of an Individual or Hospitalization of Three or More Employees

The procedure as outlined in "First Aid and Medical Cases", above, should be followed. If the injured person dies, then STANTEC Human Resources Department, local officials and coroner must be notified ***immediately***. STANTEC Human Resources will notify the **local OSHA office within 8 hours of the incident or fatality** in the event of fatality or hospitalization of three or more employees.

Response to Spills or Cut Lines

Prevent problems by documenting the location of underground lines (e.g., product, sewer, telephone, fiber optic) before starting site work. If a line or tank is drilled through, or another leak occurs, document the event as soon as possible using the Incident Investigation Report in **Attachment 3. Notification of the event must be made to the STANTEC Project Manager by the SHSO immediately after stabilizing the victim(s)/site.** The STANTEC Project Manager shall then immediately contact **STANTEC Human Resources and the Health & Safety Department.** Include dates, times, actions taken, agreements reached, and names of people involved. Use additional pieces of paper to document the event completely. The **SHSO**, PM and client must be notified immediately. The PM will notify the regulatory authority or utility as necessary.

In the event of a spill/release, follow this plan:

1. Stay upwind of the spill/release.

2. Wear appropriate PPE.
3. Turn off equipment and other sources of ignition.
4. Turn off pumps and shut valves to stop the flow/leak.
5. Plug the leak or collect drippings, when possible.
6. Use sorbent pads to collect product and impede its flow, if possible.
7. Call Fire Department immediately if fire or emergency develops.
8. Inform STANTEC Project Manager about the situation.
9. Determine if the client wants STANTEC to repair the damage or if the client will use an emergency repair contractor.
10. Based on agreements, contact emergency spill contractor for containment of free product. The contact for this project will be NRC Environmental Services, Phone: (800) 337-7455
11. Advise the client of spill discharge notification requirements and determine who will complete and submit forms. *(Do not submit or report to agencies without the client's consent.)* Document each interaction with the client and regulators and note, in writing; name, title, authorizations, refusals, decisions, and commitments to any action.
12. Do not transport or approve transportation of contaminated soils or product until proper manifests have been completed and approved. Be aware that soils / product may meet criteria for hazardous waste.
13. Do not sign manifests as generator of wastes; contact PM or Waste Compliance Manager to discuss waste transportation.

Notifications – a spill/release requires completion of an Incident Investigation (II). **The incident shall be reported immediately after stabilizing the victim(s)/site. The PM must involve the client/generator in the Incident Investigation process. The client/generator is under obligation to report to the proper government agencies. If the spill extends into waterways, the Coast Guard and the National Response Center (800) 424-8802 must be notified immediately by the client or by STANTEC PM with the client's permission.**

All spills/releases must be reported per site/client requirements per procedures listed in **Attachment 1**.
All spills/releases must be reported to Myron Smith Phone: (602) 432-1576 at CP Transportation Sites - Washington.

Emergency Decontamination Procedures

Ensure eyewash bottle, water (unless the chemicals of concern are water reactive), and other decontamination aids are available on-site.

In the event of emergency decontamination:

- Secure area or move/evacuate to the emergency gathering location.
- Immediately remove any contaminated PPE or clothing (gloves, etc.)
- If possible, wash contaminated area with mild soap and water. Use eyewash station if necessary.
- Observe the contaminated area.
- Repeat washing as necessary.
- Notify SHSO immediately.

Exposure to contaminated individuals should be limited to personnel wearing the proper PPE to avoid unnecessary exposure.

5.0 CONTRACTOR EMERGENCY ACTION PLAN

The **SHSO** will ensure that the Subcontractor/Contractor is capable of efficient evacuation/emergency response in the event of an emergency. Subcontractor/Contractor's employees will be trained by their employer in site-specific evacuation/emergency procedures, including alarm systems and evacuation plans and routes.

The Subcontractor/Contractor shall instruct its employees that in the event of an emergency such as a fire, release, or accident involving injuries, they are required to dial **911**, or **(425) 430-7500** (**Renton Police Department**). The reporting employee is to state the problem clearly and fully and remain on the line until dismissed by the operator.

STANTEC staff and Subcontractor/Contractors working in an area where an emergency exists shall evacuate to a safe location, preferably upwind, away from the area and take attendance. **The gathering location will be determined by the STANTEC SHSO upon arrival on site. It is the responsibility of the SHSO to annotate the Site Plan with the gathering location position and to disseminate that info to all site personnel during the Daily Production Safety Meeting and any other appropriate time after that.**

(If the emergency causes the route to a gate surrounding the site to be closed, the STANTEC staff and Subcontractor/Contractors shall move to an open area upwind of the hazard area, and remain there until instructed by emergency response personnel (i.e., police, fire, ambulance, paramedics, etc.) to do otherwise.)

Subcontractor/Contractor has the responsibility to account for its own employees and to provide such information immediately to emergency response personnel upon request.

STANTEC staff and Subcontractor/Contractor may not reenter the emergency site without specific approval from emergency response personnel.

In the event of fire ignition in close proximity to STANTEC staff and Subcontractor/Contractor's employees, those persons shall evacuate the area and notify emergency personnel unless the fire is readily extinguished with portable dry chemical equipment on-hand. **When in doubt, emergency response personnel shall be notified.**

6.0 BACKGROUND INFORMATION ON THE PROJECT SITE

The site is an active bulk petroleum distribution terminal located at 2423 Lind Avenue SW in Renton, Washington (Figure 1). There are currently seven above ground product storage tanks located in the tank farm at the site (Figure 2), which store premium and regular unleaded gasoline, diesel fuel, and ethanol. Smaller gasoline and diesel additive tanks are also located in the tank farm. Each product tank is surrounded by concrete block walls which are approximately 3 feet high, and the entire tank area is surrounded by an earthen containment berm which provides secondary surface spill containment

In November 2002 approximately 14,800 gallons of super-unleaded gasoline were released from Tank 2 located in the tank farm (Figure 2). Upon discovery of the release from Tank 2, site personnel began transferring the remaining gasoline from Tank 2 into other bulk fuel tanks in the tank farm and into tanker trucks. On November 13, 2002, Landau began coordinating efforts to assess the extent of impact and conduct interim action LPH recovery efforts. STANTEC assumed operation of Remedial activities in January 2005.

The site is currently under Washington State Voluntary Clean Up Program Which follows the Model Toxic Control Act s Method A cleanup protocols.

The 2002 spill consisted of super-unleaded gasoline. The contaminants of concern are TPH-g, TPH-d, TPH-o, and BTEX.

7.0 CLIENT SAFETY PROCEDURES

ConocoPhillips requires all of its contractors to abide by the policies and procedures set forth in the RISK MANAGEMENT AND REMEDIATION CONTRACTOR SAFETY HANDBOOK and a copy of the handbook shall be maintained on site See Attachment #1 (CLIENT SAFETY PROCEDURES) for additional information.

8.0 GOVERNMENT AND LINE LOCATOR CONTACT NAMES AND PHONE NUMBERS

AGENCY or LINE LOCATOR	NAME	TELEPHONE NO	VERIFIED
National Response Center	(24 Hour Hotline)	(800) 424-8802	
U.S. E.P.A.	(24 Hour Hotline)	(800) 424-9346	
Office of Emergency Services	(24 Hour Hotline)	(800) 852-7550	
U.S. National Poison Control Center	(24 Hour Hotline)	(800) 222-1222	
LINE LOCATOR	Washington Call Before You Dig	(800) 424-5555	

9.0 PROJECT PERSONNEL AND RELEVANT INFORMATION

Questions about this project posed by neighbors, the press, or other interested parties should be directed to:

Name: Myron Smith Company: ConocoPhillips Phone: (602) 432-1578

The site phone number is (425) 228-6142

Site personnel shall be trained and certified in hazardous waste operations; specifically,

- 40-Hour HAZWOPER Training and a current;
- Annual 8-Hour Refresher [29 CFR 1910.120(e)(8)];
- First Aid/CPR training; and
- Shall have had a physical examination consistent with 29 Code of Federal Regulations (CFR) 1910.120. (and 8 California Code of Regulations (CCR) 5192, if applicable.)

In addition, the Site Manager/SHSO will have Supervisory 8-hour Training [29 CFR 1910.120(e)(4)].

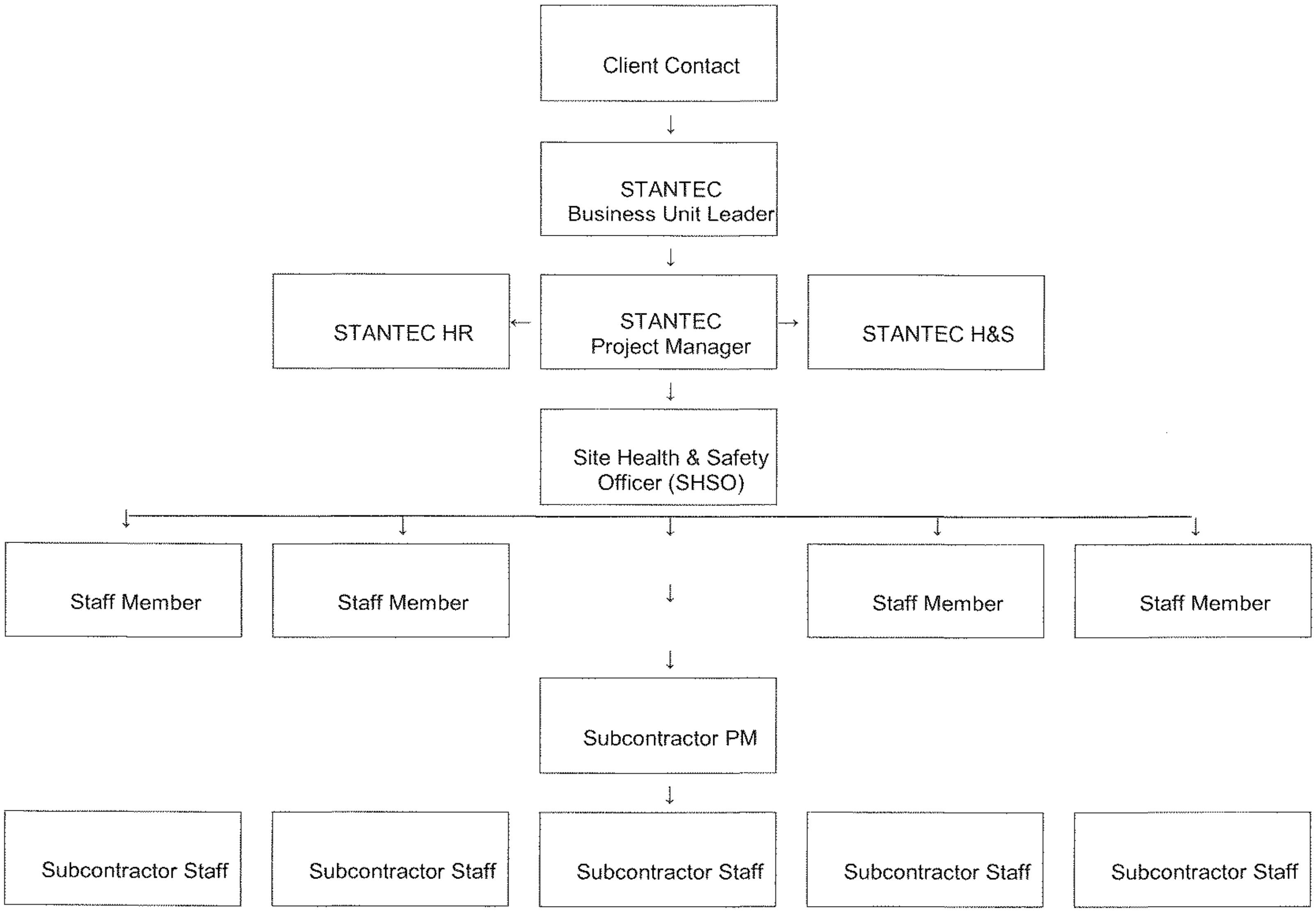
Subcontractors shall review and sign the form in **Attachment 12 ACKNOWLEDGMENT & AGREEMENT FORM**

The table below summarizes project personnel, responsibilities, and training dates.

PROJECT JOB TITLE	NAME	TELEPHONE NO.	GENERAL PROJECT RESPONSIBILITIES	40-Hr HAZWOPER	8-Hr Refresher	CPR/First-Aid	MEDICAL SURVEILANCE DATE
Project Manager	**Chris Gdak**	425-298-1000	Overall financial and logistics. Contact client and subs to understand all hazards. Discuss with SHSO. Follow-up all incidents upon notice.	**12/15/2003**	**N/A**	**N/A**	**6/26/2010**
Site Health and Safety Officer	**Matthew Tolley**	425-298-1000	Conduct work in accordance with JSA and this HASP. Report all incidents and near misses immediately to Project Manager.	**3/20/2008**	**12/17/2009**	**12/17/2010**	**4/20/2010**
Project Staff	**Tammy Parise**	425-298-1000	Conduct work in accordance with JSA and this HASP. Report all incidents and near misses immediately to Project Manager.	**6/16/2006**	**12/17/2009**	**7/17/2010**	**6/10/2010**
Project Staff	**Andrea Donnell**	425-298-1000	Conduct work in accordance with JSA and this HASP. Report all incidents and near misses immediately to Project Manager.	**5/18/07**	**8/6/2010**	**12/2011**	**5/2009**
STANTEC Business Unit Leader	**John Bollier**	805-230-1266	Provide immediate support at notice of all incidents	**N/A**	**N/A**	**N/A**	**N/A**
STANTEC Director of Industrial Hygiene	**Alice Larsen**	(617) 232-7355 Cell (617) 739-1224 Home	Respond with corporate resources to all incidents as appropriate. Assist in HASP review. Assist in incident investigation.	**N/A**	**N/A**	**N/A**	**N/A**
STANTEC Human Resources Director	**Marguerite Shuffelton**	(619) 718-9430 Cell (760) 749-9603 Home	Assist with incident review, recordkeeping.	**N/A**	**N/A**	**N/A**	**N/A**
Site Health and Safety Officer	**Matthew Tolley**	425-298-1000	Manage Health and Safety responsibilities for personnel in Office. Assist employees with setting up training and attending/completing necessary courses.	**3/20/2008**	**12/17/2009**	**12/17/2010**	**4/20/2010**

- Other training may be required such as LPS, Passport, Fall Protection, Lock Out Tag Out, Hot Work, Confined Space, etc. according to the clients training requirements and hazards specific to the job being performed. Enter into the table below.

NAME	TRAINING COURSE	DATE	RECERTIFICATION DUE
Matthew Tolley	Fire Watch Safety	8/3/2007	--
Matthew Tolley	FIT Test	8/8/2009	8/8/2010
Tammy Parise	FIT Test	8/7/2009	8/7/2010
Andrea Donnell	FIT Test	1/13/2009	1/13/2010
Tammy Parise	Initial Physical	5/10/2006	6/10/2010
Matthew Tolley	Initial Physical	3/29/2007	4/20/2010
Andrea Donnell	Initial Physical	5/2009	5/2010
Tammy Parise	Indoctrination Training	7/5/2006	--
Matthew Tolley	Indoctrination Training	5/3/2007	--
Andrea Donnell	Indoctrination Training	11/2008	--



10.0 CONSTITUENTS OF POTENTIAL CONCERN AND MAXIMUM CONCENTRATIONS IDENTIFIED ONSITE

Listed below are the maximum concentrations of contaminants in the soil and/or groundwater that have been encountered at the site to date.

Substance	**Date of Sample**	**Media**	**Sample Concentration**
Benzene-1910.1028	2/26/2008	Groundwater	160ug/L
TPHg	2/26/2008	Groundwater	23000ug/L
TPHd	2/26/2008	Groundwater	47000ug/L
Toluene	2/26/2008	Groundwater	370ug/L
Ethylbenzene	2/26/2008	Groundwater	1100ug/L
Xylenes	2/26/2008	Groundwater	4300ug/L
TPHo	2/26/2008	Groundwater	740ug/L

11.0 POTENTIAL AIRBORNE CONCERNS

POTENTIAL AIRBORNE CHEMICALS ONSITE IN THIS PROJECT REVIEW THIS TABLE AND CONTACT SHSO WITH QUESTIONS						
CHEMICAL (OR CLASS)	**OSHA PEL ACGIH TLV**	**OTHER PERTINENT LIMITS**	**WARNING PROPERTIES**	**ROUTES OF EXPOSURE OR IRRITATION**	**ACUTE HEALTH EFFECTS**	**CHRONIC HEALTH EFFECTS/ TARGET ORGANS**
	Cal/FedOSHA PEL 1.0 ppm TLV 0.5.0 ppm (skin)	CalOSHA & FedOSHA STEL 5.0 ppm NIOSH REL 0.1 ppm IDLH 500 ppm	Characteristic benzene odor	Inhalation, Dermal, ingestion, eyes	Skin (dermatitis), eye, respiratory tract irritant, headache, dizziness, nausea.	Carcinogen, CNS, eyedamage, bone marrow, blood, skin, leukemia.
Xylenes	Cal/FedOSHA PEL 100 ppm TLV 100 ppm PEL-STEL 125 ppm	TLV STEL 125 ppm NIOSH REL 100 ppm; REL-STEL 125 ppm IDLH 800 ppm CalOSHA STEL 125 ppm	Pungent aromatic odor	Inhalation, dermal, ingestion, eyes	Skin/eye/mucous membrane irritant, headache, dizziness, drowsiness	Eyes, respiratory tract, skin, CNS, blood, kidneys, liver.
TPHg	CalOSHA PEL 50 ppm FedOSHA PEL 200 ppm TLV 50 ppm	NIOSH REL 100 ppm TWA; 50 ppm STELILDH 500 ppm CalOSHA C 500 ppm CalOSHA STEL 150 ppm	Sweet, pungent, benzene-like odor	Inhalation, dermal,ingestion, eyes	Skin (dermatitis) eye, respiratory tract irritant, headache, dizziness, weakness, and fatigue.	CNS, liver, kidneys, skin.

POTENTIAL AIRBORNE CHEMICALS ONSITE IN THIS PROJECT REVIEW THIS TABLE AND CONTACT SHSO WITH QUESTIONS

toulene	CalOSHA PEL 300 ppm FedOSHA PEL None Established TLV 300 ppm	No REL Established CalOSHA STEL 500 ppm	Clear liquid with a characteristic odor	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonia (aspiration liquid); possible liver, kidney damage; [Potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys
TPH-gx	Cal/FedOSHA PEL 100 ppm TLV 100 ppm	TLV STEL 500 ppm NIOSH REL 100 ppm REL STEL 100 ppm IDLH 900 ppm CalOSHA C 300 ppm CalOSHA STEL 150 ppm	Aromatic odor	Inhalation, dermal, ingestion, eyes	Throat and skin irritant(dermatitis), headache, nausea, drowsiness, fatigue	CNS, liver, kidneys, skin,gastrointestinal damage, eye damage
Benzene-1910.1028	Cal/FedOSHA PEL 1.0 ppm TLV 0.5.0 ppm (skin)	CalOSHA & FedOSHA STEL 5.0 ppm NIOSH REL 0.1 ppm IDLH 500 ppm	Characteristic benzene odor.	Inhalation, Dermal, ingestion, eyes.	Skin (dermatitis), eye, respiratory tract irritant, headache, dizziness, nausea.	Carcinogen, CNS, eye damage, bone marrow, blood, skin, leukemia.
Methyl Tertiary Butyl Ether (MTBE)	CalOSHA PEL 40 ppm FedOSHA PEL None Established TLV 40 ppm	AIHA WEEL 100 ppm.	Flammable liquid with a distinctive, disagreeable odor.	Inhalation, dermal, ingestion.	Irritated nose, throat, headache, dizziness, nausea, sleepiness	CNS, liver, kidney, gastrointestinal damage, potential carcinogen
Ethylbenzene	Cal/FedOSHA PEL 100 ppm TLV 100 ppm PEL-STEL 125 ppm	TLV STEL 125 ppm NIOSH REL 100 ppm REL-STEL 125 ppm IDLH 800 ppm CalOSHA STEL 125 ppm	Pungent aromatic odor.	Inhalation, dermal, ingestion, eyes.	Skin/eye/mucous membrane irritant, headache, dizziness, drowsiness	Eyes, respiratory tract, skin, CNS, blood, kidneys, liver.

POTENTIAL AIRBORNE CHEMICALS ONSITE IN THIS PROJECT
REVIEW THIS TABLE AND CONTACT SHSO WITH QUESTIONS

Toluene	CalOSHA PEL 50 ppm FedOSHA PEL 200 ppm TLV 50 ppm	NIOSH REL 100 ppm TWA; 50 ppm STELILDH 500 ppm CalOSHA C 500 ppm CalOSHA STEL 150 ppm	Sweet, pungent, benzene-like odor.	Inhalation, dermal, ingestion, eyes.	Skin (dermatitis) eye, respiratory tract irritant, headache, dizziness, weakness, and fatigue.	CNS, liver, kidneys, skin.
TPHd	FedOSHA PEL 400 ppm	NIOSH REL 350 ppm	Yellowish to light brown liquid.	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Nausea, eye irritation, increased blood pressure, headache, light-headedness, loss of appetite, poor coordination, and difficulty concentrating. [Potential occupational carcinogen	Kidneys, circulatory system
TPHo	FedOSHA PEL 5mg/m3 TLV 5mg/m3	None	Brown-to-black, oily liquid (used). Amber colored liquid with petroleum odor (new).	Inhalation, ingestion, skin and/or eye contact.	Slightly irritated noses, throats, and eyes, diarrhea, anemia and tremors, nausea. Irritated skin.	Respiratory system, epidermis.

Explanation of Abbreviations

Abbreviation	Explanation
PEL	Permissible Exposure Limit
REL	Recommended exposure limit set by NIOSH
C	Ceiling limit
STEL	Short Term Exposure Limit
IDLH	Immediately Dangerous to Life or Health
TLV	Threshold Limit Value set by the ACGIH (American Conference of Governmental Industrial Hygienists)
AIHA WEEL	Workplace Environmental Exposure Limits set by the AIHA (American Industrial Hygiene Association)
SKIN	Skin absorption
NIOSH	National Institute for Occupation Safety and Health
CNS	Central Nervous System
CVS	cardiovascular system

Action Level Table for Air Quality Monitoring

- The level for respirator use indicated below is that concentration at which a respirator must be put on. It does not require the job to stop. The respirator is a tool to be used while determining why the exposure has reached that concentration. Take action to reduce the concentration by engineering controls such as water mist, spray foam, plastic cover, etc.
- The level for work stoppage indicated below is that concentration at which work on the job must stop. Determine why exposures have reached that concentration and how they can be reduced. Site evacuation is not necessary at this level. It does not mean that stopping operations should reduce the likelihood that the concentration will continue to rise. Implement engineering controls to reduce the concentration, and then resume work.
- **PIDs – Photoionization Detectors** are used for general hydrocarbon monitoring; an example would be benzene, toluene, ethyl benzene and xylene, common on gasoline station sites. The PID typically uses either a 10.6 eV lamp (responds to pentane and higher hydrocarbons), or 11.7 eV lamp (responds to ethane (weakly), propane and higher hydrocarbons) to ionize and detect the gas. The PID will measure hydrocarbons that are ionized, and therefore is a screening device, not a chemical-specific measurement instrument.
- **FIDs – Flame Ionization Detectors** – Uses a hydrogen flame to ionize the gas and detect its concentration. Typically used to measure concentrations of natural gas or gases that can not be ionized by the PID. Use of an FID may not be intrinsically safe for use on high hazard sites where there is a danger of reaching the lower explosive limit of the gas being measured. FIDs are typically calibrated using methane. **Always follow the manufacturer's instructions for calibrating the FID and for calculating response and correction factors.**
- **Combustible Gas Meters – Measure 10% of the LEL** or Lower Explosive Limit for the particular gas of concern – check the MSDS for the LEL. Combustible gas meters are usually equipped with an oxygen monitor measuring in % Oxygen. These meters are used in potentially explosive environments or where the PID measurement is at or above 100ppm.
  Example: Gasoline has an LEL of 1.7%. 1% = 10,000 PPM. LEL of 1.7% = 17,000 PPM and 10% of that is 1700 PPM.
- **Draeger Tubes** – colorimetric tubes where air sample is pulled through the tube using a pump. The results are read from the color change on the tube. Follow the manufacturer's directions.
- Use of PDA's, cell phones, pagers or other electrical devices (with the exception of intrinsically safe monitoring instruments) are prohibited in the exclusion zone until the atmosphere is considered safe through the use of a CGI.
- The "levels for work stoppage" listed in the table below are based on measurements taken using PIDs calibrated with isobutylene; PIDs calibrated with gases other than isobutylene may have a different response factor. When calibrating with a calibration gas other than isobutylene, contact
  Phil Platcow, Director of IH/H & S, at (617) 232-7355 office/(617)899-5403 cell or
  Mike Philipp, at (619) 296-6195X240 office / (619) 985-4340 cell,
  for guidance on the air monitoring requirements.
- **These values can be modified with particular knowledge of contaminants and site conditions. Contact Director of Industrial Hygiene & Health and Safety, Alice Larsen to discuss (617) 232-7355.**
- **On sites impacted with chemicals other Petroleum products, contact Phil Platcow, Director of IH/H & S, at (617) 232-7355 office / (617)899-5403 cell or Mike Philipp, at (619) 296-6195-Ext 240 office/(619) 985-4340 cell, for guidance on the air monitoring requirements.**

CHEMICAL (OR CLASS)	MONITORING EQUIPMENT	TASK	MONITORING FREQUENCY/ LOCATION	LEVEL FOR RESPIRATOR USE	LEVEL FOR WORK STOPPAGE

12.0 WASTE CHARACTERISTICS

A.WasteGeneration(Type(s)/Quantities Expected):

Anticipated (YES/NO): YES

Types: Liquid __X__ Solid __X__Sludge __X__ Other (describe)

Quantity (Expected Volume):__NA

B.Characteristics(Expected):

Corrosive Flammable/Ignitable Radioactive Toxic

Reactive Unknown______

Other (specify) _X

C.Packaging requirements for waste material(Expected):

- DOT-approved drums
- Baker tanks—water (possibly tankers if trucked off site)___X
- Lined waste bins
- Temporary Stockpile
-

D.Disposal and/or Treatment Methods Proposed:

All wastes will be sampled and analyzed for all applicable COCs and physical properties (pH, Vapor Pressure, etc) to ensure proper waste characterization. Results of analysis will determine how and where impacted materials may be disposed of. Calgon Carbon ((503) 625-4000) will be responsible for the categorization and transportation of all waste generated on this site. All materials will be disposed of or treated in accordance with federal, state and local regulations as selected and arranged by STANTEC/CP Transportation Sites - Washington . The client (CP Transportation Sites - Washington) will be responsible for signing the manifest.

Water and iron sludge from settling tank are vacced out periodically and disposed of by Cowlitz Clean Sweep. Carbon waste is disposed of by Calgon Carbon

13.0 DETAILED PROJECT STEPS WITH HAZARD ASSESSMENTS, PRECAUTIONS AND JSAs

1. Driving to/from the job Site
2. Private Locate
3. Geo-Probe drilling
4. Soil and groundwater sampling
5. Performing Operations and Maintenance

Traffic Guidance and Control Plan:

Incidents on sites have shown the need for a well-thought out traffic guidance and control plan. This plan must consider:

- *Level of traffic activity on a site and provide for the safety of all workers on the site. E.g., a gasoline site that is open to the public should require sawhorse barricades to protect workers.*
- *Using rotating amber lights on vehicles.*
- *Using flaggers in high hazard areas.*
- *Stepping back and evaluating (PPE/SPSA) the Traffic Guidance and Control setup to see if it will really protect you.*
- *Stop Work Authority if after performing a PPE/SPSA and the set up aren't protecting you as planned.*
- *Cones and caution tape have proven ineffective in a number of situations. Other traffic guidance and control precautions include, delineators, placing vehicles between staff and the public, construction fence, etc.*
- *We must cordon off as much space as is necessary to ensure our safety. This must be discussed with clients as it may mean closing down additional gasoline pumps or entrances to a factory, etc.*
- *Personal vehicles should be parked as far away from potential traffic as possible.*
- *How contractor heavy equipment, e.g., vacuum trucks, drill rigs, cranes, loader/diggers, etc will be parked and maneuvered around the site. All heavy equipment movements must be coordinated in advance to avoid incidents.*
- *Review local regulations for: formally developed traffic guidance and control plans signed by licensed individuals, police details, flagmen, hours of activity, closure of streets to move equipment, etc.*
- *Review the STANTEC Safe Driving Procedures located in* **Attachment 6**.
- *Utilize the Journey Hazard Assessment Card to identify potential driving/journey/traffic hazards before each trip. Copies of the Journey Hazard Assessment Card are located in* **Attachment 6a**.
- *Utilize the Daily Vehicle Checklist at least once a day for each vehicle driven for STANTEC business to identify potential vehicle issues/hazards. Copies of the Daily Vehicle Inspection Checklist are located in* **Attachment 6b**.
- *Have each team member who will travel to/from the site complete a Journey Management Plan (JMP) before traveling to identify routes of travel and potential driving/journey/traffic hazards. JMP(s) should be kept with each traveling employee throughout the entire course of travel. A blank JMP is included in* **Attachment 6c**.
- *A STANTEC Vehicle Collision Kit should be kept in every vehicle used for STANTEC project work. A copy of the STANTEC Vehicle Collision Kit is located in* **Attachment 6d**.
- **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a "formally developed" Traffic Guidance and Control Plan is not available. It is also the responsibility of the SHSO to disseminate the Traffic Guidance and Control information to all site personnel during the Daily Production Safety Meeting and any other time as necessary.**

Work on this project will be conducted during the hours: **Start: 7:00 AM End: 7:00 PM Monday -- Friday**

Daily Production Safety Meeting

A safety meeting will be conducted in the morning on each working day on the site to discuss the health and safety issues for the activities to be conducted that day. The topics of the meeting will include, at a minimum, general health and safety procedures, reviewing heath and safety policies and reviewing the job hazard analyses for the tasks to be conducted. Additional safety meetings may be conducted if the scope of work changes during the day, or if other health and safety issues are identified. Suggested meeting topics and daily meeting log sheets are included in **Attachment 11**.

Hazard Communication

All employees at the Site must review this site wide HASP prior to field activities. The information in the JSAs and the attached data sheets is made available to all employees who could be affected by it prior to the time they begin their work activities. Modifications to JSAs and the accompanying data sheets are communicated during routine briefings. Consistent with OSHA regulations, STANTEC must also inform other contractors and subcontractors about the nature and level of hazardous substances at this site, and the likely degree of exposure to workers who participate in site operations.

Evacuation Information

Randomly scheduled evacuation drills may be conducted at any time during field activities. Employees should follow emergency procedures outlined in **Section 4** of this HASP and discussed during the day's daily production safety meeting.

Shutoff valves/switches for utilities and products: **It is the responsibility of the SHSO to annotate the Site Plan with the location of all shutoff valves and switches and to disseminate that information to all site personnel during the Daily Production Safety Meeting and any other time as necessary.**

Personal Protective Equipment

The site-specific Personal Protective Equipment (PPE) ensembles and materials are identified in the Job Safety Analysis (JSA) sheets located later in this section. The PPE ensembles listed in each JSA has been identified as appropriate to protect the worker for the task addressed. The PPE ensembles are consistent with Appendix B of 29 CFR 1910.120. PPE is to be used in accordance with manufacturers' recommendations.

Personal Safety Concerns and Precautions: **"There are no other safety concerns associated with this site other than those normally encountered on a hazardous waste site."**

Jewelry safety: **Jewelry can be dangerous. Large ear rings, long necklaces, loose-fitting bracelets, rings, watches, etc. can become entangled in machinery and cause removal of limbs, as well as be conductive of electricity. Use caution and avoid unnecessary hazards!**

Personal Hygiene

No eating, drinking or tobacco use within the exclusion zone. Wash your hands, face, arms, and neck (i.e. any exposed skin) before leaving the site.

Permits

This HASP will serve as the general permit to work for this site. Other permits that may be required such as, authorization to work, confined space entry, and other required "work" permits are to be kept in **Attachment 7**.

Additional Physical and Biological Concerns

Any additional health and safety issues such as **physical concerns** (including but not limited to uneven terrain, electrical fencing, buried spikes, tsunamis, holes, extreme heat/cold etc) or **biological concerns** (including but not limited to poisonous spiders, bees/wasps/other flying/stinging insects, gophers (holes), wild dogs, poisonous/allergenic plants, etc) should be identified prior to work with precautionary measures listed in **Attachment 8**.

Material Safety Data Sheets

Material Safety Data Sheets (MSDSs) for all compounds used and/or found on site should be obtained prior to work on site. Current copies of MSDSs are to be maintained on site in this HASP in **Attachment 9**.

Cameras

Prior to using a camera or other electronic recording devices on this site, all contractors and/or visitors must obtain written approval from the property owner and/or Conoco Phillips Project Manager.

Task 1. Driving to/from the job Site Job Safety Analysis (JSA)

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	Christina DeJarlais	OE Coordinator	10/4/2006		
	Gary Sparks	Project Geologist	12/5/2006		
	Anthony Evans	Project Geologist	12/6/2006		
X	Michael Philipp	West Region Health and Safety Manager	10/4/2006		
			12/6/2006	Michael Philipp	West Region Health and Safety Manager
Site specific edits to this JSA were made by					
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Perform PPE/SPSA procedures.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip/trip/falls, struck by traffic	● Assess the potential hazards. Analyze how to reduce the risk. Act to ensure trailer use is performed safely STANTEC/Contractor. ● Review JSA STANTEC/Contractor. ● Verify trailer wheels are chocked STANTEC/Contractor
Verify Journey Management Plan is complete and current		Unexpected traffic detours	● Assure directions are available and understood prior to commencing travel STANTEC/Contractor. ● Pull the vehicle into a safe location if additional directions must be confirmed STANTEC/Contractor. ● Increase following distance to allow extra time to stop if you are in unfamiliar territory - STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Set up necessary traffic guidance and control equipment (as necessary).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment Slip, Trip, FallsIf trailer load is centered, or toward the rear, it will cause the trailer to sway, sometimes violently.	● Use buddy system for placing traffic guidance and control equipment. STANTEC/Contractor. ● Create a traffic guidance and control plan to address traffic issues STANTEC/Contractor. ● Adhere to approved Traffic Guidance and Control Plans when working in roadways. STANTEC/Contractor. ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available. STANTEC.
Verify a Vehicle Collision Kit, a 3-lb type ABC fire extinguisher and other as needed emergency equipment is in the vehicle	Fire extinguisher	Fire in vehicle, vehicle incident	● Verify prepared field kit is in the vehicle. Inventory of the kit should include first aid kit, blood borne pathogen kit, fire extinguisher, collision kit, flashlight, sampling tools, etc. STANTEC/Contractor. ● For cold weather areas the inventory should also include a bag of sand, a bag of salt, gloves, wool socks, wool caps, wool blankets, tire chains, small shovel and matches STANTEC/Contractor.
Perform perimeter walk around of vehicle for damage or unusual conditions.	Window scraper	Flat tire, blowout, impaired vision, collision, slippery surfaces, injury or death.	● Complete the STANTEC Daily Vehicle Checklist prior to travel STANTEC/Contractor. ● Assure tires are properly inflated and there is sufficient tread STANTEC/Contractor. ● Assure there are no cuts or bulges in the sidewalls STANTEC/Contractor ● Assure windshield and window glass is clean STANTEC/Contractor ● Lift wiper arms and check wiper blades for damage or deterioration STANTEC/Contractor. ● Check behind vehicle for obstructions STANTEC/Contractor. ● Check under vehicle engine for evidence of fluid leaks STANTEC/Contractor. ● Do not touch metal with moist or wet skin STANTEC/Contractor. ● Scrap windows, front and rear windshields STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Identify appropriate towing equipment	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Trailer and tow vehicle not mechanically compatible (hitch size, weight restriction, etc.); Damage to trailer, towing vehicle, cargo; Physical injury during hook-up.	● Review towing vehicle mechanical specifications as pertains to towing (load capacity, height of load, safe towing speed) STANTEC/Contractor. ● Review trailer specifications (Manufacturer Identification Tag (weight limit, etc)) STANTEC/Contractor. ● Confirm hitch size compatibility (The ball size is listed on both the ball and hitch) STANTEC/Contractor. ● Confirm that the hitch is in good working condition (nut on bottom that tightens the hitch is snug and set properly) STANTEC/Contractor. ● Towing a trailer use should only be accomplished by individuals that have the appropriate training/licensing STANTEC/Contractor.
Inspect trailer.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip/trip/falls, equipment malfunction, traffic, trailer rolling.	● Verify trailer tires are chocked STANTEC/Contractor. ● Inspect: hitch, wiring, cargo tie down points, loose equipment, tires, chains, sway bars, and brakes, as applicable STANTEC/Contractor.
Check and adjust seat, mirrors, headlamps, turn signals, washer/wipers.	Window scraper	Back or body strain. Blind spots. Inability to signal intentions. Streaking windshield, impaired vision.	● Adjust seat so back is fully supported, upper arms close to body, and pedals within easy reach STANTEC/Contractor. ● Lower steering wheel so hands are below shoulders and shoulders are relaxed STANTEC/Contractor. ● Check mirror adjustments each time vehicle is re-started STANTEC/Contractor. ● Test operations of front and rear turn signals STANTEC/Contractor STANTEC/Contractor. ● Locate and test operation of headlamps, wiper and washer switches STANTEC/Contractor. ● Verify heater and windshield defroster fan operates properly STANTEC/Contractor.
Site specific emergency equipment		Unexpected situations.	● When applicable, each vehicle is to be outfitted with site specific emergency equipment in the vehicle (i.e. snake bite kit, hypothermia kit) STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Fasten seat belts.		Increased risk of more serious injury or death in collision.	● Assure seat belt is in good condition and fastened STANTEC/Contractor ● Assure all passenger seat belts are in good condition and fastened STANTEC/Contractor.
Lock doors.		Ejection from vehicle in collision. Unwanted intrusion.	● Lock all doors to vehicle STANTEC/Contractor.
Cellular Phone Usage		Driver distractions and static electric discharge that could lead to preventable incidents	● Always turn cellular phones to the off position before starting the engine STANTEC/Contractor. ● Do not use cellular phones when refueling STANTEC/Contractor.
Start engine and let vehicle warm up.		Unexpected movement.	● Refer to Manufacturers vehicle manual for warm up times STANTEC/Contractor. ● Assure that transmission is in 'Park' or neutral if a standard transmission and that parking brake is set STANTEC/Contractor.
Check heater, defroster, gauges and warning lights.		Overheated engine or break-down due to lack of critical fluids. Brake failure. Stranding.	● Assure there is sufficient gas, oil and other critical fluids STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Back towing vehicle to trailer hitch.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip/trip/falls, back strain, pinch points. Personal injury or equipment damage. Potential collision due to equipment failure. Struck by vehicle.	● Verify trailer wheels are chocked STANTEC/Contractor ● Trailer and tow vehicle should be located on a level area STANTEC/Contractor ● Clear obstructions from loading areas STANTEC/Contractor. ● Use a spotter to back tow vehicle to the trailer. Spotter shall be in a position to see the driver, towing hitch and be out of the way of the towing vehicle as it reverses STANTEC/Contractor. ● Ensure trailer is high enough for ball to clear the hitch without making contact STANTEC/Contractor. ● Utilize safe lifting techniques STANTEC/Contractor. ● Keep hands free of pinch points/moving parts especially around the ball and hitch, pins or other connecting points STANTEC/Contractor. ● Back up slowly to avoid overcompensating for steering errors STANTEC/Contractor. ● Do not try to reposition the trailer by hand. Move the towing vehicle as necessary STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Attaching the trailer to the towing vehicle.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip/trip/falls, back strain, pinch points. Personal injury or equipment damage. Potential collision due to equipment failure.	● Keep hands free of pinch points/moving parts especially around the ball and hitch when lowering the trailer, pins or other connecting points STANTEC/Contractor. ● If the trailer has never been towed before, use the following procedure to adjust the height of the ball (or pintle hook) STANTEC/Contractor.1.Level the trailer using the tongue jack.2. Adjust the height of the ball (or pintle hook) so the trailer is level once it is connected to the towing vehicle.3. Ensure the lock mechanism grasps the ball (or the lunette eye) securely.4. Secure the trailer hitch and ball with the latch. Ensure the latch is secured with the appropriate hardware (pin, lock, or a bolt with a self locking nut). Do not use nail, wire or tape.5. Secure sway bars (as required).6. Measure the height from the bottom of the bumper to the ground at all four corners. The vehicle should squat somewhat but be close to sitting level. If the tow vehicle squats unequally, a weight distributing hitch may be necessary to tow the trailer. See pictures in the definitions section below. ● Connect the safety chains from the trailer to the tow vehicle in a crisscross pattern under the trailer hitch with approximately four inches of clearance to the ground surface. (If the hitch becomes disconnected the chains will prevent the tongue from hitting the ground). When connecting a fifth wheel (gooseneck) trailer, the chains do not need to be attached in a crisscross pattern. See pictures in the definitions section below. STANTEC/Contractor. ● Make connections for the lights and brakes as appropriate. (Minimum requirements for lighting are running lights, brake lights and turn signals STANTEC/Contractor. ● Use a spotter to verify lights and brakes work properly. Replace/repair light bulbs/fuses/functions immediately after problem is identified STANTEC/Contractor. ● Tandem-axle trailers and trailers greater than 2500 lbs require trailer braking systems and emergency breakaway braking systems (Tow vehicle must have appropriate connections and controllers).

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Loading/unloading cargo onto trailer.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip, Trip, FallsBack strain.If trailer load is centered, or toward the rear, it will cause the trailer to sway, sometimes violently.	● Verify trailer wheels are chocked STANTEC/Contractor ● Trailer and tow vehicle should be located on a level area STANTEC/Contractor ● Clear obstructions from loading areas STANTEC/Contractor. ● Utilize safe lifting techniques STANTEC/Contractor. ● All dollies or ramps used to maneuver cargo onto the trailer must be inspected prior to use. Extra attention should be given to the location where the ramp meets the bed of the trailer. Ramps that slip from the edge of the trailer bed can cause serious injury. Ensure that ramps are secured to trailer bed BEFORE attempting use STANTEC/Contractor. ● Load trailer so that it is heavier at the front, which will transfer most of the weight to the rear of the tow vehicle. Approximately 60% of the gross trailer weight should be forward of the axle STANTEC/Contractor. ● Ensure the load is properly secured/tied down on the trailer and all loose chains and/or straps are secured STANTEC/Contractor. ● Once the trailer is loaded, do a complete walk around the trailer to ensure the wheel chocks have been removed and properly stowed, trailer ramps are stored and secured, all cargo/equipment is secured and tie-downs are tight, recheck all the chains, electrical and hitch connections STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Pull out of parking space.		Collision with other vehicles, pedestrians, or stationary objects.	● When pulling a trailer ALWAYS look for pull through parking first. Avoid reversing whenever possible STANTEC/Contractor. ● Verify all traffic guidance and control equipment is removed/safely stowed away STANTEC/Contractor. ● Check mirrors and over shoulder in all directions prior to pulling out of parking space STANTEC/Contractor. ● Signal if parallel parked along a street STANTEC/Contractor. ● Avoid reversing while pulling a trailer as much as possible. If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter. If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles. When clear get in vehicle, do a 360 scan then put in gear. Give two short blasts on the horn and while looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed STANTEC/Contractor.
DURING TRIP Scan - Keep your eyes moving.		Collision, injury or death to occupants or other parties.	● Move eyes at least every 2 seconds STANTEC/Contractor. ● Scan major and minor intersections before entry (left-right-left) STANTEC/Contractor. ● Check mirrors when slowing or stopping vehicle STANTEC/Contractor. ● Scan mirrors frequently, at least one mirror every 5-8 seconds STANTEC/Contractor. ● Avoid staring while evaluating road conditions STANTEC/Contractor. ● Maintain adequate spacing between your vehicle and the vehicle in front of you. (Rule of thumb two second for every 10 miles per hour (minimum of 6 seconds), double the distance during poor road conditions) STANTEC/Contractor. ● Watch for ice on road, slow down before hitting the ice, keep your foot off the brake STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Elevate elevate your line sight		Collision, injury or death to occupants or other parties.	● Maintain 12 second eye lead time (1 1/2 blocks in city traffic, 1/4 mile in highway traffic). Assess condition of traffic lights (fresh vs. stale) STANTEC/Contractor. ● Assess information from distant objects STANTEC/Contractor. ● Adjust eye lead distance to speed STANTEC/Contractor. ● Watch for ice on road, slow down before hitting the ice, keep your foot off the brake STANTEC/Contractor.
Count keep your distance		Collision, injury or death to occupants or other parties.	● Maintain safety cushion around vehicle (front, sides, rear) STANTEC/Contractor. ● Adjust vehicle space and speed to avoid unsafe intrusion by other drivers STANTEC/Contractor. ● Allow a minimum of 1 second for every 10 mph you are traveling between you and the vehicle in front of you when driving a vehicle without a trailer. STANTEC/Contractor ● It takes longer to stop when pulling a trailer due to the extra weight. Allow a minimum of 2 seconds for each 10 mph you are traveling between you and the vehicle in front of you STANTEC/Contractor. ● At signal controlled intersections, stop 10 feet behind crosswalks or behind other vehicles STANTEC/Contractor. ● When stopped, allow vehicle in front to move for 3 seconds before accelerating STANTEC/Contractor. ● Observe approaching merge areas and choose lane of least resistance STANTEC/Contractor. ● Cede right of way and allow other vehicles to merge, change lanes, make turns, etc STANTEC/Contractor. ● Watch for ice on road, slow down before hitting the ice, keep your foot off the brake STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Out have a way out		Collision, injury or death to occupants or other parties.	● Avoid being unnecessarily boxed in STANTEC/Contractor. ● Avoid sudden acceleration and deceleration STANTEC/Contractor. ● Maintain 1 second for every 10 mph (with 3 second minimum) following distance when driving a vehicle without a trailer, adjust speed to traffic conditions, scan immediate and adjacent lanes before merging STANTEC/Contractor. ● Maintain 2 seconds for every 10 mph (with 6 second minimum) following distance when pulling a trailer, adjust speed to traffic conditions, scan immediate and adjacent lanes before merging STANTEC/Contractor.
Recognize - make sure others see you.		Collision, injury or death to occupants or other parties.	● Seek eye contact with other drivers STANTEC/Contractor. ● Cover or use horn when conditions warrant STANTEC/Contractor. ● Before changing lanes, signal well in advance, check mirrors and over shoulder, and allow adequate space before changing lanes STANTEC/Contractor. ● Break early to activate brake lights STANTEC/Contractor. ● Stay out of blind spots. Gently sound horn or flash lights if unsure other driver sees you STANTEC/Contractor. ● Turn on headlamps in high traffic areas, at dusk, and in inclement weather. Do not over drive your headlights STANTEC/Contractor. ● Increase the distance between your vehicle and the vehicle in front of you at night STANTEC/Contractor.
Turning with trailer		Turning too tightly with the trailer may result in sideswiping objects with trailer.	● Signal all turns well in advance. The trailer wheels will be closer to the inside of a turn than the vehicle wheels. Use caution if swinging wide to the left STANTEC/Contractor. ● Because the arc of the turn is greater with a trailer, you cannot turn as tightly. Start a turn near the center of the street to place you on the far right side of the new street when the turn is complete. Start the turn at the outside portion of the road to complete the turn near the center of the new street. This means that you must drive slightly beyond your normal turning point. Before turning, ensure that no cars are beside the trailer on the turn side STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Passing other vehicles while towing trailer.		Not allowing extra room for the length of the trailer when passing may result in sideswiping the vehicle you were passing.When being passed by a large truck or bus, displaced air may push the trailer causing sway.	● Never pass on a hill, curve or an intersection. Leave enough room before starting to pass; acceleration will be considerably slower with added weight. Remember to allow for extra length when pulling back in after passing STANTEC/Contractor. ● When you are passed by, or passing a large truck or bus, the displaced air may push the trailer and affect the front of the trailer, causing the trailer to sway. Dont hit the brakes or make any sudden maneuvers; this will only make it worse. Slow a little and the trailer will straighten itself out STANTEC/Contractor.
Following and stopping		Sudden stops may cause the trailer to jackknife.	● It takes longer to stop with a trailer. Allow at least twice you normal stopping distance and try to anticipate all stops. Do not follow too closely behind other vehicles. Allow a minimum of 2 seconds for each 10 mph you are traveling between you and the vehicle in front of you (i.e. 20 mph = 4 seconds) STANTEC/Contractor. ● If trailer is equipped with electric brakes and an emergency stop is necessary, manual application of electric brakes for the trailer will mitigate the possibility of a jackknife STANTEC/Contractor. ● Exercise caution when nearing intersections. Remember, if someone pulls out in front of you, the stopping distance is proportional to how fast you are traveling STANTEC/Contractor.
Driving on hills		Overuse of brakes may result in overheating and loss of effectiveness.	● On down grades, use lower gears and let engine compression slow the vehicle and trailer STANTEC/Contractor. ● When going up long hills, reduce the chance of overheating by using a lower gear. Should overheating occur, pull off the road, turn off all accessories except the heater and run the engine at fast idle until the temperature returns to normal. Check for leaks, broken drive belts, cracked hoses, etc., but never open the radiator cap.
Pauses in travel	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Load shifting, chains dragging, load security, insecure connections	● If there is a pause in travel (i.e. rest stop) do another walk around the vehicle to recheck all connections to the towing vehicle and double-check the load is still secure. STANTEC

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Backing up.		Collision, injury or death to occupants or other parties.	● Make all backing maneuvers slowly and cautiously STANTEC/Contractor. ● Check mirrors and over shoulders. When parking, look for pull-through parking to avoid backing STANTEC/Contractor. ● If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter. If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles. When clear get in vehicle, do a 360 scan then put in gear. Give two short blasts on the horn and while looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed STANTEC/Contractor.
Pay attention to driving at all times		Collision, injury or death to occupants or other parties.	● Always focus on driving. Stop driving if you become distracted STANTEC/Contractor. ● Refrain from conducting involved or emotional discussions while driving - end the conversation or pull over to the side of the road if it becomes difficult to concentrate on driving while conversing with your passengers STANTEC/Contractor.
Parking		Collision, injury or death to occupants or other parties.	● Park away from other cars STANTEC/Contractor. ● Back into parking spot when possible and safe STANTEC/Contractor. ● If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter. If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles. When clear get in vehicle, do a 360 scan then put in gear. Give two short blasts on the horn and while looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed STANTEC/Contractor. ● Maintain cushion of safety from fixed objects. Set parking brake STANTEC/Contractor.
POST-TRIP - Report maintenance or mechanical problems upon returning vehicle.		Conditions worsen leading to mechanical failure resulting in accident, injury or death.	● Report vehicle problems immediately to company representative or rental car agency STANTEC/Contractor.

TASK 2: The following table addresses the generic concerns of utility locating.

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
√	Michael Allen Philipp	West Region H & S Manager	11/21/05		
	Phil Platcow, CIH,	Director of IH/H & S	11/21/05		
	Scott Jordan	National OE Coordinator	11/21/05		
			02/02/06	Michael A Philipp	West Region Health and Safety Manager
Site specific edits to this JSA were made on and by					
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Mobilize with proper equipment/supplies for Utility Locating.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, long sleeved shirt, hardhat, safety glasses with side shields, ear plugs/muffs, and leather gloves. (*Howard Leight Max foam earplugs with an NRR of 33*).	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	● Start project with Production Safety Meeting (**Attachment 8**) - STANTEC/Contractor. Discuss: -Ensure all STANTEC/Client permits are filled out appropriately and discussed - STANTEC. -potential hazards and ways to avoid them - STANTEC/Contractor. - motor vehicle safety topic - STANTEC/Contractor. - current days weather conditions - STANTEC/Contractor.. - PPE requirements - STANTEC/Contractor. - check subcontractors HASP, Certs, MSDS's, and equipment maintenance records - STANTEC. - using safe lifting procedures - STANTEC/Contractor. ● Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies - STANTEC/Contractor. ● Review permit conditions (as required) - STANTEC/Contractor. ● Conduct Plan, Prevent, Execute/Safe Performance Self Assessment - STANTEC/Contractor. ● Take your time. Do not rush - STANTEC/Contractor. ● Access the area, are there trip hazards present - STANTEC/Contractor? ● Wear safety glasses and leather work gloves when loading, unloading, and whenever material handling - STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			● Secure load in vehicle - STANTEC/Contractor. ● Use lids to debris/garbage containers. Do not leave buckets open with out a lid! Material in the bucket can spill - STANTEC/Contractor.
Set up necessary traffic control.	Wear reflective vest for traffic; steel toed and shank shoes, long sleeved shirt, hardhat, safety glasses with side shields, ear plugs/muffs and leather gloves as necessary.	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control - STANTEC/Contractor . ● Create a traffic control plan to address traffic issues - STANTEC/Contractor. ● Adhere to approved Traffic Control Plans when working in roadways - STANTEC/Contractor. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is not available** - STANTEC.
Perform Utility Locating, marking utility locations with paint.	Wear reflective vest for traffic; steel toed and shank shoes, long sleeved shirt, hardhat, safety glasses with side shields, ear plugs/muffs and leather gloves as necessary.	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement. Muscle strains/sprains from lifting equipment.	● Adhere to approved traffic control plan - STANTEC/Contractor. ● Use proper lifting techniques - STANTEC/Contractor.
Clean site/demobilize.	Steel toed and shank shoes, long sleeved shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work.	Traffic. Safety hazard left on site. Lifting hazards.	● Use buddy system as necessary to remove traffic control - STANTEC/Contractor. ● Leave site clean of refuse and debris - STANTEC/Contractor. ● Clearly mark/barricade any borings that need later topping off or curing - STANTEC/Contractor. ● Notify site personnel of departure - STANTEC. ● Use proper lifting techniques - STANTEC/Contractor.

Task 3. Performing Operations and Maintenance Job Safety Analysis (JSA)

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	David Stolcenberg	Staff Engineer	10/31/2005		
X	Michael Philipp	West Region Health and Safety Manager	10/7/2005		

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
			10/31/2005	Michael Philipp	West Region Health and Safety Manager
Site specific edits to this JSA were made by					
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with proper equipment/supplies.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, hardhat, long sleeved shirts, safety glasses with side shields, ear plugs/muffs, and leather gloves for the non-chemical aspects of work as necessary; Wear an air purifying respirator with combination organic vapor/P-100 cartridges, and other PPE as needed. (Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek, poly coated chemical resistant suit or its equivalent).	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	● Follow safe driving procedures. - STANTEC ● Employ safe lifting procedures. - STANTEC ● Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies. - STANTEC ____________ ● Review HASP and permit conditions - STANTEC ● Start project with Production Safety Meeting - STANTEC ● Develop a traffic guidance and control plan with the client and/or local agencies as applicable. Plan may include use of delineators, barrier tape, jersey barriers, snow fence, etc. - STANTEC ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available. - STANTEC ____________

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Set up necessary traffic control.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic guidance and control equipment placement.	● Use buddy system for placing traffic guidance and control equipment. - STANTEC __________ ● Reference traffic guidance and control plan section of HASP (may include specific requirements based on permits). - STANTEC __________ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available. - STANTEC __________
Perform material condition of building, system and/or compound	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Back strain, inhalation or dermal exposure to chemical hazards. Repetitive motion. Traffic hazards.	● Look for obvious damage, exposed wires, broken windows, material placed on the roof, etc. - STANTEC __________ ● Keep work area clean, minimizing slip, trip and fall hazards. - STANTEC __________ ● Pick up trash using tools and not your hands and arms. - STANTEC __________
Unload and set up equipment.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle. Trip hazards. Accident when maneuvering equipment. Lifting hazard. Electrical hazard.	● Place equipment away from pump islands or other high traffic areas. - STANTEC __________ ● Visually inspect equipment (fire extinguisher on board/available on site, no damaged hoses or electrical lines, pressurized hoses secured with whip-checks or adequate substitute, all vapor and/or water hoses firmly connected, equipment grounded). - STANTEC __________ ● Use proper lifting techniques. - STANTEC __________

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Gauge water levels and product thickness (where applicable).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate chemical resistant gloves as needed. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate hearing protection as needed.	Back strain, inhalation or dermal exposure to chemical hazards. Repetitive motion. Traffic hazards.	● Maintain safe distance from the wellhead. - STANTEC ________________ ● Employ safe lifting procedures. - STANTEC ________________ ● Initiate air monitoring - STANTEC ________________ ● Have appropriate air purifying respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - STANTEC ________________ ● Decontaminate equipment between each measurement. Decontamination will be accomplished by an Alconox wash, rinsed with tap water, and then rinsed with a distilled or de-ionized water rinse. - STANTEC ________________
Commence remedial system monitoring (where applicable).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate chemical resistant gloves as needed. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate hearing protection as needed.	Explosion or fire. Trip hazards. Unauthorized release of contaminants. Exposure to contaminants (inhalation, dermal contact). Noise. Electrical hazards.	● Follow equipment-specific operation instructions. - STANTEC ________________ ● Monitor treatment system vapor and oxygen concentrations if applicable - STANTEC ________________ ● Perform air monitoring - STANTEC ________________ ● Have appropriate air purifying respirator combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - STANTEC ________________ ● Keep work area clean, minimizing slip, trip and fall hazards. - STANTEC ________________ ● Monitor treatment system and collect data to ensure discharge is within permit parameters and capacity of any storage containers (concentrations and flow rates). - STANTEC ________________

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Collect samples in accordance with sampling plan, (where applicable).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate chemical resistant gloves as needed. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate hearing protection as needed.	Cross-contamination, improper sample labeling or storage, exposure to site contaminants. Repetitive motion. Body position.	● Label samples in accordance with sampling plan. - STANTEC ____________ ● Keep samples stored in proper containers, at correct temperature, and away from work area. Minimize splashing when collecting water samples. - STANTEC ____________ ● Perform air monitoring - STANTEC ____________ ● Have appropriate air purifying respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - STANTEC ____________ ● Decontaminate sampling equipment after collecting each sample. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums in a location determined by the O & M Technician and the Station Manager/Property Owner. - STANTEC ____________

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Proper clean up and disposal of broken sample container.	Steel toed and shank shoes, hardhat, safety glasses with side shields, long sleeved shirt, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Hand broom and dust pan.A receptacle to place the broken glass in such as a box or bucket with a lid.	Exposure to broken glass and acid (from water preservation acids)Injury	● Isolate area where broken glass is located - STANTEC ____________ ● Determine if the sample container was preserved (did it have acid in it?) - STANTEC ____________ ● Determine what to contain the broken glass in, and where to dispose of the broken glass before beginning to pick up the glass. - STANTEC ____________ ● Collect equipment needed to clean up and contain the broken glass. - STANTEC ____________ ● Minimize picking up broken glass pieces with your gloved hands. Use a dust pan if possible/practical. - STANTEC ____________ ● If broken glass is located inside a container (i.e. box), to the extent practical, leave glass inside box and put entire box into a garbage bag. Double bag if warranted. Place into dumpster. - STANTEC ____________ ● If broken glass is inside a cooler, remove all other sample containers and place in a safe location, then use hand broom and dust pan to sweep up glass in cooler. - STANTEC ____________ ● After clean up is complete, contact your Project Manager to report this Near Loss/Miss. - STANTEC ____________
Perform Electrical/Mechanical maintenance.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate electrical resistant gloves.	Slip, trip and fall hazards. Overhead hazards. Exposure to pressurized chemicals/air/gases. Chemical exposure. Vacuum and electrical hazards. Heat/cold stress.	● Use appropriate Lockout/Tagout precautions.. - STANTEC ____________ ● Perform air monitoring - STANTEC ____________ ● Have appropriate air purifying respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - STANTEC ____________

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Perform routine maintenance. (e.g., Replace air filters and belts, change oil, etc.)	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate electrical resistant gloves.	Slip, trip and fall hazards. Overhead hazards. Exposure to pressurized chemicals/air/gases. Chemical exposure. Vacuum and electrical hazards. Heat/cold stress.	● Use appropriate Lockout/Tagout precautions.. - STANTEC ____________ ● Perform air monitoring - STANTEC ____________ ● Have appropriate air purifying respirator with combination organic vapor/P 100 cartridges within 3-5 feet of work area, readily available. - STANTEC ____________ ● Dispose of all drained oil, filters, etc, in an appropriate manner. - STANTEC ____________
Store waste (water, carbon canisters, etc.) in accordance with site-specific requirements	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed.	Back strain. Traffic hazard. Improper storage or disposal. If disposing through onsite treatment system, damage or injury from improper use of equipment	● Use proper equipment to transport waste containers (pumps, drum dollies, etc). - STANTEC ____________ ● Have proper storage containment and labeling available onsite. - STANTEC ____________ ● Place materials in isolated location away from traffic and other site functions. - STANTEC ____________ ● Label waste. - STANTEC ____________ ● Coordinate proper disposal offsite (where applicable). - STANTEC ____________ ● Check to ensure bung caps and lid ring are secured. - STANTEC ____________ ● Review instructions for use of onsite treatment systems. - STANTEC ____________
Clean site/demobilize	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Traffic hazard. Lifting hazards. Safety hazard left on site.	● Use buddy system as necessary to remove traffic guidance and control equipment. - STANTEC ____________ ● Use proper lifting techniques. - STANTEC ____________ ● Leave site clean of refuse and debris. - STANTEC ____________ ● Notify station personnel of departure and location of any stored waste. - STANTEC ____________
Supervisor/SHSO must confirm all wells are closed, and/or capped and compound is secure.		Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every well. - STANTEC ____________ ● Check compound locks for being secured. Give a couple firm tugs on the lock to make sure it is actually closed - STANTEC ____________

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Package and deliver samples to lab		Bottle breakage, back strain.	● Handle and pack bottles carefully (bubble wrap bags are helpful). - STANTEC ________________ ● Use proper lifting techniques. - STANTEC ________________

Task 3: The following table addresses the generic concerns of direct push drilling.

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
√	Jocelyn Jackson	OE Coordinator	09/07/06		
	Dennis Rourke	Principal Geologist	10/03/06		
			12/06/06	Michael A Philipp	West Region Health and Safety Manager
Site specific edits to this JSA were made on and by					
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Clear drilling locations.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	● Perform PPE/SPSA procedures – STANTEC/Contractor. ● Reference Utility Clearance Review form (**Attachment 4**) - STANTEC/Contractor. ● Coordinate with Site Manger (or designee) to minimize potential conflicts – STANTEC. ● Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc - STANTEC/Contractor. ● Mark out the proposed borehole locations - STANTEC/Contractor. ● Call underground utility locating service for public line location clearance and get list of utilities being contacted. If necessary, coordinate private line locator for private property - STANTEC. ● Develop a traffic control plan with the client and local agencies as applicable. Plan may include use of delineators, barrier tape, jersey barriers, etc. *(Refer to* **Attachment 2***)* - STANTEC/Contractor. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a "formally developed" Traffic Control Plan is not available** - STANTEC.
Obtain sub-contractor		Improper equipment	● Verify records in possession are for equipment on site - STANTEC.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
equipment maintenance records prior to commencing work.		maintenance, which can cause equipment failure and possible personal injury.	● Verify maintenance is current - STANTEC.
Mobilize with proper equipment/supplies for drilling.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, goggles with face shield for operating air knife/hydro-excavation, ear plugs/muffs for hearing protection, leather gloves for the non-chemical aspects of work as necessary; Wear an air purifying respirator with combination organic vapor/ P-100 cartridges, and other PPE as needed. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek, poly coated chemical resistant suit or its equivalent*).	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	● Start project with Production Safety Meeting (**Attachment 6**) - STANTEC/Contractor. Discuss: -Ensure all STANTEC/Client permits are filled out appropriately and discussed - STANTEC. -potential hazards and ways to avoid them - STANTEC/Contractor. - motor vehicle safety topic - STANTEC/Contractor. - current days weather conditions - STANTEC/Contractor. - PPE requirements - STANTEC/Contractor. - check subcontractors HASP, Certs, MSDS's, and equipment maintenance records - STANTEC. - using safe lifting procedures - STANTEC/Contractor. ● Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies - STANTEC/Contractor. ● Review permit conditions - STANTEC/Contractor. ● Conduct Plan, Prevent, Execute/Safe Performance Self Assessment - STANTEC/Contractor. ● Take your time. Do not rush - STANTEC/Contractor. ● Assess the area, are there hazards present - STANTEC/Contractor. ● Employ proper lifting and bending techniques – STANTEC/Contractor. ● Wear safety glasses and leather work gloves when loading, unloading, and whenever material handling - STANTEC/Contractor. ● Secure load in vehicle - STANTEC/Contractor ● Use lids to debris/garbage containers. Do not leave buckets open with out a lid! Material in the bucket can spill - STANTEC/Contractor. ● Use bubble wrap or other insulating material to cushion the sample containers during transport – STANTEC ● Use the right tools to open and close well boxes. Wear leather gloves when opening/closing well boxes – STANTEC/Contractor.
Visually clear proposed drilling locations.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with	Underground and overhead installations.	● Complete Pre-Mobilization section of Utility Clearance Review form (**Attachment 4**) and adjust drilling locations as necessary - STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	side shields, and leather gloves as necessary.		
Set up necessary traffic guidance and control equipment. See **Attachment 2** for detailed plan.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control. Implement traffic control plan such as setting out delineators, construction fence and/or caution tape defining safety area - STANTEC/Contractor. ● Adhere to approved Traffic Control Plans when working in roadways - STANTEC/Contractor. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a "formally developed" Traffic Control Plan is not available-** STANTEC.
Set up exclusion zone(s) and workstations.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during set up. Slip, trip and fall hazards.	● Implement exclusion zone set-up – STANTEC/Contractor. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Exclusion Zone set up -** STANTEC. ● Set up workstations with clear walking paths to and from rig. Use delineators, with caution tape and/or construction fence – STANTEC/Contractor.
Assist with set up of drill rig.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Vehicle accident during rig movement. Damage caused by equipment while accessing set-up location. Contact with overhead installations. Soft terrain. Air knife movement.	● All staff should know where the kill switch is for the drilling rig - STANTEC/Contractor. ● Verify clear pathway to drilling location and clearance for raising mast - STANTEC/Contractor. ● Provide as-needed hand signals and guidance to driver to place rig - STANTEC/Contractor. ● Visually inspect drill rig (fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition?) - STANTEC/Contractor. ● Provide as-needed hand signals and guidance to driver to place rig - STANTEC/Contractor. ● If necessary, use wooden blocks under jacks to spread load. Chock wheels - Contractor.
Clear upper five feet (or 8 feet for Chevron) of direct push location using compressed air/water.	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, goggles with face shield for	Back strain, exposure to chemical hazards, hitting an underground utility, repetitive motion. Eye injury from airborne debris. Personal	● Initiate air quality monitoring as outlined in **Section 12** as necessary – STANTEC. ● Stand upwind to avoid exposure whenever possible- STANTEC/Contractor. ● Have appropriate respirator with combination organic vapor/P-100

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	operating air knife/hydro-excavation and suction equipment, ear plugs/muffs for hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/ P-100 cartridges if necessary. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek poly coated suit or its equivalent).*	injury from compressed air.	cartridges within 3-5 feet of work area, readily available - STANTEC/Contractor. ● Limit number of people working directly in area of AET/Air Knife/Water Excavation operation to avoid getting blasted by flying debris - STANTEC/Contractor. ● Use the PID/FID aggressively to track the airborne concentration of contaminants close to potential sources such as the core as it is being raised from the hole, the core is opened, etc – STANTEC. ● Evaluate any soil samples inside a Ziploc bag at arm's length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE - STANTEC. ● Use proper lifting techniques and tools - STANTEC/Contractor. ● Complete the Pre-Drilling section of the Borehole Clearance Review form - STANTEC/Contractor. ● Avoid twisting back during the operation; Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums - STANTEC/Contractor.
Remove loose soil from borehole.	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeved shirts, hard hat, goggles with face shield for operating air knife/hydro-excavation and suction equipment, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges if necessary.	Back strain, eye injury, exposure to chemical hazards, slip, trip and fall hazards, equipment failure, lifting hazards, overhead hazards.	● Decontaminate AET/Air Knife/Water Excavation rod after each borehole. Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a second de-ionized or distilled water rinse. Collect rinse STANTEC/Contractor. ● Use proper lifting techniques - STANTEC/Contractor. ● Conduct air monitoring as outlined in **Section 12** - STANTEC. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - STANTEC/Contractor. ● Monitor AET/Air Knife/Water Excavation progress – proceed cautiously – watching for cuttings - STANTEC/Contractor. ● Keep work area clear of tripping or slipping hazards - STANTEC/Contractor. ● Perform periodic visual inspections of AET/Air Knife/Water Excavation equipment and compressor - STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Commence direct push operations.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges if needed. Wear chemical resistant gloves if needed.	Cross-contamination from previous hole. Back strain, heat or cold, eye injury, noise, exposure to chemical hazards, hitting an underground utility, slips, trips and falls, equipment failure.	● Decontaminate sampling eq1uipment after collecting a sample. Decontaminate equipment after each use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a second de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage - STANTEC/Contractor. ● Decontaminate direct push equipment after each location. STANTEC/Contractor. ● Use proper lifting techniques - STANTEC/Contractor. ● Conduct air monitoring as outlined in **Section 12** - STANTEC. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - STANTEC/Contractor. ● Monitor direct push progress - STANTEC/Contractor. ● When driving pipe, drive cylinder should never be extended at a rate where pipe exhibits lateral flex from vertical or the rig wheels lose contact with the ground – STANTEC/Contractor. ● Use correct tools for opening sleeves (hooked safety blade) – STANTEC/Contractor. ● When opening sleeves, place on sturdy surface and cut away from body – STANTEC/Contractor. ● Do not stow tools in unsecured locations. Stow hack saws and other small tools on hooks - STANTEC/Contractor. ● Keep work area clear of tripping or slipping hazards - STANTEC/Contractor. ● Perform periodic visual inspections of direct push rig - STANTEC/Contractor.
Collect samples in accordance with sampling plan.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100	Cross-contamination, improper labeling or storage, exposure to site contaminants.	● Conduct air monitoring as outlined in **Section 12** - STANTEC. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - STANTEC/Contractor. ● Decontaminate sampling equipment between each sampling run (unless disposable). If the equipment is reusable, then decontamination will be accomplished by an Alconox wash with tap water rinse followed by a second de-ionized or distilled water rinse. Collect rinse water in 5 gallon

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
	cartridges if needed.		buckets and transfer to 55-gallon drums and stage drums - STANTEC/Contractor. ● Use proper lifting/bending techniques. Utilize knee pads or a kneeling pad - STANTEC/Contractor. ● Label samples in accordance with sampling plan - STANTEC. ● Keep samples stored in proper containers, at correct temperature, and away from work area - STANTEC. ● Determine the best location to set the sample containers (avoid stepping on them or other materials coming into contact with them. - STANTEC ● Fill sample containers slowly and over a bucket to eliminate potential spills or place sample container on bucket lid on the ground or other surface, then fill container to avoid sample container from slipping out of your nitrile gloved hand – STANTEC. ● Do not over pack cooler. - STANTEC ● Use bubble wrap or other insulating material for cushioning sample containers in the cooler. - STANTEC ● Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully. - STANTEC
Proper clean up and disposal of broken sample container.	Safety glasses, long sleeved shirts, leather work gloves. Hand broom and dust pan. A receptacle for the broken glass (something to contain the broken glass (double garbage bag, a box, or bucket).	Exposure to broken glass and acid (from water preservation acids) Injury	● Isolate area where broken glass is located - STANTEC/Contractor. ● Determine if the sample container was preserved (did it have acid in it?) - STANTEC. ● Determine what to contain the broken glass in, and where to dispose of the broken glass before beginning to pick up the glass - STANTEC. ● Collect equipment needed to clean up and contain the broken glass - STANTEC/Contractor. ● Minimize “picking up” broken glass pieces with your gloved hands. Use a dust pan if possible/practical - STANTEC/Contractor. ● If broken glass is located inside a container (i.e. box), to the extent practical, leave glass inside box and put entire box into a garbage bag. Double bag if warranted. Place into dumpster - STANTEC/Contractor. ● If broken glass is inside a cooler, remove all other sample containers and place in a safe location, then use hand broom and dust pan to sweep up glass in cooler - STANTEC. ● After clean up is complete, contact your Project Manager to report this

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
			Loss/Incident - STANTEC.
Cuttings will be picked up by shovel and placed directly in 55 gallon drums.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air purifying respirator with combination organic vapor/ P-100 cartridges as needed.	Exposure to public. Traffic hazard or obstruction/inconvenience to station operation. Improper storage or disposal. Back strain. Eye injury from airborne debris.	● Have proper storage containment and labeling available onsite. Place materials in isolated location away from traffic and other site functions. *(See next section for Waste Description)* STANTEC. ● Use appropriate drum handling procedures. Do not attempt to lift, push or move drums without the proper tools and equipment - STANTEC/Contractor. ● Conduct air monitoring as outlined in **Section 12** as necessary - STANTEC. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - STANTEC/Contractor.
Backfill borehole.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Improper grouting can lead to future vertical conduit for contaminant migration. Back strain, trip hazards, and eye injury from splashing or release of pressurized grout. Unauthorized backfilling causes extra work.	● Mix grout to specification and completely fill the hole. – STANTEC/Contractor. ● Use proper lifting/bending techniques. – STANTEC/Contractor. ● Keep work area clear of slip/trip/fall hazards. – STANTEC/Contractor.
Dispose or store purge water (if any) onsite.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Back strain. Exposure to contaminants. If disposing through onsite treatment system, damage or injury from improper use of equipment. Improper storage or disposal.	● Use appropriate drum handling practice. - STANTEC ● Use proper equipment to transport water (pumps, drum dollies, etc). - STANTEC ● Monitor air quality in accordance with Section 12. - STANTEC ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of working location, readily available. – STANTEC ● Visually inspect drums prior to use, if corroded dispose of properly. ● Label storage containers properly, and locate in isolated area away from traffic and other site functions. - STANTEC ● Coordinate offsite disposal (where applicable). - STANTEC ● Do not attempt to lift, push or move bins/drums without the proper tools and equipment. - STANTEC
Perform personal decontamination procedures.	As worn in exclusion zone.	Slips/trips/falls. Splashes, chemical contamination. Contact with contaminated materials.	● Perform personal (dry) decontamination procedures – STANTEC/Contractor. ■ Drop off tools and perform equipment decontamination procedures on the equipment - STANTEC/Contractor. ■ Perform a "dry" decontamination on boots using a stiff bristle fiberglass long handled brush - STANTEC/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			■ Remove inner/outer gloves and dispose of properly - STANTEC/Contractor. ● Wash hands, face, arms and neck (any exposed skin) using sink or bottled water. If water isn't available, use baby wipes or a similar product - STANTEC/Contractor.
Supervisor/SHSO must confirm all air-knifed/hydro-excavation locations are closed, filled in and/or capped.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every air-knifed/hydro-excavation location – STANTEC/Contractor.
Clean site/demobilize.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic. Safety hazard left on site. Lifting hazards.	● Use buddy system as necessary to remove traffic control - STANTEC/Contractor. ● Leave site clean of refuse and debris - STANTEC/Contractor. ● Clearly mark/barricade any borings that need later topping off or curing - STANTEC/Contractor. ● Notify site personnel of departure, final well locations and any cuttings/purge water left onsite - STANTEC. ● Use proper lifting techniques - STANTEC/Contractor. ● Use a mechanical aid or other colleague, as appropriate to help lift weights over 50lbs - STANTEC/Contractor. ● Be aware of sharp edges on equipment - STANTEC/Contractor. ● Ensure that all waste containers are closed before moving them - STANTEC/Contractor. ● Do not jump off the back of the pick-up - STANTEC/Contractor.

Task 4: **The following table addresses the concerns of airknifing/hydro excavation utility clearance.**

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
√	Michael Allen Philipp	Health, Safety, & Environment Professional	10/12/05		
	Scott Jordan	OE Coordinator	10/12/05		
	Dianne Burnia	National OE Coordinator	10/12/05		
			02/02/06	Michael A Philipp	Health, Safety, & Environment Professional
		Site specific edits to this JSA were made on and by			
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Clear air knifing/hydro-excavation locations.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	● Perform PPE/SPSA procedures – Stantec/Contractor. ● Reference Utility Clearance Review form (**Attachment 4**) - Stantec/Contractor. ● Coordinate with Site Manger (or designee) to minimize potential conflicts – Stantec. ● Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc - Stantec/Contractor.. ● Mark out the proposed borehole locations - Stantec/Contractor. ● Call underground utility locating service for public line location clearance and get list of utilities being contacted. If necessary, coordinate private line locator for private property - Stantec. ● Develop a traffic control plan with the client and local agencies as applicable. Plan may include use of delineators, barrier tape, jersey barriers, etc. *(Refer to* **Attachment 2***)* - Stantec/Contractor. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a "formally developed" Traffic Control Plan is not available** - Stantec.
Obtain sub-contractor equipment maintenance records prior to commencing work.		Improper equipment maintenance, which can cause equipment failure and possible personal injury.	● Verify records in possession are for equipment on site - Stantec. ● Verify maintenance is current - Stantec.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Mobilize with proper equipment/supplies for air knifing/hydro-excavation.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, (chemical splash goggles and a full face shield during air knife procedures), ear plugs/muffs for hearing protection, leather gloves for the non-chemical aspects of work as necessary; Wear an air purifying respirator with combination organic vapor/ P-100 cartridges, and other PPE as needed. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek, poly coated chemical resistant suit or it's equivalent*).	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	● Start project with Production Safety Meeting (**Attachment 6**) - Stantec/Contractor. Discuss: -Ensure all Stantec/Client permits are filled out appropriately and discussed - Stantec. -potential hazards and ways to avoid them - Stantec/Contractor. - motor vehicle safety topic - Stantec/Contractor. - current days weather conditions - Stantec/Contractor.. - PPE requirements - Stantec/Contractor. - check subcontractors HASP, Certs, MSDS's, and equipment maintenance records - Stantec. - using safe lifting procedures - Stantec/Contractor. ● Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies - Stantec/Contractor. ● Review permit conditions - Stantec/Contractor. ● Conduct Plan, Prevent, Execute/Safe Performance Self Assessment (assess the site for hazards) - Stantec/Contractor. ● Take your time. Do not rush - Stantec/Contractor. ● Wear safety glasses and leather work gloves when loading, unloading, and whenever material handling - Stantec/Contractor. ● Secure load in vehicle - Stantec/Contractor ● Use lids to debris/garbage containers. Do not leave buckets open with out a lid! Material in the bucket can spill - Stantec/Contractor. ● Use bubble wrap or other insulating material to cushion the sample containers during transport – Stantec ● Use the right tools to open and close well boxes – Stantec/Contractor.
Visually clear proposed air knife/hydro-excavation locations.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Underground and overhead installations.	● Complete Pre-Mobilization section of Utility Clearance Review form (**Attachment 4**) and adjust drilling locations as necessary - Stantec/Contractor. ● Complete the checklist in the Air/Hydro Knifing/Vacuum Extraction SOP – Stantec/Contractor.
Set up necessary traffic guidance and control equipment. See **Attachment 2** for detailed plan.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control. Implement traffic control plan such as setting out delineators, construction fence and/or caution tape defining safety area - Stantec/Contractor. ● Adhere to approved Traffic Control Plans when working in roadways - Stantec/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a "formally developed" Traffic Control Plan is not available-** Stantec.
Assist with set up of air knife/hydro-excavation equipment.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Vehicle accident during rig movement. Damage caused by equipment while accessing set-up location. Contact with overhead installations. Soft terrain. Air knife movement.	● All staff should know where the kill switch is for the drilling rig - Stantec/Contractor. ● Mast should be in the "down" position before moving the rig – Stantec. ● Verify clear pathway to drilling location and clearance for raising mast - Stantec/Contractor. ● Provide as-needed hand signals and guidance to driver to place rig - Stantec/Contractor. ● Visually inspect drill rig (fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition?) - Stantec/Contractor. ● Allow plenty of room between the rig and other obstacles to provide ample work space for the crew – Stantec. ● If necessary, use wooden blocks under jacks to spread load - Contractor. ● Chock wheels - Contractor.
Set up exclusion zone(s) and workstations.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during set up. Slip, trip and fall hazards.	● Implement exclusion zone set-up utilizing delineators, construction fence and/or caution tape – Stantec/Contractor. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Exclusion Zone set up -** Stantec. ● Set up workstations with clear walking paths to and from rig. Use caution tape and/or construction fence and delineators – Stantec/Contractor. ● **Set up deflection shields or over borehole shield device –** Stantec/Contractor.
Clear upper five feet (or 8 feet for Chevron) of air knife/hydro-excavation location using compressed air/water.	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, (chemical splash goggles and a full face shield during air knife procedures), ear plugs/muffs for hearing protection, reflective safety vest, and leather gloves for the	Back strain, exposure to chemical hazards, hitting an underground utility, repetitive motion. Eye injury from airborne debris. Personal injury from compressed air.	● Initiate air quality monitoring as outlined in **Section 12** as necessary – Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor. ● Limit number of people working directly in area of AET/Air Knife/Water Excavation operation to avoid getting blasted by flying debris. **All personnel other than the AET/Air Knife/Water Excavation operators**

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/ P-100 cartridges if necessary. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek poly coated suit or it's equivalent).*		**should remain 20 -30 feet away from the borehole** - Stantec/Contractor. ● Keep wand pointed away from personnel/equipment – Stantec/Contractor. ● Stand upwind to avoid exposure whenever possible- Stantec/Contractor. ● Use the PID/FID aggressively to track the airborne concentration of contaminants close to potential sources such as the core as it is being raised from the hole, the core is opened, etc – Stantec. ● Evaluate any soil samples inside a Ziploc bag at arm's length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE - Stantec. ● Use proper lifting techniques and tools - Stantec/Contractor. ● Complete the Pre-Drilling section of the Borehole Clearance Review form - Stantec/Contractor. ● Avoid twisting back during the operation; Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums - Stantec/Contractor.
Remove loose soil from borehole.	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeved shirts, hard hat, goggles and/or face shield, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges if necessary.	Back strain, eye injury, exposure to chemical hazards, slip, trip and fall hazards, equipment failure, lifting hazards, overhead hazards.	● Decontaminate AET/Air Knife/Water Excavation rod after each borehole. Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums - Stantec/Contractor. ● Use proper lifting techniques - Stantec/Contractor. ● Conduct air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor. ● Monitor AET/Air Knife/Water Excavation progress – proceed cautiously – watching for cuttings - Stantec/Contractor. ● Keep work area clear of tripping or slipping hazards - Stantec/Contractor. ● Perform periodic visual inspections of AET/Air Knife/Water Excavation equipment and compressor - Stantec/Contractor.
Backfill borehole with sand or native material, cold patch surface (If Drilling on separate	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeved shirts, hard	Back strain, eye injury, exposure to chemical	● Use proper lifting techniques – Stantec/Contractor. ● Avoid identified pinch points on AET/Air Knife/Water Excavation rig –

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
day)	hat, goggles and/or face shield, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges if necessary.	hazards, slip, trip and fall hazards, equipment failure, lifting hazards, overhead hazards	Stantec/Contractor. ● Conduct air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor. ● Monitor AET/Air Knife/Water Excavation progress – proceed cautiously – watching for cuttings - Stantec/Contractor. ● Keep work area clear of tripping or slipping hazards - Stantec/Contractor. ● Perform periodic visual inspections of AET/Air Knife/Water Excavation equipment and compressor - Stantec/Contractor.
Commence drilling operation (If drilling same day).	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges if needed. Wear chemical resistant gloves if needed.	Cross-contamination from previous hole. Back strain, heat or cold, eye injury, noise, exposure to chemical hazards, hitting an underground utility, slips, trips and falls, equipment failure.	● Decontaminate sampling after collecting a sample and decontaminate drilling equipment after each borehole - Stantec/Contractor. ● Use proper lifting techniques - Stantec/Contractor. ● Conduct air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor. ● Monitor drilling progress - Stantec/Contractor. ● Keep work area clear of tripping or slipping hazards - Stantec/Contractor. ● Perform periodic visual inspections of drill rig - Stantec/Contractor.
Collect samples in accordance with sampling plan.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges if needed.	Cross-contamination, improper labeling or storage, exposure to site contaminants.	● Evaluate any soil samples inside a Ziploc bag at arm's length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE - Stantec. ● Decontaminate sampling equipment between each sampling run - Stantec/Contractor. ● Label samples in accordance with sampling plan - Stantec. ● Keep samples stored in proper containers, at correct temperature, and away from work area - Stantec. ● Conduct air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Cuttings will be picked up by a post-hole digger or suction line/vac truck	Steel toed and shank shoes, hardhat, safety glasses with side shields, goggles with face shield when in the vicinity of the air knife/hydro-excavation equipment, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air purifying respirator with combination organic vapor/ P-100 cartridges as needed.	Exposure to public. Traffic hazard or obstruction/inconvenience to station operation. Improper storage or disposal. Back strain. Eye injury from airborne debris.	● Have proper storage containment and labeling available onsite. Place materials in isolated location away from traffic and other site functions. *(See next section for Waste Description)* Stantec. ● Do not attempt to lift, push or move drums without the proper tools and equipment - Stantec/Contractor. ● Conduct air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor.
Construct well.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Back strain, eye injury, slip, trip and fall hazards. Cross-contamination. Non-approved well construction.	● Use proper lifting techniques - Stantec/Contractor. ● Keep pathways from well supplies to borehole clear of tripping hazards - Stantec/Contractor. ● Make sure casing and other materials are clean before going into borehole Stantec/Contractor. ● Verify presence or other authorization by any required inspectors for well installation/grouting - Stantec/Contractor.
Cut pavement to set well vault.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work. If you suspect that equipment is contaminated, wear chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Moving blade, eye hazards, exhaust from motor, noise, back strain. Particulate inhalation. Traffic hazards.	● Employ proper lifting techniques or mechanical assistance - Stantec/Contractor. ● Keep work area clear of debris - Stantec/Contractor. ● Maintain traffic control and face oncoming traffic - Stantec/Contractor. ● Conduct air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor.
Install well vault and set in concrete.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that	Back strain, eye injury, skin exposure to concrete, particulate inhalation, slip, trip and fall hazards. Traffic hazards.	● Use proper lifting technique and equipment to install well vault and in concrete preparation - Contractor. ● Complete well vault smooth to grade to eliminate trip hazard (if slightly elevated to prevent storm water intrusion, slope concrete skirt gradually) - Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	equipment is contaminated, wear chemical resistant gloves. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.		● Maintain traffic control and face oncoming traffic - Stantec/Contractor. ● Perform air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor.
Develop well by hand bailing or vacuum truck	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Physical injury from mechanical failure vacuum truck. Trip hazard. Exposure to contaminants. Cross-contamination. Electric shock. Back strain.	● Make sure equipment is in good working order and pressurized hoses are whip-checked - Stantec/Contractor. ● Perform air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - Stantec/Contractor. ● Keep work area orderly - Stantec/Contractor. ● Decontaminate all equipment going into well - Stantec/Contractor. ● Any generators must be equipped with GFCI circuit - Stantec/Contractor.
Gauge water levels and product thickness (where applicable) in wells.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear chemical resistant suit as needed.	Back strain, inhalation or dermal exposure to chemical hazards, repetitive motion.	● Perform air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of working location for quick access - Stantec/Contractor. ● Maintain safe distance from wellhead - Stantec/Contractor. ● Bend at knees, not at the waist - Stantec/Contractor.
Purge well(s) and collect purge water. Purging of the wells can be done by using one of two methods, by hand bailer or vacuum truck. If a hand bailer is used, collected water will be transferred to a 55-gallon drum .	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work. If you suspect that equipment is contaminated, wear chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear chemical resistant suit as	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Spilling contaminated water.	● Decontaminate purging equipment between each sampling location. Two methods of equipment decontamination will be used on this site. If disposable bailers are used, then they will be properly disposed of. If the bailers are reusable, then they will be washed in an Alconox wash, rinsed with tap water, then rinsed with de-ionized or distilled water. Decontamination water will be transferred to 55-gallon drums and staged - Stantec/Contractor. ● Use proper lifting techniques - Stantec/Contractor. ● Perform air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of working location , readily available -

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
	needed.		Stantec/Contractor. ● Keep work area clear of tripping or slipping hazards - Stantec/Contractor. ● Store purge water in 55-gallon drums and stage - Stantec/Contractor.
Collect groundwater samples in accordance with sampling plan.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Improper labeling or storage, injury from broken sample bottle (cuts or acid burn). And spills.	● Decontaminate sampling equipment between each well (unless disposable) - Stantec/Contractor. ● Perform air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor P-100 cartridges within 3-5 feet of working location for quick access - Stantec/Contractor. ● Label samples in accordance with sampling plan - Stantec. ● Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully - Stantec. ● Use proper lifting and bending techniques. Use knee pads or a kneeling pad - Stantec/Contractor. ● Determine the best location to set the sample containers (avoid stepping on them, or other materials coming into contact with them) - Stantec/Contractor. ● Fill sample containers slowly and over a bucket to eliminate potential spills. Or place sample container on bucket lid on the ground or other surface, then fill container. To avoid sample container from slipping out of your nitrile gloved hand - Stantec. ● Do not over pack cooler - Stantec. ● Use bubble wrap or other insulating material for cushioning sample containers in the cooler - Stantec.
Proper clean up and disposal of broken sample container.	Safety glasses Long sleeved shirts Leather Work Gloves Hand Broom and Dust Pan A receptacle for the broken glass (something to contain the broken glass (double garbage bag, a box, or bucket).	Exposure to broken glass and acid (from water preservation acids) Injury	● Isolate area where broken glass is located - Stantec/Contractor. ● Determine if the sample container was preserved (did it have acid in it?) - Stantec. ● Determine what to contain the broken glass in, and where to dispose of the broken glass before beginning to pick up the glass - Stantec. ● Collect equipment needed to clean up and contain the broken glass - Stantec/Contractor. ● Minimize "picking up" broken glass pieces with your gloved hands. Use a dust pan if possible/practical - Stantec/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			● If broken glass is located inside a container (i.e. box), to the extent practical, leave glass inside box and put entire box into a garbage bag. Double bag if warranted. Place into dumpster - Stantec/Contractor. ● If broken glass is inside a cooler, remove all other sample containers and place in a safe location, then use hand broom and dust pan to sweep up glass in cooler - Stantec. ● After clean up is complete, contact your Project Manager to report this Loss/Incident - Stantec.
Dispose or store purge water (if any) onsite.	Steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Back strain. Exposure to contaminants. If disposing through onsite treatment system, damage or injury from improper use of equipment. Improper storage or disposal.	● Use proper equipment to transport water (pumps, drum dollies, etc.). ● Perform air monitoring as outlined in **Section 12** - Stantec. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of working location for quick access - Stantec/Contractor. ● Label storage containers properly, and locate in isolated area away from traffic and other site functions - Stantec/Contractor. ● Coordinate offsite disposal (where applicable) - Stantec. ● Do not attempt to lift, push or move drums without the proper tools or equipment - Stantec/Contractor.
Perform personal decontamination procedures.	As worn in exclusion zone.	Slips/trips/falls. Splashes, chemical contamination. Contact with contaminated materials.	● See **Personal Decontamination (Wet) JSA** – Stantec/Contractor. ● Perform personal (dry) decontamination procedures –Stantec/Contractor. ■ Drop off tools and perform equipment decontamination procedures on the equipment - Stantec/Contractor. ■ Perform a "dry" decontamination on boots using a stiff bristle fiberglass long handled brush - Stantec/Contractor. ■ Remove inner/outer gloves and dispose of properly - Stantec/Contractor. ● Wash hands, face, arms and neck (any exposed skin) using sink or bottled water. If water isn't available, use baby wipes or a similar product - Stantec/Contractor.
Supervisor/SHSO must confirm all air-knifed/hydro-excavation locations are closed, filled in and/or capped.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-	Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every air-knifed/hydro-excavation location – Stantec/Contractor.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	chemical aspects of work as necessary.		
Clean site/demobilize.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic. Safety hazard left on site. Lifting hazards.	● Use buddy system as necessary to remove traffic control - Stantec/Contractor. ● Leave site clean of refuse and debris - Stantec/Contractor. ● Clearly mark/barricade any borings that need later topping off or curing - Stantec/Contractor. ● Notify site personnel of departure, final well locations and any cuttings/purge water left onsite - Stantec. ● Use proper lifting techniques - Stantec/Contractor. ● Use a mechanical aid or other colleague, as appropriate to help lift weights over 50lbs - Stantec/Contractor. ● Be aware of sharp edges on equipment - Stantec/Contractor. ● Ensure that all waste containers are closed before moving them - Stantec/Contractor. ● Do not jump off the back of the pick-up - Stantec/Contractor.

Task 5. The following table addresses the concerns with Monitoring Well Sampling/Gauging.

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	Stephen R Zayko	RI Manager Purity and BeeJay Scales	1/13/2006		
	Michael A Philipp	West Region Health and Safety Manager	09/23/05		
	Michele Boswell	Project Scientist	09/23/05		
			03/29/07	Michael A Philipp	West Region Health and Safety Manager
	Site specific edits to this JSA were made on and by				

If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current

POC is the JSA development 'Point Of Contact'

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
Mobilize with proper equipment/supplies for sampling.	Gather necessary equipment and supplies: Scope of Work, or sampling plan HASP, including Journey Management Plan, Steel-toed and shank boots, Long sleeve shirt. Hardhat, Hearing protection (NRR 33), if needed Full Face Respirator with organic vapor/P-100 combo cartridges, Safety glasses and Safety Sun Glasses, Leather work gloves Chemical resistant gloves and *Tyvek*. Safety Vest, Sun block/Insect Repellant First Aid & Blood borne Path. Kit, Eye Wash Bottle, Fire Extinguisher	Back or muscle strain (lifting hazard), Motor Vehicle Crash Delay or improper performance of work due to improper equipment onsite. Exposure to broken glass Injury from material handling	● Conduct Plan Prevent Execute/Self Assessment Safe Performance procedures – STANTEC/Contractor. ● Assess the site for slip/trip/fall hazards, biological and chemical hazards, unsafe conditions, traffic hazards, etc - STANTEC/Contractor. ● Take your time. Do not rush - STANTEC/Contractor. ● Start project with Daily Production Safety Meeting (**Attachment 6**) - STANTEC/Contractor Include in the discussion; -potential hazards and ways to avoid them - STANTEC/Contractor. -motor vehicle safety topic - STANTEC/Contractor. -current days weather conditions - STANTEC/Contractor. -PPE requirements - STANTEC/Contractor. -check subcontractors HASP, Certs, MSDS's, and equipment maintenance records as applicable - STANTEC ● Follow safe driving procedures - STANTEC/Contractor. ● Employ proper lifting and bending procedures - STANTEC/Contractor. ● Wear safety glasses and leather work gloves when loading, unloading, and whenever material handling STANTEC/Contractor. ● Secure load in vehicle - STANTEC/Contractor. ● Use lids to debris/garbage containers. Do not leave buckets open with

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			out a lid! Material in the bucket can spill STANTEC/Contractor. ● Use bubble wrap or other insulating material to cushion the sample containers during transport STANTEC/Contractor. ● Use the right tools to open and close well boxes. Wear leather work gloves when opening the well boxes - STANTEC/Contractor. ○ **Wear leather gloves when walking/working in areas with brush or other undergrowth** – STANTEC/Contractor.
Set up necessary traffic control.	Wear reflective traffic vest, steel toed and shank shoes, long sleeve shirt, hardhat.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control - STANTEC/Contractor. ● Reference traffic control plan (See **Attachment 2**) - STANTEC/Contractor. ● **It is the responsibility of the Supervisor / SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is not available** - STANTEC.
Set up exclusion zone(s).	Wear reflective traffic vest, steel toed and shank shoes, long sleeve shirt, hardhat.	Struck by vehicle. Slip and fall hazards to workers.	● Implement exclusion zone set-up instructions - STANTEC/Contractor. ● **It is the responsibility of the Supervisor / SHSO to annotate the site Plan with the Exclusion Zone configuration** STANTEC. ● Set up clear walking paths between workstations - STANTEC/Contractor.
WARNING – Some wells may be under pressure and pose a hazard when the cap is released for access. Care must be taken when removing the well cap.	Wear steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges as necessary.	Struck by vehicle, back strain, inhalation or dermal exposure to chemical hazards (splashes), repetitive motion.	● Review site plan with system layout, understand system layout and operation, including well field - STANTEC. ● Identify wells to be accessed for monitoring - STANTEC. ● Assume well(s) are within a zone of positive pressure from the active air sparging system – STANTEC.. ● Use appropriate Traffic Guidance & Control equipment – STANTEC. ● Assess remediation system area for potential hazards - STANTEC. ● Enter remediation system area and perform job steps - STANTEC. ● Use caution when removing lid and wear appropriate gloves – STANTEC. ● Loosen and remove cap slowly with head and face away from potential trajectory of popping well cap. ● Ensure no bystanders are within potential trajectory of flying well cap.
Gauge water levels and product thickness (where	Don required PPE as appropriate for this step: steel toed and shank shoes,	Back strain, inhalation or dermal exposure to chemical	● Initiate air quality monitoring in accordance with **Section 12 -**

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
applicable) in wells.	long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges as necessary.	hazards, repetitive motion.	STANTEC. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3 – 5 feet of working location, readily available - STANTEC/Contractor. ● Maintain safe distance from wellhead - STANTEC/Contractor. ● Use proper lifting techniques - STANTEC/Contractor. ● Decontaminate equipment between each measurement - STANTEC/Contractor.
Purge well(s) and collect purge water. Purging of the wells can be done by using one of three methods, by hand bailer (manual or quickie hand bailer) , vacuum truck or battery operated pump. If a hand bailer or battery operated pump are used, collected water will be transferred to a 55-gallon drums. If the vacuum truck is used there will be no collected water.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air-purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate chemical resistant suit as needed.	Cross-contamination. Back and or arm strain, inhalation or dermal exposure to chemical hazards, slip and fall. Spilling contaminated water. Potential electrical shock.	● Decontaminate purging equipment between each sampling location. (Two methods of equipment decontamination can be used. If disposable bailers are used, then they will be properly disposed of. If the bailers are reusable *then* they will be washed in an Alconox wash, rinsed with tap water, then rinsed with a de-ionized or distilled water rinse. Wash/rinse water will be transferred to 55-gallon drums and staged - STANTEC/Contractor. ● When moving 5 gallon buckets from one position to another position place the lids on the buckets to prevent spilling – STANTEC/Contractor ● Use proper stretching techniques prior to beginning work – STANTEC/Contractor. ● Use proper lifting techniques STANTEC/Contractor. ● Perform air monitoring in accordance with **Section 12** - STANTEC. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3 – 5 feet of working location, readily available - STANTEC/Contractor. ● Keep work area clear of tripping or slipping hazards - STANTEC/Contractor. ● Store purge water in 55-gallon drums. . Drums will be staged at - STANTEC/Contractor. ● **Drums containing flammable/combustible liquids or solids must be grounded and if there are multiple drums bonded together -** STANTEC/Contractor. ● **Use extreme care when opening the bung caps. Stand an arms length away and open the bung slowly to relieve any built up**

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			pressure - STANTEC/Contractor.
Purge wells using a battery operated pump	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air-purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate chemical resistant suit as needed. Level D PPE with nitrile gloves, Traffic Vest, Exclusion Zone Equipment, Leather Work Gloves.	Electrical shock, electrocution, fire hazards, cross-contamination.	● Currently STANTEC is using 12 Volt Direct Current (DC) submersible pumps (model: Tempest Proactive Environmental Products www.gopronow.biz). **USE BATTERY CLAMPS ONLY ON THIS PUMP** - STANTEC! ● The manufacturer recommends a minimum 12 volt to maximum 15 volt DC power supply. **DO NOT PLUG INTO ATERNATING CURRENT (AC) OUTLET** - STANTEC! ● The manufacturer recommends using a mobile battery power pack, gas generator or vehicle battery to power the 12 volt DC submersible pump - STANTEC. ● **When using a vehicle battery power supply it is important to turn on the vehicle and run for 2 minutes every 30 minutes in order to maintain charge in the vehicles battery** - STANTEC. ● Prior to inserting the pump into the well, connect the pump to a length of 3/8-inch id low or medium density polyethylene tubing - STANTEC. ● These pumps are designed for minimum 2-inch diameter wells. Lower the pump into the well so that the pump intake is submerged. (Higher pump rates will be achieved when the pump is lowered near the bottom of the well, but not the end of the well) – STANTEC. ● Connect the pumps negative alligator clamp securely to the negative terminal on the power supply. Then connect the positive clamp to the positive terminal. The pump should now be energized. Continuous pump operation is suitable when placed in water. If running dry, damage may occur within two hours of continuous use - STANTEC. ● When purging of the well is completed, disconnect the pump from the power supply by first removing the positive clamp and then the negative clamp - STANTEC. ● When the pump is removed from the well, hold the pump in the upright position so that all water is drained from the unit - STANTEC. ● Decontaminate the pump by immersing into a bucket of warm water with non-phosphate detergent. Attach the pump to the power supply and allow the cleaning solution to circulate through the pump. Repeat with clean water - STANTEC.
Collect samples in	Steel toed and shank shoes, long	Cross-contamination. Back	● Use proper lifting and bending techniques. Use knee pads or a

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
accordance with sampling plan.	sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air-purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate chemical resistant suit as needed. Level D PPE with nitrile gloves, Traffic Vest, Exclusion Zone Equipment, Leather Work Gloves.	strain, inhalation or dermal exposure to chemical hazards, slip and fall. Improper labeling or storage, injury from *broken sample bottle (cuts or acid burn). ***Note: If a sample bottle breaks while sampling, follow the guidelines listed below for proper containment and disposal of broken glass.**	kneeling pad - STANTEC/Contractor. ● Determine the best location to set the sample containers (avoid stepping on them, or other materials coming into contact with them) - STANTEC. ● Label samples in accordance with sampling plan - STANTEC. ● Fill sample containers slowly and over a bucket to eliminate potential spills. Or place sample container on bucket lid on the ground or other surface, then fill container. To avoid sample container from slipping out of your nitrile gloved hand - STANTEC. ● Do not over pack cooler - STANTEC. ● Use bubble wrap or other insulating material for cushioning sample containers in the cooler - STANTEC. ● Have full face respirator with organic vapor/P-100 combination cartridges within 3-5 feet of working location for quick access - STANTEC/Contractor. ● Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully - STANTEC/Contractor. ● Perform personal decontamination procedures –STANTEC/Contractor. ■ Drop off tools and perform equipment decontamination procedures on the equipment - STANTEC/Contractor. ■ Perform a "dry" decon on boots using a stiff bristle long fiberglass handled brush - STANTEC/Contractor. ■ Remove inner/outer gloves and dispose of properly - STANTEC/Contractor. ■ Wash hands, face, arms and neck (any exposed skin) using sink or bottled water. If water isn't available, use baby wipes or a similar product - STANTEC/Contractor. ● When moving 5 gallon buckets from one position to another position place the lids on the buckets to prevent spilling – STANTEC/Contractor
Proper clean up and disposal of broken sample container.	Safety glasses. Leather Work Gloves. Long Sleeve Shirt. Hand Broom and Dust Pan. A receptacle for the broken glass (something to contain the broken glass (double garbage bag, a box, or bucket.	Exposure to broken glass and acid (from water preservation acids) Injury	● Isolate area where broken glass is located - STANTEC/Contractor. ● Determine if the sample container was preserved (did it have preservative acid in it?) - STANTEC/Contractor. ● Determine what to contain the broken glass in, and where to dispose

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			of the broken glass before beginning to pick up the glass - STANTEC/Contractor. ● Collect equipment needed to clean up and contain the broken glass. ● Minimize "picking up" broken glass pieces with your gloved hands. Use a dust pan if possible/practical - STANTEC/Contractor. ● If broken glass is located inside a container (i.e. box), to the extent practical, leave glass inside box and put entire box into a garbage bag. Double bag if warranted. Place into dumpster - STANTEC/Contractor. ● If broken glass is inside a cooler, remove all other sample containers and place in a safe location, then use hand broom and dust pan to sweep up glass in cooler - STANTEC/Contractor. ● After clean up is complete, contact your Project Manager to report this Near Loss/Miss - STANTEC/Contractor.
Dispose or store purge water (if any) onsite.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air-purifying respirator with combination organic vapor / P-100 cartridges as needed. Wear appropriate chemical resistant suit as needed.	Back strain. Exposure to contaminants. If disposing through onsite treatment system, damage or injury from improper use of equipment. Improper storage or disposal.	● Use proper equipment to transport water (pumps, drum dollies, etc.) - STANTEC/Contractor. ● Perform air monitoring in accordance with **Section 12** - STANTEC. ● Have appropriate respirator with combination organic vapor P-100 cartridges within 3 – 5 feet of working location, readily available - STANTEC/Contractor. ● Label storage containers properly, and locate in isolated area away from traffic and other site functions - STANTEC/Contractor. ● Coordinate offsite disposal (where applicable) - STANTEC. ● Do not attempt to lift, push or move drums without the proper tools or equipment - STANTEC/Contractor. ● Store purge water in 55-gallon drums. Stage drums on border of empty lot - STANTEC/Contractor. ● **Drums containing flammable/combustible liquids or solids must be grounded and if there are multiple drums bonded together -** STANTEC. ● **Use extreme care when opening the bung caps. Stand an arms length away and open the bung slowly to relieve any built up pressure -** STANTEC/Contractor.
Supervisor/SHSO must confirm all	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing	Possible injuries and damage to property due to stepping	● Visually inspect each and every borehole/monitoring well - STANTEC.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
boreholes/monitoring wells are closed, filled in and/or capped.	protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	into or driving over the well.	
Perform personnel dry decontamination procedures.		Chemical exposure.	● Perform dry boot wash using a stiff bristle, fiberglass handled brush paying special attention to the welt and sole areas of the boot. Remove tape from boot tops and properly dispose of the tape, remove tape from outer gloves and properly dispose of the tape, remove outer gloves and properly dispose of outer gloves, remove Tyvek and properly dispose of Tyvek, , remove boots and place in large garbage bag, remove inner gloves and properly dispose of inner gloves. Put street shoes on. Wash hands, face arms and neck (any exposed skin) (use baby wipes if a washing facility is unavailable) Decontamination water will be stored in 55 gallon drums - STANTEC. ● **Drums will be staged in a location determined by the SHSO and the Property Owner/Station Manager** - STANTEC. ● **Drums containing flammable/combustible liquids or solids must be grounded and if there are multiple drums bonded together** - STANTEC. ● **Use extreme care when opening the bung caps. Stand an arms length away and open the bung slowly to relieve any built up pressure** - STANTEC.
Clean site/demobilize.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic. Safety hazard left on site. Lifting hazard. Sharp equipment, broken glass, heavy equipment.	● Use buddy system as necessary to remove traffic control - STANTEC/Contractor. ● Leave site clean of refuse and debris - STANTEC/Contractor. ● Notify station personnel of departure - STANTEC. ● Use proper lifting techniques or use mechanical assistance - STANTEC/Contractor. ● Use a mechanical aid or other colleague, as appropriate to help lift weights over 50lbs - STANTEC/Contractor. ● Be careful of sharp edges on equipment - STANTEC/Contractor. ● Ensure that all waste containers are closed before moving them - STANTEC/Contractor. ● Do not jump off the back of the pick-up - STANTEC/Contractor.
Package and deliver samples to lab.	Nitrile gloves, Heavy leather gloves if bottles are broken.	*Bottle breakage, back strain.	● Handle and pack bottle carefully (bubble wrap bags are helpful) - STANTEC.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			• Use proper lifting techniques - STANTEC/Contractor. • Broken glass shall be placed in a container with a secure lid o` disposed on site whenever possible - STANTEC/Contractor. • Heavy leather gloves shall be worn when handling broken glass. **DO NOT PICK UP BROKEN GLASS WITH YOUR HANDS. USE A BROOM AND DUST PAN!** - STANTEC/Contractor.

TASK 6: The following table addresses the generic concerns with System Operations and Maintenance.

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	Stephen R Zayko	RI Manager Purity and BeeJay Scales	1/13/2006		
√	Michael A Philipp	West Region Health and Safety Manager	09/23/04		
	Justin Hawkins	Principal Engineer	09/23/04		
			02/02/06	Michael A Philipp	West Region Health and Safety Manager
		Site specific edits to this JSA were made on and by			

If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current

POC is the JSA development 'Point Of Contact'

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. . Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions/Precautions
Mobilize with proper equipment/supplies.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, hardhat, long sleeved shirts, safety glasses with side shields, ear plugs/muffs, and leather gloves for the non-chemical aspects of work as necessary; Wear an air purifying	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	• Conduct Plan Prevent Execute/Self Assessment Safe Performance procedures – STANTEC. • Assess the site for slip/trip/fall hazards, biological and chemical hazards, unsafe conditions, traffic hazards, etc - STANTEC. • Take your time. Do not rush - STANTEC.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. . Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions/Precautions
	respirator with combination organic vapor/P-100 cartridges, and other PPE as needed. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek, poly coated chemical resistant suit or its equivalent).*		● Start project with Daily Production Safety Meeting (**Attachment 16**) - STANTEC Include in the discussion; -potential hazards and ways to avoid them - STANTEC. -motor vehicle safety topic - STANTEC. -current days weather conditions - STANTEC. -PPE requirements - STANTEC. -check HASP, Certs, MSDS's, and equipment maintenance records as applicable - STANTEC ● Follow safe driving procedures - STANTEC. ● Employ proper lifting and bending procedures - STANTEC. ● Wear safety glasses and leather work gloves when loading, unloading, and whenever material handling STANTEC. ● Secure load in vehicle - STANTEC. ● Use lids to debris/garbage containers. Do not leave buckets open with out a lid! Material in the bucket can spill STANTEC. ● Use bubble wrap or other insulating material to cushion the sample containers during transport STANTEC. ● Use the right tools to open and close well boxes. Wear leather work gloves when opening the well boxes - STANTEC. ● **Wear leather gloves when walking/working in areas with brush or other undergrowth** – STANTEC.
Set up necessary traffic control.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic guidance and control equipment placement.	● Use buddy system for placing traffic guidance and control equipment – STANTEC. ● Reference traffic guidance and control plan section of HASP (may include specific requirements based on permits). (See **Attachment 2)** – STANTEC. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available** – STANTEC.
Perform material condition of building, system and/or compound	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields,	Back strain, inhalation or dermal exposure to chemical hazards. Repetitive motion.	● Look for obvious damage, exposed wires, broken windows, material placed on the roof, etc – STANTEC.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. . Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions/Precautions
	and leather gloves as necessary.	Traffic hazards.	● Keep work area clean, minimizing slip, trip and fall hazards – STANTEC. ● Pick up trash using tools and not your hands and arms – STANTEC.
Unload and set up equipment.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle. Trip hazards. Accident when maneuvering equipment. Lifting hazard. Electrical hazard.	● Place equipment away from pump islands or other high traffic areas – STANTEC. ● Visually inspect equipment (fire extinguisher on board/available on site, no damaged hoses or electrical lines, pressurized hoses secured with whip-checks or adequate substitute, all vapor and/or water hoses firmly connected, equipment grounded) – STANTEC. ● Use proper lifting techniques – STANTEC.
Gauge water levels and product thickness (where applicable).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate chemical resistant gloves as needed. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate hearing protection as needed.	Back strain, inhalation or dermal exposure to chemical hazards. Repetitive motion. Traffic hazards.	● Maintain safe distance from the wellhead – STANTEC. ● Employ safe lifting procedures – STANTEC. ● Initiate air monitoring as outlined in **Section 12** as necessary – STANTEC. ● Have appropriate air purifying respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available – STANTEC. ● Decontaminate equipment between each measurement. Decontamination will be accomplished by an Alconox wash, rinsed with tap water, and then rinsed with a distilled or de-ionized water rinse. Decon water will be transferred to 55 gallon drums. The drums will be staged in the Thermal Treatment area near the job trailer – STANTEC.
Commence remedial system monitoring (where applicable).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate chemical resistant gloves as needed. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate hearing protection as needed.	Explosion or fire. Trip hazards. Unauthorized release of contaminants. Exposure to contaminants (inhalation, dermal contact). Noise. Electrical hazards.	● Follow equipment-specific operation instructions – STANTEC. ● Monitor treatment system vapor and oxygen concentrations if applicable – STANTEC. ● Perform air monitoring as outlined in **Section 12** as necessary – STANTEC. ● Have appropriate air purifying respirator combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available – STANTEC. ● Keep work area clean, minimizing slip, trip and fall hazards –

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. . Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions/Precautions
			STANTEC. ● Monitor treatment system and collect data to ensure discharge is within permit parameters and capacity of any storage containers (concentrations and flow rates) – STANTEC.
Collect samples in accordance with sampling plan, (where applicable).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate chemical resistant gloves as needed. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate hearing protection as needed.	Cross-contamination, improper sample labeling or storage, exposure to site contaminants. Repetitive motion. Body position.	● Label samples in accordance with sampling plan – STANTEC. ● Keep samples stored in proper containers, at correct temperature, and away from work area. Minimize splashing when collecting water samples – STANTEC. ● Perform air monitoring as outlined in **Section 12**as necessary – STANTEC. ● Have appropriate air purifying respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available – STANTEC. ● Decontaminate sampling equipment after collecting each sample. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums in the Thermal Treatment area near the job trailer - STANTEC.
Proper clean up and disposal of broken sample container.	Steel toed and shank shoes, hardhat, safety glasses with side shields, long sleeved shirt, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Hand broom and dust pan. A receptacle to place the broken glass in such as a box or bucket with a lid.	Exposure to broken glass and acid (from water preservation acids) Injury	● Isolate area where broken glass is located - STANTEC. ● Determine if the sample container was preserved (did it have acid in it?) - STANTEC. ● Determine what to contain the broken glass in, and where to dispose of the broken glass before beginning to pick up the glass - STANTEC. ● Collect equipment needed to clean up and contain the broken glass - STANTEC. ● Minimize "picking up" broken glass pieces with your gloved hands. Use a dust pan if possible/practical - STANTEC. ● If broken glass is located inside a container (i.e. box), to the extent practical, leave glass inside box and put entire box into a garbage bag. Double bag if warranted. Place into dumpster - STANTEC. ● If broken glass is inside a cooler, remove all other sample containers and place in a safe location, then use hand broom and dust pan to

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. . Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions/Precautions
			sweep up glass in cooler - STANTEC. • After clean up is complete, contact your Project Manager to report this Near Loss/Miss - STANTEC.
Perform Electrical/Mechanical maintenance.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate electrical resistant gloves.	Slip, trip and fall hazards. Overhead hazards. Exposure to pressurized chemicals/air/gases. Chemical exposure. Vacuum and electrical hazards. Heat/cold stress.	• Use appropriate Lockout/Tagout precautions - STANTEC. • Perform air monitoring as outlined in **Section 12** as necessary - STANTEC. • Have appropriate air purifying respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available - STANTEC.
Perform routine maintenance. (e.g., Replace air filters and belts, change oil, etc.)	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed. Wear appropriate electrical resistant gloves.	Slip, trip and fall hazards. Overhead hazards. Exposure to pressurized chemicals/air/gases. Chemical exposure. Vacuum and electrical hazards. Heat/cold stress.	• Use appropriate Lockout/Tagout precautions - STANTEC. • Perform air monitoring as outlined in **Section 12** as necessary - STANTEC. • Have appropriate air purifying respirator with combination organic vapor/P 100 cartridges within 3-5 feet of work area, readily available - STANTEC. • Dispose of all drained oil, filters, etc., in an appropriate manner - STANTEC.
Store waste (water, carbon canisters, etc.) in accordance with site-specific requirements	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary. Wear chemical resistant suit as needed.	Back strain. Traffic hazard. Improper storage or disposal. If disposing through onsite treatment system, damage or injury from improper use of equipment	• Use proper equipment to transport waste containers (pumps, drum dollies, etc.) - STANTEC. • Have proper storage containment and labeling available onsite - STANTEC. • Label waste - STANTEC. • Coordinate proper disposal offsite (where applicable) - STANTEC. • Check to ensure bung caps and lid ring are secured - STANTEC. • Review instructions for use of onsite treatment systems - STANTEC. • **Drums will be staged in the Thermal Treatment area next to the job trailer** - STANTEC.
Perform personnel dry decontamination procedures.		Chemical exposure.	• Perform dry boot wash using a stiff bristle, fiberglass handled brush paying special attention to the welt and sole areas of the boot.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. . Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions/Precautions
			Remove tape from boot tops and properly dispose of the tape, remove tape from outer gloves and properly dispose of the tape, remove outer gloves and properly dispose of outer gloves, remove Tyvek and properly dispose of Tyvek, , remove boots and place in large garbage bag, remove inner gloves and properly dispose of inner gloves. Put street shoes on. Wash hands, face arms and neck (any exposed skin) (use baby wipes if a washing facility is unavailable) Decontamination water will be stored in 55 gallon drums. Drums will be staged at the Thermal Treatment area next to the job trailer – STANTEC. ● **Drums will be staged in the Thermal Treatment area next to the job trailer** - STANTEC. ● **Drums containing flammable/combustible liquids or solids must be grounded and if there are multiple drums bonded together** - STANTEC. ● **Use extreme care when opening the bung caps. Stand an arms length away and open the bung slowly to relieve any built up pressure** - STANTEC.
Clean site/demobilize	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Traffic hazard. Lifting hazards. Safety hazard left on site.	● Use buddy system as necessary to remove traffic guidance and control equipment - STANTEC. ● Use proper lifting techniques - STANTEC. ● Leave site clean of refuse and debris - STANTEC. ● Notify site personnel of departure and location of any stored waste - STANTEC.
Supervisor/SHSO must confirm all wells are closed, and/or capped and compound is secure.		Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every well - STANTEC. ● Check compound locks for being secured. Give a couple firm tugs on the lock to make sure it is actually closed – STANTEC.
Package and deliver samples to lab		Bottle breakage, back strain.	● Handle and pack bottles carefully (bubble wrap bags are helpful) - STANTEC. ● Use proper lifting techniques - STANTEC.

Task 7. The following table addresses the concerns with hand auguring for the collection of soil samples.

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	Stephen R Zayko	RI Manager Purity and BeeJay Scales	1/13/2006		
	Michael Allen Philipp	West Region Health and Safety Manager	09/23/05		
			02/02/06	Michael Allen Philipp	West Region Health and Safety Manager
Site specific edits to this JSA were made on and by					

If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current

POC is the JSA development 'Point Of Contact'

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Clear hand auguring locations.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	• Reference Utility Clearance Review form (**Attachment 4**). • Coordinate with Site Manger (or designee) to minimize potential conflicts. • Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. • Mark out the proposed borehole locations. • Call underground utility locating service for public line location clearance and get list of utilities being contacted. If necessary, coordinate private line locator for private property. • Develop a traffic guidance and control plan with the client and local agencies as applicable. Plan may include use of delineators, barrier tape, jersey barriers, construction fence, etc. *(Refer to* **Attachment 2***)*. • **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available.**
Mobilize with proper equipment/supplies for hand auguring/soil sampling.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, hard hat, safety glasses with side shields, ear plugs/muffs, leather gloves for the non-chemical aspects of work as necessary; Wear an air purifying respirator with combination organic	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	• Start project with Production Safety Meeting (**Attachment 6**). • Follow safe driving procedures. • Employ safe lifting procedures. • Review permit conditions (if applicable).

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	vapor/P-100 cartridges, and other PPE as needed. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek, poly coated chemical resistant suit or it's equivalent*).		
Visually clear proposed hand auguring/soil sampling locations.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Underground installations.	● Complete Pre-Mobilization section of Utility Clearance Review form (**Attachment 4**) and adjust hand auguring locations as necessary.
Set up necessary traffic guidance and control equipment. See **Attachment 2** for detailed plan.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic guidance and control equipment placement.	● Use buddy system for placing traffic guidance and control equipment. ● Implement traffic guidance and control plan such as setting out delineators, construction fence and caution tape defining safety area. ● Adhere to approved Traffic Guidance and Control Plans when working in roadways. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available.**
Set up exclusion zone(s) and workstations (hand auguring and logging/sample collection).	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during set up. Slip, trip and fall hazards.	● Implement exclusion zone set-up. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Exclusion Zone set up.** ● Set up workstations with clear walking paths to and from hand auguring location. ● Use delineators, construction fence, and/or safety tape as required. ● If utilizing Visqueen, (sheet plastic), for sampling area, completely secure Visqueen to the pavement, dirt, etc. with duct tape, delineators, etc. Do not use objects that are hard to notice or could become a trip hazard themselves.
Commence hand auguring .	Don required PPE as appropriate for this step: steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an	Back strain, exposure to chemical hazards, hitting an underground utility, repetitive motion.	● Initiate air quality monitoring as outlined in **Section 12 if required.** ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. ● Stand upwind to avoid exposure whenever possible. ● Use the organic vapor monitor aggressively to track the airborne concentration of contaminants close to potential sources such as the core

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
	air-purifying respirator with combination organic vapor/P-100 cartridges if necessary. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek poly coated suit or it's equivalent).*		as it is being raised from the hole, the core is opened, etc. ● Evaluate any soil samples inside a Ziploc bag at arm's length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE. ● Use proper lifting techniques and tools. ● Complete the Pre-Drilling section of the Borehole Clearance Review form. ● Decontaminate sampling equipment after collecting a sample and decontaminate hand auguring equipment after each borehole. ● Avoid twisting back during the operation; Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums in a location agreed upon by the SHSO and the Property/Station Owner/Manager.
Collect samples in accordance with sampling plan.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges if needed.	Cross-contamination, improper labeling or storage, exposure to site contaminants.	● Evaluate any soil samples inside a Ziploc bag at arm's length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE. ● Decontaminate sampling equipment between each sampling run. Label samples in accordance with sampling plan. ● Keep samples stored in proper containers, at correct temperature, and away from work area. ● Conduct air monitoring as outlined in **Section 12**. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available.
Proper clean up and disposal of broken sample container.	Safety glasses Long sleeved shirts Leather Work Gloves Hand Broom and Dust Pan A receptacle for the broken glass (something to contain the broken glass (double garbage bag, a box, or bucket).	Exposure to broken glass and acid (from water preservation acids) Injury	● Isolate area where broken glass is located - STANTEC/Contractor. ● Determine if the sample container was preserved (did it have acid in it?) - STANTEC. ● Determine what to contain the broken glass in, and where to dispose of the broken glass before beginning to pick up the glass - STANTEC. ● Collect equipment needed to clean up and contain the broken glass - STANTEC/Contractor. ● Minimize "picking up" broken glass pieces with your gloved hands. Use a dust pan if possible/practical - STANTEC/Contractor. ● If broken glass is located inside a container (i.e. box), to the extent

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
			practical, leave glass inside box and put entire box into a garbage bag. Double bag if warranted. Place into dumpster - STANTEC/Contractor. ● If broken glass is inside a cooler, remove all other sample containers and place in a safe location, then use hand broom and dust pan to sweep up glass in cooler - STANTEC. ● After clean up is complete, contact your Project Manager to report this Loss/Incident - STANTEC.
Supervisor/SHSO must confirm all boreholes are closed, filled in and/or capped.		Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every borehole.
Perform personal decontamination procedures.	As worn in exclusion zone.	Slips/trips/falls. Splashes, chemical contamination. Contact with contaminated materials.	● Perform personal (dry) decontamination procedures – STANTEC/Contractor. ■ Drop off tools and perform equipment decontamination procedures on the equipment - STANTEC/Contractor. ■ Perform a "dry" decontamination on boots using a stiff bristle fiberglass long handled brush - STANTEC/Contractor. ■ Remove inner/outer gloves and dispose of properly - STANTEC/Contractor. ● Wash hands, face, arms and neck (any exposed skin) using sink or bottled water. If water isn't available, use baby wipes or a similar product - STANTEC/Contractor.
Clean site/demobilize.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic. Safety hazard left on site. Lifting hazards.	● Use buddy system as necessary to remove traffic guidance and control equipment. ● Leave site clean of refuse and debris. ● Clearly mark/barricade any borings that need later topping off or curing. ● Notify site personnel of departure, final well locations and any cuttings/purge water left onsite. ● Use proper lifting techniques
Package and deliver samples to lab.		Bottle breakage, back strain.	● Handle and pack bottle carefully (bubble wrap bags are helpful). Use proper lifting techniques.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Clear hand auguring locations.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	● Reference Utility Clearance Review form (**Attachment 4**). ● Coordinate with Site Manger (or designee) to minimize potential conflicts. ● Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. ● Mark out the proposed borehole locations. ● Call underground utility locating service for public line location clearance and get list of utilities being contacted. If necessary, coordinate private line locator for private property. ● Develop a traffic guidance and control plan with the client and local agencies as applicable. Plan may include use of delineators, barrier tape, jersey barriers, construction fence, etc. *(Refer to* **Attachment 2***).* ● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available.**
Mobilize with proper equipment/supplies for hand auguring/soil sampling.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, hard hat, safety glasses with side shields, ear plugs/muffs, leather gloves for the non-chemical aspects of work as necessary; Wear an air purifying respirator with combination organic vapor/P-100 cartridges, and other PPE as needed. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek, poly coated chemical resistant suit or it's equivalent*).	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	● Start project with Production Safety Meeting (**Attachment 6**). ● Follow safe driving procedures. ● Employ safe lifting procedures. ● Review permit conditions (if applicable).
Visually clear proposed hand auguring/soil sampling locations.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Underground installations.	● Complete Pre-Mobilization section of Utility Clearance Review form (**Attachment 4**) and adjust hand auguring locations as necessary.
Set up necessary traffic guidance and control equipment. See **Attachment 2** for detailed plan.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic guidance and control equipment placement.	● Use buddy system for placing traffic guidance and control equipment. ● Implement traffic guidance and control plan such as setting out delineators, construction fence and caution tape defining safety area.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
			● Adhere to approved Traffic Guidance and Control Plans when working in roadways. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available.**
Set up exclusion zone(s) and workstations (hand auguring and logging/sample collection).	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during set up. Slip, trip and fall hazards.	● Implement exclusion zone set-up. ● **It is the responsibility of the SHSO to annotate the Site Plan with the Exclusion Zone set up.** ● Set up workstations with clear walking paths to and from hand auguring location. ● Use delineators, construction fence, and/or safety tape as required. ● If utilizing Visqueen, (sheet plastic), for sampling area, completely secure Visqueen to the pavement, dirt, etc. with duct tape, delineators, etc. Do not use objects that are hard to notice or could become a trip hazard themselves.
Commence hand auguring	Don required PPE as appropriate for this step: steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges if necessary. (*Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek poly coated suit or it's equivalent).*	Back strain, exposure to chemical hazards, hitting an underground utility, repetitive motion.	● Initiate air quality monitoring as outlined in **Section 12 if required.** ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. ● Stand upwind to avoid exposure whenever possible. ● Use the organic vapor monitor aggressively to track the airborne concentration of contaminants close to potential sources such as the core as it is being raised from the hole, the core is opened, etc. ● Evaluate any soil samples inside a Ziploc bag at arm's length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE. ● Use proper lifting techniques and tools. ● Complete the Pre-Drilling section of the Borehole Clearance Review form. ● Decontaminate sampling equipment after collecting a sample and decontaminate hand auguring equipment after each borehole. ● Avoid twisting back during the operation; Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums in a location agreed upon by the SHSO and the Property/Station

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
			Owner/Manager.
Collect samples in accordance with sampling plan.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges if needed.	Cross-contamination, improper labeling or storage, exposure to site contaminants.	● Evaluate any soil samples inside a Ziploc bag at arm's length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE. ● Decontaminate sampling equipment between each sampling run. Label samples in accordance with sampling plan. ● Keep samples stored in proper containers, at correct temperature, and away from work area. ● Conduct air monitoring as outlined in **Section 12**. ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available.
Supervisor/SHSO must confirm all boreholes are closed, filled in and/or capped.		Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every borehole.
Clean site/demobilize.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic. Safety hazard left on site. Lifting hazards.	● Use buddy system as necessary to remove traffic guidance and control equipment. ● Leave site clean of refuse and debris. ● Clearly mark/barricade any borings that need later topping off or curing. ● Notify site personnel of departure, final well locations and any cuttings/purge water left onsite. ● Use proper lifting techniques
Package and deliver samples to lab.		Bottle breakage, back strain.	● Handle and pack bottle carefully (bubble wrap bags are helpful). Use proper lifting techniques.

ATTACHMENT 1

CLIENT'S SAFETY PROCEDURES

ConocoPhillips requires all of its contractors to abide by the policies and procedures set forth in the RISK MANAGEMENT AND REMEDIATION CONTRACTOR SAFETY HANDBOOK and a copy of the handbook shall be maintained on site See Attachment #1 (CLIENT SAFETY PROCEDURES) for additional information.

ConocoPhillips

RISK MANAGEMENT AND REMEDIATION CONTRACTOR SAFETY HANDBOOK

Purpose

The purpose of the Contractor Safety Handbook is to focus on contractor management practices aimed at achieving top performance in safety while carrying out a wide variety of activities.

Information within this document is intended to be based on federal and state regulations, industry standards, accepted safety practices and ConocoPhillips corporate standards in effect at the time of its issuance. This document does not attempt to encompass all situations. This manual is a resource to enhance the safety of contract personnel and the public, as well as preventing loss of assets.

ConocoPhillips Risk Management and Remediation expects contracted consultant companies to develop Site Health and Safety Plans and Emergency Response Plans that meet the requirements of federal and state regulations, industry standards, accepted safety practices.

When remediation activities are occurring at operated facilities, contracted consults shall also work with the operating group to ensure the site health and safety plan and emergency response plan is consistent with and bridges to the operating units health and safety and emergency response procedures.

Focus

The focus of all our endeavors is based on these basic principles:

- All injuries, losses and environmental releases are preventable and all contractor personnel must work toward this goal.
- Contractor is responsible, without assistance from ConocoPhillips, for staying abreast of all regulations and accepted industry practices and complying with them regardless of the contents of this Manual, which shall be considered **minimum** requirements for the Contractor to follow.
- All contractor personnel have the responsibility to request, receive and understand training on the work they are conducting. The contractor has the responsibility to be familiar with the jobs of the contractor personnel and the training needed for those jobs, and to provide necessary training. In the performance of their assigned work, contractor personnel are expected to do their work safely and follow correct operating procedures. This is a condition of the contract between the contractor and the Company.
- All contractor personnel shall work safely in their jobs and understand that they have a definite responsibility to do so because it is always to the advantage of the person, contractor and the Company.

Attachment 1

SAFETY TRAINING

ConocoPhillips Company's personnel and affiliates are not always able to be present when contractors carry out work assignments. ConocoPhillips must rely upon its contractors to adopt, implement and enforce rules and practices necessary for the safe performance of the contractor's work. The following represent minimum safety training responsibilities of the contractor:

- Contractor shall indoctrinate each of its employees in the contractor's safety program prior to starting work and monitor the work of its employees to ensure proper job safety.
- Contractor shall ensure that its personnel are familiar with the appropriate guidelines included in RM&Rs "Contractor Safety Handbook" prior to commencement of work at a ConocoPhillips RM&R job site.
- Contractor shall conduct safety meetings at appropriate intervals to ensure its personnel are fully informed of potential hazards. Attendance at safety meetings is to be documented and attendance sheets signed by all contractor personnel in attendance and retained by contractor and made available to ConocoPhillips on request.
- Contractor shall document that its personnel have received appropriate safety training regarding any potential hazards of the job prior to commencement of work at a ConocoPhillips job site. Acknowledgement of the safety training received by personnel must be documented by the contractor.
- Contractor shall ensure that all contract personnel are familiar with all types of warning alarms and emergency procedures at the job site.
- Contractor personnel shall be instructed to immediately shut down all sources of ignition and leave the area when an emergency alarm is sounded.
- Contractor personnel shall be instructed in incident/injury reporting procedures.
- Contractor shall ensure sub-contractors shall adhere to the requirements of the ConocoPhillips Contractor Safety Handbook.

SAFETY AND HEALTH

Contractor shall prepare a written Health and Safety Plan prior to commencement of work on a ConocoPhillips job site and upon request be prepared to provide a copy of the Health and Safety Plan to the ConocoPhillips site representative.

Contractor shall conduct a thorough examination of the ConocoPhillips job site premises prior to performing work. This includes all energy sources and any necessary preparation of the job site area. Contractor shall be solely responsible for the safety and health of its personnel at all ConocoPhillips job sites.

Contractor shall thoroughly familiarize itself with ConocoPhillips' operations at the ConocoPhillips job site, including operations that may pose a hazard to personnel.

Contractor shall provide Material Safety Data Sheets (MSDS) on all hazardous substances brought on site by the contractor. Contractor may obtain MSDS on existing hazardous substances located on site by contacting the ConocoPhillips representative. MSDS shall be in a centralized location available to all contractor personnel.

Contractor shall be responsible for providing or arranging all emergency medical and first aid care for its personnel, and any follow-up care which may be necessary.

Contractor shall use only personnel who are fit and physically and mentally qualified to perform the work.

Contractor personnel who are under the influence of or impaired by the use of alcohol, drugs or medicine are not considered to be physically and mentally qualified. Contractor shall not allow these personnel to work on the job site under these conditions.

Contractor shall be responsible to instruct its personnel on all safety matters and to enforce safety practices.

Contractor shall comply with local, state and federal occupational safety and health regulations and maintain required records.

Contractor shall ensure that an appropriate number of personnel receive training in first aid and are maintained in their familiarity with the skills taught. Adequate first aid supplies shall also be provided by the contractor.

Contractor personnel shall immediately notify their supervisor of any observed unsafe working conditions and/or practices for correction.

The contractor shall be responsible for an ongoing safety and loss prevention program during the performance of the work that shall include but is not limited to safety meetings, reporting unsafe conditions, providing proper personal protective equipment and encouraging safety awareness.

The possession of cameras, weapons or explosives without proper authorization from the ConocoPhillips representative is prohibited.

Contractor operations shall at all times be under the immediate supervision of a contractor representative who has authority to modify the work methods as necessary to ensure safety.

PERSONAL PROTECTIVE EQUIPMENT

Contractor shall provide and maintain its own safety supplies and equipment including personal protective equipment unless otherwise contractually agreed.

Contractor shall require its personnel to utilize necessary personal protective equipment to complete the job in a safe manner.

All personnel shall wear eye protection suitable for the area, condition, or operation being carried out. Eye and face protection selected must protect against hazards known to exist or those that may reasonably be anticipated.

All operating, assisting or standby personnel engaged in welding shall wear welding helmets equipped with the appropriate lens shade.

All personnel on the job site shall wear hard hat protection within 100 feet of processing equipment, mechanical equipment, construction equipment, rotating equipment or any other type of operating equipment, encountered at shoulder height including in bending position, unless there is a physical barrier between you and the operation that prevents direct access such as brick walls, fences, buildings, etc.

All personnel shall wear hearing protection in posted or un-posted areas where the potential for temporary high noise levels may exist.

Fire retardant clothing shall be provided by the contractor to personnel working in regulated confined spaces on equipment containing hydrocarbons.

If areas or sites are designated/necessary for a respirator, personnel shall adhere to OSHA respiratory regulations and be clean shaven in the respirator-to-face sealing surface to allow proper fit of the respirator.

FIRE PROTECTION

Contractor is not expected to extinguish a fire in order to save assets owned by ConocoPhillips.

Contractor shall warn others in the area of a fire and evacuate the danger area to a safe location, assemble and make an immediate accounting for all personnel and immediately notify a local emergency responder (ex. fire department, police, ambulance).

Contractor shall promptly report any uncontrolled fires to an Emergency Responder first, then to the ConocoPhillips representative immediately after. All fires, controlled (extinguished by the contractor) and uncontrolled (extinguished by an emergency responder), shall be reported verbally to a ConocoPhillips representative within a 24-hour period. If a job cannot continue in a safe manner, operations shall be discontinued until safe conditions are re-established.

Contractor shall assume responsibility for fire prevention in its work areas.

Contractor shall ensure that all fire fighting equipment such as hoses, fire extinguishers and fire hydrants are not to be used for any purpose other than fire fighting.

Contractor shall furnish approved fire extinguishers and have them available at all times.

VEHICLE SAFETY

Contractor shall operate vehicles and other mobile equipment within posted speed limits and only in areas necessary to perform work, and shall observe roadblocks and caution signs.

Contractor shall ensure that vehicles left running are **only** for the purposes of operating auxiliary equipment or lights, and then only when the driver can ensure the vehicle is secure with the transmission in park or neutral and the parking brake set.

Contractor shall ensure that vehicles will not be driven over unprotected hoses or exposed piping.

No private vehicles will be allowed on site property unless prior written approval is obtained from the ConocoPhillips representative.

Contractors shall enter and exit through the gates or pathway provided and designated for this use.

Keys to all unattended vehicles and equipment shall be easily accessible to contractor personnel so the vehicles and equipment can be moved as necessary. Vehicles and/or equipment are described as unattended anytime the driver is not at the controls of the vehicle.

Upon notification of a release of flammable vapors, fire, or other immediate dangers, the contractor shall immediately shut down all sources of ignition under its control. No attempt to start or move vehicles in the area shall be made until all conditions are safe for re-entry.

EMERGENCY SITUATIONS

- Evacuate all persons on site or in danger of hazard.
- Call 911 if available. Otherwise, call the appropriate local emergency responder (ie. fire department, ambulance, police). Alternative emergency numbers shall be designated in advance and placed in a centralized location available to all personnel.
- Keep unauthorized people from re-entering the area.
- Contact the ConocoPhillips representative. If you can not reach the ConocoPhillips representative, call Property Management Hotline (ConocoPhillips Emergency phone line) # (918) 661-4291 to report the situation to ConocoPhillips security. The message will immediately be relayed to a ConocoPhillips representative.

Upon notification of a release of flammable vapors, fire, or other immediate dangers, the contractor shall immediately shut down all sources of ignition under its control. No attempt to start or move vehicles in the area shall be made until all conditions are safe for re-entry.

During a vapor release or fire, contractor personnel shall immediately evacuate the danger area to an upwind or cross wind position or another appropriate/safe position and assemble. At this point the supervisor shall attempt to contact an emergency responder (police, fire, ambulance, 911 if available).

In the event of a release of toxic gases or chemicals, contractor shall evacuate personnel upwind or crosswind.

Re-entry into the danger area is prohibited until after the emergency is under control and the Emergency Responder provides clearance to re-enter.

Contractor shall **immediately** furnish a verbal report to the ConocoPhillips representative, and follow up with a written report within 24 hours, regarding any emergency situation, incidents, accidents and near misses involving persons or property at a ConocoPhillips RM&R job site.

Contractor shall **immediately** cease work when discovering any unexpected or unusual situations that may arise, and immediately contact the ConocoPhillips representative with a verbal report of the situation.

Contractor personnel shall understand the importance and necessity of immediately shutting down all sources of ignition and leaving the area when an emergency alarm is sounded.

EQUIPMENT AND OPERATIONS MAINTENANCE

Contract personnel shall practice safe and orderly housekeeping in work areas at all times.

Contractor shall rope off areas for excavations and over-head work, and post safety and caution signs as required.

Contractor shall insure that all necessary guards are properly installed on equipment before operating/starting the equipment.

Contractor shall ensure that equipment will not be operated unless it is in proper working condition. Belts, cords, hoses and safety guards shall be in good shape and properly placed on the equipment.

Drilling operations shall at all times be under the immediate supervision of a contractor's representative who has authority to modify the work methods as necessary to ensure safety.

Contractor shall perform daily documented inspections of critical and operational safety items, correct any deficiencies found, and report any corrective actions and deficiencies to the ConocoPhillips representative in writing.

During the installation or repair of underground lines, the contractor shall verify location, running direction, and depth of the lines, and shall suitably mark the lines before any mechanized equipment is allowed near it.

Contractor shall ensure that all necessary precautions will be taken to avoid damaging or making contact with underground lines, storm and sanitary sewers, septic systems drain tile or other underground structures encountered.

Contractor shall ensure that public and/or private crossings and entrances that must be temporarily left open must be clearly marked, maintained in a safe condition and approved by the landowner and/or ConocoPhillips representative.

Contractor shall comply with all applicable laws and regulations as to placing danger signals and flares at road crossings. In the absence of such regulations, contractor must provide suitable danger and caution signs and lights.

Contractor shall ensure no open ditches are left overnight in public or private roadways, trails or walkways unless acceptable markings, barricades and detours are provided and approval has been granted from the owner of the roadway.

Contractor shall ensure that if blasting is necessary, it shall be in accordance with applicable regulations, shall be performed by competent and qualified personnel, and shall be under valid permits where required. No blasting will be conducted by contractor without the permission of a ConocoPhillips representative.

Contractor shall ensure all trenching, operations, excavations, river crossings and pipelines comply with all federal, state and local regulations.

Contractor shall ensure that building materials are stored in a safe manner and do not block entrances or exits to roads or buildings.

Contractor shall ensure that regulated materials are stored in appropriate containers and transported to an appropriate waste facility.

Contractor shall ensure that clean-up work shall keep pace with demolition or construction work.

HOT WORK/CONFINED SPACE ENTRY PERMITS

Contractor shall have a written program in compliance with OSHA regulations to address the dangers and hazards of hot work/confined space entry.

Hot work is defined as a work area that requires electric or gas welding, flame cutting, lead pots, tar pots, and other work equipment capable of producing flames, sparks, or ignition sources.

A confined space is defined as any enclosed space that: 1) is large enough to enter and perform work; and 2) has limited means of entry and exit; and 3) is not designed to for continuous employee occupancy.

For confined space entries, one person shall stand at the entry point while the other person is working in the confined space.

A hot work/confined space entry permit shall be obtained from an authorized permit writer when entering a confined space and/or performing hot work.

Hot work/confined space entry permits are valid only so long as work conditions existing at the time of their issuance continue. Permits expire upon occurrence of hazards, such as gas leaks, liquid spills, drastic operating changes in adjacent equipment, and change in wind direction blowing vapors into work area. A new work permit is required daily or upon occurrence of an additional hazard.

Contractor shall furnish trained personnel with their own fire extinguishers in a work area that requires hot work/confined space entry permits.

A "Regulated Confined Space" is defined as a confined space that has one or more of the following characteristics: 1) contains or has a potential to contain a hazardous atmosphere; 2) contains a material that has the potential for engulfing an entrant; 3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or 4) contains any other recognized serious safety or health hazard (29 CFR 1910.146).

Entry into a Regulated Confined Space is prohibited unless approved by Company's management. Authorized permit Writers cannot authorize entry into a Regulated Confined Space.

Written Hot Work/Confined Space Entry permits are required but may not be limited to the following work:

- Electric or gas welding, flame cutting, lead pots, tar pots, and other work equipment capable of producing flames, sparks, or ignition sources.
- Opening or entering any process vessel.
- Parting flanges, or cutting into operating valves in any process line or vessel.
- Sandblasting.
- Using electric or pneumatic tools.
- Excavations, trenching, boring, drilling.
- Operation of electrical switches and breakers.

Contractor shall ensure all equipment being used in a designated hot work/confined space entry shall be immediately shut down in an emergency or when requested by a ConocoPhillips representative.

LOCK OUT TAG OUT

Contractor is responsible to provide a lock out/tag out program in accordance with OSHA 1910.147.

Contractor shall provide each of its authorized personnel with unique lockout devices to isolate all energy sources in order to protect personnel from injury due to an unexpected start-up or energy source while working in, on or around equipment during repair or maintenance operations.

Contractor shall ensure that all maintenance on power driven equipment shall be individually locked out and tagged prior to servicing.

Contractor shall ensure that the maintenance or servicing of electrical lines, air lines, gas lines or other lines containing hazardous materials or energy, shall be rendered safe by emptying, purging or disconnecting by the appropriate maintenance crew before work may begin.

Contractor shall not remove safety locks from main power breakers, disconnect switches, or valves until all persons are in the clear.

REPORTING REQUIREMENTS FOR CONTRACT PERSONNEL

Contractor shall report in writing to the ConocoPhillips representative, any incident resulting in property damage to a ConocoPhillips' operated site, materials or equipment, including motor vehicles owned by ConocoPhillips.

Contractor shall use the following definitions when reporting incidents:

> INCIDENT - An unplanned, undesired event that potentially or adversely affects completion of a task. Subcategories of an incident include: Accidents, Injuries, Illnesses, Near Misses and Environmental Incidents.
>
> ACCIDENT – Property damage in excess of $500.00.
>
> INJURY– All injuries that meet OSHA-defined criteria for: First Aid Cases, Medical Treatment Cases, Restricted Work Cases, Lost Workday Cases and Fatalities.
>
> ILLNESS – An OSHA-defined occupational illness requiring medical treatment beyond first-aid.
>
> NEAR MISS –No property was damaged and no injury was sustained but where, given a change in time or position, an environmental event, property damage in excess of $500.00 or personal injury could easily have occurred.
>
> ENVIRONMENTAL INCIDENT – An intentional or unintentional leaking, pouring, overflowing, spilling, discharging, emitting or other moving of gaseous, fluid or solid materials from equipment or containment devices to the atmosphere, soil, water or outside of that which is allowed by permit or regulation.

Contractor shall immediately report by phone to the ConocoPhillips representative, any accident resulting in an occupational death (fatality) or hospitalization of contracted personnel. Contractor shall then report in writing, to the ConocoPhillips representative any occupational death and any occupational injury of personnel treated at a hospital regardless of severity of injury within 24 hours.

Contractor has the responsibility of advising the ConocoPhillips representative of all conditions or activities that are considered a safety hazard or problem that requires immediate attention and is controllable by ConocoPhillips Company and/or the contractor.

Contractor shall correct any unsafe working conditions and/or practices observed by contractor personnel before continuing work, and report verbally to a ConocoPhillips representative within 24 hours of these recognized conditions/practices.

Contractor shall promptly report any uncontrolled fires to an Emergency Responder first, then to the ConocoPhillips representative immediately after. All fires, controlled (extinguished by the contractor) and uncontrolled (extinguished by an emergency responder), shall be reported verbally to a ConocoPhillips representative within a 24-hour period. If a job cannot continue in a safe manner, operations shall be discontinued until safe conditions are re-established.

Contractor shall **immediately** cease work when discovering any unexpected or unusual situations that may arise, and immediately contact the ConocoPhillips representative with a verbal report of the situation.

No blasting will be conducted by contractor without the permission of a ConocoPhillips representative.

DOCUMENTATION REQUIREMENTS FOR CONTRACT PERSONNEL

Contractor shall furnish upon request of the ConocoPhillips representative, documentation of training and safety meetings.

Contractor shall conduct safety meetings at appropriate intervals to assure its personnel are fully informed of potential hazards. Safety meetings are to be documented and signed by all contractor personnel in attendance.

Contractor shall document that its personnel and sub-contractor personnel have received appropriate safety training regarding any potential hazards of the job prior to commencement of work at a ConocoPhillips job site.

Contractor shall prepare a written Health and Safety Plan prior to commencement of work on a ConocoPhillips job site and upon request be prepared to provide a copy of the Health and Safety Plan to the ConocoPhillips site representative.

Contractor shall provide Material Safety Data Sheets (MSDS) on all hazardous substances brought on site by the contractor. Contractor may obtain MSDS on existing hazardous substances located on site by contacting the ConocoPhillips representative. MSDS shall be in a centralized location available to all contractor personnel.

Contractor shall perform daily documented inspections of critical and operational safety items; correct any deficiencies found and report any corrective actions and deficiencies to the ConocoPhillips representative in writing.

ConocoPhillips

Stakeholder Communications Guide for Contractors

In Anticipation of
Third-Party Inquiries

ConocoPhillips Communications Policy

- Stakeholder communication is the obligation and responsibility of ConocoPhillips, not our contractors.
- Contractors are not expected to speak on behalf of ConocoPhillips

Stakeholder Communications Protocol

- Get essential information, including name and phone number – then disengage
- Your conversation should be brief – limit your comments.
- Forward the information immediately to your ConocoPhillips project manager
- Do not give out the project manager's name or phone number

Tips for Effective Communication

- Be respectful, polite and calm
- Maintain composure – do not lose your temper
- Listen carefully
- Speak clearly and use simple language
- Develop a short script and rehearse

Sample Script

- If you would like information, I can take your name and number and forward that to the project manager/appropriate person
- I assure you that someone will contact you promptly and respond to your questions
- I apologize that I can't talk longer because our team needs to complete it's work here
- **If necessary, you may add**: Our company is doing some soil testing, groundwater testing, cleanup work for ConocoPhillips.

Important Contact Information

- Site/Project Manager

____
Myron Smith
____
602-432-1578
____
602-452-2505
____

____

- ConocoPhillips

  Issues Management Director

  Jeff Callender
  (281) 293-1043

RM&R SAFETY RULES

Our work is never so important that we cannot take the time to do it safely.

- Report physically rested and mentally alert
- Look out for your co-workers
- Zero tolerance for unsafe actions
- Stop all unsafe work
- Do not improvise – follow procedures

Attachment 1

ATTACHMENT 2

SITE PLAN(s)

ATTACHMENT 3

INCIDENT REPORTING PROCEDURES

ATTACHMENT 3a
INCIDENT REPORTING FLOWCHART

INCIDENT INVESTIGATION REPORTING GUIDELINES
(MEDICAL EMERGENCY, FIRST AID, MVC, SPILL, NOV)

STANTEC Staff Contact SHSO

Team Stabilizes situation and secures site

SHSO Notifies STANTEC PM immediately

Verbal notification immediately to:

- **Phil Platcow – (617) 232-7355 Office (617) 899-5403 Cell**
- **Mike Philipp – (619) 296-6195 Office (619) 985-4340 Cell**
- **Mary Harris – (619) 718-9430 Office**

Within 24 hours final determination to contact the client is made by Phil Platcow, Mike Philipp, Mary Harris and Business Unit Managers

ATTACHMENT 3b
INCIDENT INVESTIGATION / NEAR-MISS INVESTIGATION REPORT

Incident Investigation / Near-Miss Investigation Report

Consider using the Root Cause Analysis PROACTIVELY to avoid incidents and near misses.

INCIDENT TYPE (To be filled in by Human Resources Department)

Date of Incident:

☐ Fatality
☐ Lost Workday
☐ LW Restricted Duty
☐ OSHA Medical or Illness w/o LW
☐ First Aid
☐ Industrial Non-Recordable
☐ Non-Industrial
☐ Off-the-Job Injury
☐ MVA
☐ Fire
☐ Spill/Leak
☐ Product Integrity
☐ Equipment
☐ Business Interruption
☐ General Liability
☐ Criminal Activity
☐ Notice of Violation
☐ Near Miss

The STANTEC Project Manager, Human Resources and Corporate Health & Safety must be informed immediately after stabilizing the victim(s)/site as the result of an incident or near miss. The investigation of the incident or near miss by the employee's supervisor or Site Health and Safety Officer must also begin immediately. This report must be completed as soon as possible, in most cases within the week of the incident. It must be reviewed and signed by the Principal and e-mailed or faxed to the Vice President of Human Resources, and Corporate Health and Safety (numbers at end), even if employee is not available to review and sign. Employee or employee's doctor must submit a copy of the doctor's report to Human Resources within 24 hours of the initial exam and any subsequent exams. Contact information at end of report.

EMPLOYER (include sub-contractors, or other employers on our sites)

Company Name:

Work Location Address where incident occurred: Project Name:

EMPLOYEE

Name:

Employment Status: ☐ Full-Time ☐ Part-Time ☐ Hourly-As-Needed How long in present job?

INJURY OR ILLNESS INFO

Where did incident / near miss occur? (number, street, city, state, zip):

County: On Employer's premises? ☐ Yes ☐ No

Specific activity the employee was engaged in when the incident / near miss occurred:

All equipment, materials, or chemicals the employee was using when the incident / near miss occurred (e.g., the machine employee struck against or which struck employee; the vapor inhaled or material swallowed; what the employee was lifting, pulling, etc.):

Describe the specific injury or illness (e.g., cut, strain, fracture, skin rash, etc.):

Body part(s) affected (e.g., back, left wrist, right eye, etc.):

Name and address of Health Care Provider (e.g., physician or clinic): Phone No.:

If hospitalized, name and address of hospital: Phone No.:

Date of injury or onset of illness(MM/DD/YYYY) / / Time of event or exposure: ☐ AM ☐ PM

Time employee began work: ☐ AM ☐ PM Did employee lose at least one full shift's work? ☐ No ☐ Yes, 1st date absent (MM/DD/YYYY) / /

Has employee returned to work? ☐ Regular work ☐ Restricted work ☐ No, still off work ☐ Yes, date returned (MM/DD/YYYY) / /

Did employee die? ☐ No ☐ Yes, date (MM/DD/YYYY) / /

Date employer notified of incident / near miss: (MM/DD/YYYY) / /

To whom reported:

Other workers injured/made ill in this event? ☐ Yes ☐ No

Description of Incident / Near Miss: (Describe fully the incident / near miss events. Tell exactly what happened and how it happened so that someone could recreate the incident or near miss. Use extra paper if you need.)

Weather (Fog, rain, ice, sunshine, windy, extreme temperatures – report in degrees F or C)

Motor Vehicle Accident (MVA) - You may also have to fill out an insurance form-Call Corporate Contracts Dept. (425) 372-1600

Professional Driver? ☐ Yes ☐ No

Total Years Driving:	Company Vehicle? ☐ Yes ☐ No	Operation Type:	Accident Situation:
Truck Transportation:	Years with Carrier:	Vehicle Type:	Equipment #:

Accident Location (street, city, state):

Hazardous Material? ☐ Yes ☐ No	Reportable? ☐ Yes ☐ No	No. of Vehicles Towed	No. of Injuries:	No. of Fatalities:

Spill/Leak/Product Quality

Product Name		Quantity		Product 2 Name		Quantity		Product 3 Name		Quantity	

Agency Notifications	
Estimated Cost of Incident	$

Third Party Incidents

Name of Owner		Address		Telephone	

Description of Damage:

Witness Name		Address		Telephone	
Witness Name		Address		Telephone	

#	Root Cause and Contributing Factors: Conclusion (Describe in Detail Why Incident / Near Miss Occurred)
1	
2	
3	

Root Cause(s) Analysis (RCA) - Use proactively to avoid Incidents and Near Misses.

1) Deficiency in task related ability or knowledge
2) Deficiency in Standard Operating Procedures or Job Safety Analysis
3) Deficiency in the transference of information concerning the Standard Operating Procedures or JSA steps.
4) Deficiency or lack of the proper tools or equipment
5) Proper execution requires increased time or effort.
6) Improper procedures and performance is accepted and allowed.
7) Previous improper performance of a task did not result in adverse results.
8) Beyond the control of the Supervisor/worker(s).

#	RCA #	Solution(s): How to Prevent Incident / Near Miss From Reoccurring	Person Responsible	Due Date	Closure Date

Investigation Team Members

Name	Job Title	Date

Results of Solution Verification and Validation - after implementing solutions to make sure they work.

Reviewed By

Name	Job Title	Date

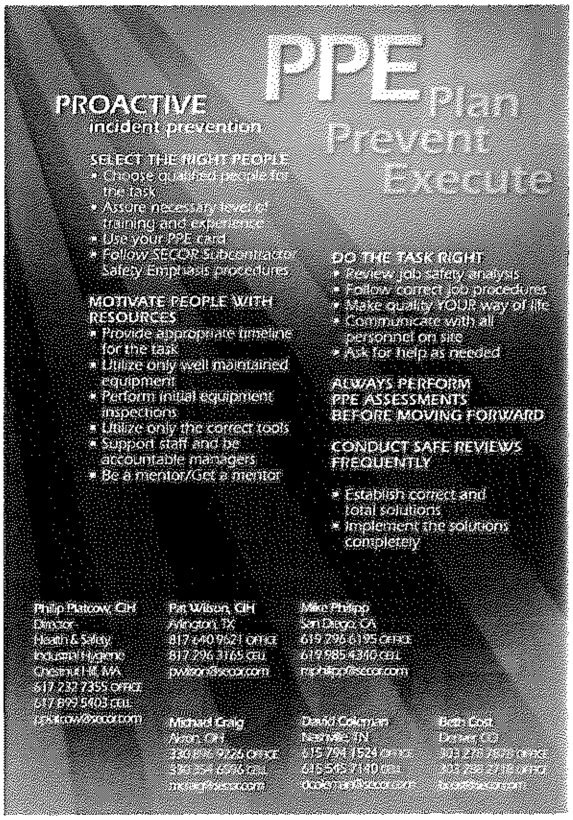
Acknowledgment Signatures for Injuries/Illnesses		
Title	**Signature**	**Date**
Director of HR: Marguerite Shuffelton		
Director of IH/H&S: Alice Larsen		
NAME:		
Regional Managers:		
Frank Aceto		
Oren Gottlieb		
Jim Grasty		
Sr. Vice President: Jim Baumgardner		
Chief Executive Officer: Jim Vais		

Contact information.
Call Human Resources and Corporate H&S Immediately.

HR: Mary Harris Phone: 619-718-9429, Fax: 619-296-2006, E-Mail: mharris@Stantec.com. After hours or weekends, please call Marguerite Shuffelton Cell: 619-925-8365 or Home 760-749-9603.

Health & Safety: Call Alice Larsen and Michael Philipp
Alice Larsen: 617-232-7355; fax 801-340-8657 Email: pplatcow@Stantec.com.
After hours or weekends, cell: 617-899-5403 or Home 617-739-1224 and
Michael Philipp 619-296-6195; fax 619-296-6199 Email: mphilipp@Stantec.com. After hours or weekends, cell: (619) 985-4340

Fax report to all three.



PPE Plan Prevent Execute

PROACTIVE
incident prevention

SELECT THE RIGHT PEOPLE
- Choose qualified people for the task
- Assure necessary level of training and experience
- Use your PPE card
- Follow SECOR Subcontractor Safety Emphasis procedures

MOTIVATE PEOPLE WITH RESOURCES
- Provide appropriate timeline for the task
- Utilize only well maintained equipment
- Perform initial equipment inspections
- Utilize only the correct tools
- Support staff and be accountable managers
- Be a mentor/Get a mentor

DO THE TASK RIGHT
- Review job safety analysis
- Follow correct job procedures
- Make quality YOUR way of life
- Communicate with all personnel on site
- Ask for help as needed

ALWAYS PERFORM PPE ASSESSMENTS BEFORE MOVING FORWARD

CONDUCT SAFE REVIEWS FREQUENTLY
- Establish correct and total solutions
- Implement the solutions completely

Philip Platcow, CIH
Director
Health & Safety
Industrial Hygiene
Chestnut Hill, MA
617 232 7355 office
617 899 5403 cell
pplatcow@secor.com

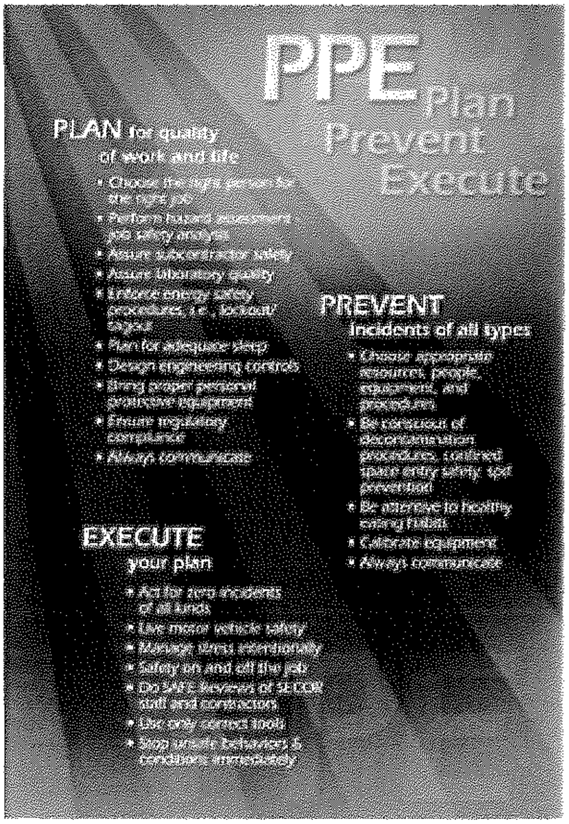
Pat Wilson, CIH
Arlington, TX
817 640 9621 office
817 296 3165 cell
pwilson@secor.com

Mike Philipp
San Diego, CA
619 296 6195 office
619 985 4340 cell
mphilipp@secor.com

Michael Craig
Akron, OH
330 896 9226 office
330 354 6996 cell
mcraig@secor.com

David Coleman
Nashville, TN
615 794 1524 office
615 545 7140 cell
dcoleman@secor.com

Beth Cost
Denver, CO
303 278 7878 office
303 798 2718 office
bcost@secor.com



PPE Plan Prevent Execute

PLAN for quality of work and life
- Choose the right person for the right job
- Perform hazard assessment - job safety analysis
- Assure subcontractor safety
- Assure laboratory quality
- Enforce energy safety procedures, i.e., lockout/tagout
- Plan for adequate sleep
- Design engineering controls
- Bring proper personal protective equipment
- Ensure regulatory compliance
- Always communicate

PREVENT incidents of all types
- Choose appropriate resources, people, equipment, and procedures
- Be conscious of decontamination procedures, confined space entry safety, spill prevention
- Be attentive to healthy eating habits
- Calibrate equipment
- Always communicate

EXECUTE your plan
- Act for zero incidents of all kinds
- Live motor vehicle safety
- Manage stress intentionally
- Safety on and off the job
- Do SAFE Reviews of SECOR staff and contractors
- Use only correct tools
- Stop unsafe behaviors & conditions immediately

ATTACMENT 3c
EMERGENCY RESPONSE INFORMATION

Local emergency contact information

	NAME	TELEPHONE
Hospital	**Valley Medical Center** **400 S 43rd st.** **Renton, WA 98055**	**(425) 228-3450**
Ambulance	**American Medical Response**	**911 OR,** **(206) 243-5622**
Police	**Renton Police Department**	**911 OR,** **(425) 430-7500**
Fire Department	**Renton Fire Department**	**911 OR,** **(425) 430-7000**
Poison	**National Poison Control Center**	**(800) 876-4766**

DIRECTIONS AND MAP TO THE HOSPITAL

ATTACMENT 3d
OCCUPATIONAL HEALTH CLINICS

Concentra Medical Centers

Alabama

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Birmingham	South	110 Oxmoor Court	35209	205-945-0773	205-945-0426	8:00 am - 5:00 pm (Mon.- Fri.)
Birmingham	Downtown	2500 Fourth Avenue	35233	205-263-5800	205-263-5850	8:00 am - 5:00 pm (Mon.- Fri.)
Total Alabama	2					

Arizona

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Flagstaff	Flagstaff	120 West Fine Ave	86001	928-773-9695	928-773-0208	8:00 am - 8:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat - Sun)
Mesa	Val Vista (East Valley)	1959 South Val Vista Road, Ste. 106	85204	480-545-1398	480-545-2706	8:00 am - 5:00 pm (Mon - Fri)
Mesa	Mesa	1710 West Southern	85202	480-644-7900	480-644-7800	7:00 am - 7:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat.)
Peoria	Northwest	7400 W. Olive Avenue, Ste. 1	85345	623-487-8598	623-487-8647	7:00 am - 6:00 pm (Mon - Fri)
Phoenix	Airport	1818 E Sky Harbor Circle North Bldg 2, Ste. 150	85034	602-244-9500	602.244.9543	24 hours / 7 days
Phoenix	Metro	12808 North Black Canyon Highway	85029	602-375-1155	602-866-9169	7:00 am - 7:00 pm (Mon - Fri)
Phoenix	Midtown	901 East Jefferson Street	85034	602-261-7888	602-261-7889	8:00 am - 5:00 pm (Mon - Fri)
Phoenix	Advanced Medical Specialists Phoenix	901 East Jefferson Street	85034	602-256-2281	602-256-6199	8:00 am - 5:00 pm (Mon - Fri)
Phoenix	Southwest	5340 West Buckeye Road, Ste. 3	85043	602-233-2117	602-484-7930	6:00 am - 6:00 pm (Mon - Fri)
Phoenix	West	3532 West Thomas Road	85019	602-272-7662	602-269-2417	7:00 am - 7:00 pm (Mon - Fri) 8:00 am - 5:00 pm (Sat.)
Scottsdale	Scottsdale	14747 N. Northsight Blvd.	85260	480-922-4776	480-922-4778	8:00 am - 5:00 pm (Mon - Fri)
Tempe	Tempe	950 West Southern Avenue	85282	480-968-7200	480-968-5100	7:30 am - 6:00 pm (Mon - Fri)
Tucson	Central	3402 E. Broadway Blvd.	85716	520-881-0050	520-795-8815	8:00 am - 5:00 pm (Mon - Fri)
Tucson	North	2005 West Ruthrauff Road, Ste. 111	85705	520-293-7250	520-293-7234	8:00 am - 5:00 pm (Mon - Fri)
Tucson	South	4600 South Park Avenue, Ste. 5	85714	520-889-9574	520-889-5072	7:00 am - 6:00 pm (Mon - Fri) 8:00 am - 6:00 pm (Sat.)
Total Arizona	15					

Arkansas

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Little Rock	Southwest	10101 Mabelvale Plaza Dr, Ste. 3	72209	501-568-7868	501-568-3035	8:00 am - 6:00 pm (Mon - Fri)
North Little Rock	North	3470 Landers Road	72117	501-945-0661	501-945-0621	8:00 am - 6:00 pm (Mon - Fri)
Total Arkansas	2					

California

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Anaheim	Anaheim	2121 Towne Centre Place Ste. 100	92806	714-937-1919	714-937-1095	24 hours / 7 days
Bakersfield	Bakersfield	9500 Stockdale Highway, Ste. 100 & 103	93311	661-326-7536	661-321-0690	8:00 am - 6:00 pm (Mon - Fri)
Fresno	Downtown	2610 Tuolumne Street	93721	559-268-0666	559-268-0462	8:00 am - 5:00 pm (Mon - Fri)
Fresno	North	7265 North First Street, Suite 105	93720	559-431-8181	559-431-1291	7:00 am - 7:00 pm (Mon - Fri)
Fresno	South	2555 South East Avenue	93706	559-445-0606	559-264-9241	7:00 am - 6:00 pm (Mon - Fri) 8:00 am - 12:00 pm (Sat.)

La Palma	La Palma	26 Centerpointe Dr. Ste. 115	90623	714-522-8020	714-522-7833	24 hours / 7 days
Los Angeles	LAX	6033 West Century Blvd., Ste. 200	90045	310-215-1600	310-215-0783	24 hours / 7 days
Madera	Madera	509 South I Street, Ste. A	93637	559-673-9020	559-673-6124	8:00 am - 6:00 pm (Mon - Fri)
Oakland	Oakland	384 Embarcadero West	94607	510-465-9565	510-465-3840	8:00 am - 5:00 pm (Mon - Fri)
Ontario	Milliken	1101 S. Milliken Avenue, Ste. C	91761	909-390-2799	909-390-0929	7:00 am - 6:00 pm (Mon - Fri)
Placentia	Placentia	640 S. Placentia Avenue	92870	714-579-7772	714-579-7781	8:00 am - 6:00 pm (Mon - Fri)
Pomona	Pomona	1218 East Lexington Avenue	91766	909-628-2777	909-465-9586	24 hours / 7 days
Rancho Cucamonga	Haven	9190 Haven Avenue Ste. 100	91730	909-481-7345	909-484-8661	24 hours / 7 days
Richmond	Richmond	2970 Hilltop Mall Road, Suite 203	94806	510-222-8000	510-222-2690	8:00 am - 5:00 pm (Mon - Fri)
Rohnert Park	Rohnert Park	6174 State Farm Drive	94928	707-586-4320	707-586-4328	8:00 am - 5:00 pm (Mon - Fri)
San Francisco	Mission Bay	728 20th Street	94107	415-648-9501	415-648-9508	8:00 am - 5:00 pm (Mon - Fri)
San Francisco	Union Square	110 Sutter Street, Ste. 300	94104	415-781-7077	415-781-7099	8:00 am - 5:00 pm (Mon - Fri)
San Leandro	San Leandro	2587 Merced Street	94577	510-351-3553	510-351-3585	7:00 am - 6:00 pm (Mon - Fri)
San Marcos	San Marcos	740 Nordahl Road, Ste. 117	92069	760-432-9000	760-741-0746	8:00 am - 6:00 pm (Mon - Fri)
Santa Rosa	Santa Rosa	1221 North Dutton Avenue	95401	707-543-8360	707-543-8361	8:00 am - 5:00 pm (Mon - Fri)

Total California *20*

Colorado

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Aurora	East	3350 Peoria Street	80010	303-340-3053	303-340-3862	7:00 am - 6:00 pm (Mon - Fri)
Aurora	Southeast	10355 East Iliff Avenue	80247	303-755-4955	303-755-4956	8:00 am - 5:00 pm (Mon - Fri)
Boulder	Boulder	3434 47th Street, Ste. 100	80301	303-541-9090	303-541-9393	8:00 am - 5:00 pm (Mon - Fri)
Colorado Springs	North (Colorado Springs)	5320 Mark Dabling Blvd., Bldg. 7, Suite 100	80918	719-592-1584	719-592-0965	8:00 am - 5:00 pm (Mon - Fri)
Colorado Springs	South	2322 S. Academy Blvd.	80916	719-390-1727	719-390-9690	8:00 am - 5:00 pm (Mon - Fri)
Denver	Downtown	1730 Blake Street, Ste. 100	80202	303-296-2273	303-296-8330	8:00 am - 5:00 pm (Mon - Fri)
Denver	North	420 East 58th Avenue, Ste. 111	80216	303-292-2273	303-296-4138	7:00 am - 6:00 pm (Mon - Fri)
Denver	Advanced Medical Specialists Denver	2490 West 26th Avenue, Ste. A-200	80211	303-433-2300	303-433-4222	8:00 am - 5:00 pm (Mon - Fri)
Denver	South	1212 S. Broadway, Ste. 150	80210	303-777-2777	303-871-0218	7:00 am - 6:00 pm (Mon - Fri)
Denver	Stapleton (Aviation)	6750 Stapleton Drive South	80216	303-355-2389	303-321-6268	7:00 am - 10:00 pm (Mon - Fri) 8:00 am - 12:00 pm (Sat.)
Englewood	Dry Creek	7150 S. Fulton St., Bldg. 200 C	80112	303-792-7368	303-858-7076	8:00 am - 5:00 pm (Mon - Fri)
Ft. Collins	Ft. Collins	2620 E. Prospect Road, Ste. 160	80525	970-221-5811	970-221-5817	8:00 am - 6:00 pm (Mon - Fri)
Golden	Lakewood	770 Simms Street, Ste. 100	80401	303-239-6060	303-239-6046	8:00 am - 5:00 pm (Mon - Fri)
Littleton	Littleton	20 West Dry Creek Circle Suite 100	80120	303-798-1009	303-798-1324	8:00 am - 5:00 pm (Mon - Fri)
Thornton	Thornton	500 E. 84th Ave., Ste. B-14	80229	303-287-7070	303-287-7373	8:00 am - 5:00 pm (Mon - Fri)

Total Colorado *15*

Connecticut

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
New Britain	New Britain	972 A W. Main Street	06053	860-827-0745	860-827-0824	8:00 am - 5:00 pm (Mon - Fri)
East Hartford	E. Hartford	701 Main Street	06108	860-289-5561	860-291-1895	7:00 am - 6:00 pm (Mon - Fri)
New Haven	New Haven	370 James Street Suite 304	06513	203-503-0482	203-503-0492	8:00 am - 5:00 pm (Mon - Fri)
Norwich	Norwich	One Connecticut Avenue	06360	860-859-5100	860-859-5110	8:00 am - 5:00 pm (Mon - Fri)
Stamford	Stamford	15 Commerce Rd, 3rd Floor	06902	203-324-9100	203-324-9400	8:00 am - 5:00 pm (Mon - Fri)
Stratford	Stratford	555 Lordship Boulevard	06615	203-380-5945	203-380-5953	8:00 am - 5:00 pm (Mon - Fri)
Torrington	Torrington	333 Kennedy Drive, Suite 202	06790	860-482-4552	860-496-1033	8:00 am - 5:00 pm (Mon - Fri)
Wallingford	Wallingford	900 Northrup Road	06492	203-949-1534	203-949-9036	8:00 am - 5:00 pm (Mon - Fri)
Waterbury	Waterbury	8 South Commons Road	06704	203-759-1229	203-759-0219	7:00 am - 7:00 pm (Mon - Fri)
Windsor	Windsor	1080 Day Hill Road	06095	860-298-8442	860-298-9420	8:00 am - 5:00 pm (Mon - Fri)

Total Connecticut *10*

Delaware

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Newark	Newark	4110 Stanton-Ogletown Road	19713	302-738-0103	302-738-6612	7:30 am - 6:00 pm (Mon - Fri)

Total Delaware *1*

Florida

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Ft. Lauderdale	Cypress Creek	6521 N. Andrews Avenue	33309	954-941-6301	954-941-7849	7:30 am - 12:00 am (Mon - Fri) 8:00 am - 4:00 pm (Sat.)
Ft. Lauderdale	Advanced Medical Specialist Cypress Creek	6521 N. Andrews Avenue	33309	954-229-7417	954-229-7451	7:30 am - 12:00 am (Mon - Fri) 8:00 am - 4:00 pm (Sat.)
Ft. Lauderdale	Ft. Lauderdale	501 S. E. 24th Street	33316	954-522-6009	954-522-6077	7:30 am - 6:00 pm (Mon - Fri)
Ft. Lauderdale	Sunshine	1347 South Andrews Avenue	33316	954-767-9999	954-763-9828	8:00 am - 10:00 pm (Mon - Fri) 10:00 am - 6:00 pm (Sat., Sun.)
Jacksonville	Northside	1215 Dunn Avenue, Ste. 7	32218	904-757-5656	904-757-5650	8:00 am - 5:00 pm (Mon - Fri)
Jacksonville	Southside	5600 Spring Park Rd., Ste. 100	32216	904-399-5959	904-396-5777	8:00 am - 5:00 pm (Mon - Fri)
Jacksonville	Westside	7764 Normandy Blvd., Ste. 24	32221	904-482-1400	904-482-1407	8:00 am - 5:00 pm (Mon - Fri)
Miami	Golden Glades	17601 N. W. 2nd Ave. Ste. S	33169	305-770-4500	305-770-0020	7:00 am - 10:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat.)
Miami	Miami	7800 N. W. 25th St., Ste. 4	33122	305-593-2174	305-593-1417	7:00 am - 12:00 am (Mon - Fri) 8:00 am - 4:00 pm (Sat., Sun.)
Miami	Port of Miami	907 South America Way	33132	305-372-1930	305-372-3708	8:00 am - 5:00 pm (Mon - Fri)
South Miami	South Miami	6341 Sunset Drive	33143	305-666-5971	305-666-0496	9:00 am - 6:00 pm (Mon - Fri)
West Palm Beach	West Palm Beach	4455 Medical Center Way	33407	561-881-0066	561-881-5533	7:30 am - 6:30 pm (Mon - Fri)

Total Florida *12*

Georgia

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Atlanta	Airport South	5044 Clark Howell Highway	30349	404-765-2400	404-761-3090	8:00 am - 6:00 pm (Mon - Fri)
Atlanta	Fulton	5670 Fulton Industrial Blvd.	30336	404-344-3930	404-344-8265	7:30 am - 12:00 am (Mon - Fri)
Atlanta	Midtown	688 Spring Street	30308	404-881-1155	404-881-9875	7:30 am - 9:00 pm (Mon - Fri) 10:00 am - 6:00 pm (Sat-Sun)
Columbus	Columbus	1051 Talbotton Rd.	31904	706-322-2511	706-322-0913	8:00 am - 6:00 pm (Mon - Fri)
Conley	Conley/Moreland Ave.	4223 Highway 42 (Moreland Ave.)	30288	404-366-2900	404-366-2994	7:30 am - 6:00 pm (Mon - Fri)
Conyers	Conyers	1157-B West Avenue	30012	770-760-0066	770-922-7599	8:00 am - 5:00 pm (Mon - Fri)
Garden City	Savannah	109 Minus Avenue, Ste. C-10	31408	912-966-5445	912-966-5955	8:00 am - 5:00 pm (Mon - Fri)
Hapeville	Airport North	3580 Atlanta Avenue	30354	404-768-3351	404-763-2002	24 Hours 7:00 am (Mon.)- 5:00 pm (Sat.)
Hapeville	Advanced Medical Specialists - Atlanta	3580 Atlanta Avenue	30354	404-768.0443	404-768-0842	8:00 am - 5:00 pm (Mon - Fri)
Lawrenceville	Lawrenceville	860 Duluth Highway	30043	770-995-1500	770-995-1729	7:30 am - 9:00 pm (Mon - Fri) 10:00 am - 6:00 pm (Sat -Sun)
Marietta	Marietta	220 N. Cobb Parkway, Ste. 400	30062	770-424-7125	770-424-7127	7:00 am - 7:00 pm (Mon - Fri) 9:00 am - 1:00 pm (Sat.)
Morrow	Morrow	1368 Southlake Plaza Drive	30260	678-422-8824	678-422-7291	7:30 am - 6:00 pm (Mon - Fri)
Norcross	Norcross	6475 Jimmy Carter Boulevard, Ste. 200	30071	770-242-7744	770-368-0164	7:00 am - 7:00 pm (Mon - Fri) 9:00 am - 1:00 pm (Sat.)
Norcross	Advanced Medical Specialists Norcross	6475 Jimmy Carter Boulevard, Ste. 300	30071	770-242-9414	770-242-9746	8:00 am - 5:00 pm (Mon - Fri)
Norcross	Norcross/Beaver Ruin	1905 Beaver Ruin Rd. #175	30071	770-441-0444	770-449-7962	8:00 am - 5:00 pm (Mon - Fri)

Total Georgia *15*

Hawaii

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Honolulu	Honolulu	545 Ohohia Street	96819	808-831-3000	808-834-5763	7:00 am - 5:00 pm (Mon - Fri)

Total Hawaii 1

Illinois

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Addison	Addison	501 South Grace Street	60101	630-543-4040	630-543-1050	7:00 am - 8:00 Pm (Mon - Fri) 8:00 am - 1:00 pm (Sat., Sun.)
Aurora	Aurora	4000 Ogden Avenue	60504	630-820-8963	630-851-5008	8:00 am - 6:00 pm (Mon - Fri)
Bloomingdale	Bloomingdale	211 E. Army Trail Road	60108	630-582-8946	630-582-0969	7:00 am - 10:00 pm (Mon - Fri)
Bridgeview	Bridgeview	8755 South Harlem Avenue	60455	708-430-2295	708-430-2372	24 Hours 7:00 am (Mon.) - 4:00 pm (Sat.)
Chicago	Ashland	3145 Ashland Avenue, Ste. 110	60608	773-254-5516	773-254-5518	7:00 am - 10:00 pm (Mon - Fri)
Chicago	Crawford	4201 W. 36th Street	60632	773-927-7438	773-927-7524	8:00 am - 5:00 pm (Mon - Fri)
Chicago	Advanced Medical Specialists Downtown	1030 West Chicago Avenue	60622	312-243-1574	312-243-1698	7:00 am - 10:00 pm (Mon - Fri) 7:30 am - 12:30 pm (Sat.)
Chicago	Lake Street	1230 W. Lake Street	60607	312-666-0028	312-666-5214	7:00 am - 5:00 pm (Mon - Fri)
Chicago	South Chicago	900 East 103rd Street	60628	773-468-2963	773-468-2975	8:00 am - 5:00 pm (Mon - Fri)
Elk Grove Village	Elk Grove Village	1830 Jarvis Avenue	60007	847-952-1180	847-952-1183	6:00 am - 12:00 am (Mon - Fri)
Elk Grove Village	Advanced Medical Specialists Elk Grove	1820 Jarvis Avenue	60007	847-364-9906	847-364-9964	8:00 am - 5:00 pm (Mon - Fri)
Franklin Park	Franklin Park	10474 West Grand Avenue	60131	847-451-7590	847-451-7608	24 Hours 6:00 am (Mon.) - 1:00 pm (Sat.)
Morton Grove	Morton Grove	8125 River Drive #102	60053	847-470-1720	847-470-1723	8:00 am - 5:00 pm (Mon - Fri)
Wheeling	Wheeling	544 W. Dundee Road	60090	847-419-6974	847-419-6982	7:00 am - 10:00 pm (Mon - Fri)

Total Illinois 14

Indiana

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Hammond	Hammond	6423 Columbia Avenue	46320	219-937-3632	219-937-4715	7:00 am - 10:00 pm (Mon - Fri)
Indianapolis	Northwest	5604 W. 74th Street	46278	317-290-1551	317-290-2052	7:00 am - 9:00 pm (Mon - Fri)
Indianapolis	Southwest	6920 Gatwick Drive #100	46241	317-856-2945	317-856-5122	24 hours / 7 days

Total Indiana 3

Iowa

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Des Moines	Dixon	2100 Dixon Ste. E	50316	515-265-1020	515-265-1511	8:00 am - 5:00 pm (Mon - Fri)
Urbandale	West (Aurora)	11144 Aurora Avenue	50322	515-278-6868	515-278-1660	8:00 am - 5:00 pm (Mon - Fri)

Total Iowa 2

Kansas

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Kansas City	Kansas Avenue	4214 Kansas Avenue	66106	913-321-7557	913-321-7667	7:00 am - 8:00 pm (Mon - Fri)
Lenexa	KC Lenexa	14809 W. 95th Street	66215	913-894-6664	913-894-6891	8:00 am - 5:00 pm (Mon - Fri)

Lenexa

Total Kansas 2

Kentucky

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Erlanger	Mineola	1825 Airport Exchange Blvd., Ste 100	41018	859-647-6228	859-372-6350	7:00 am - 11:00 pm (Mon - Fri) 9:00 pm - 1:00 pm (Sat)
Independence	Independence	10110 Toebben Drive	41051	859-282-6060	859-647-3962	8:00 am - 5:00 pm (Mon - Fri)
Louisville	Crittenden	4870 Crittenden Drive	40209	502-361-0606	502-361-0698	8:00 am - 6:00 pm (Mon - Fri)

Total Kentucky 3

Louisiana

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Baton Rouge	Baton Rouge	3235 Perkins Road	70808	225-387-3030	225-387-4521	7:00 am - 5:00 pm (Mon - Fri)
Jefferson	Jefferson	4015 Jefferson Highway	70121	504-837-6447	504-833-8088	8:00 am - 5:00 pm (Mon - Fri)
Kenner	Kenner	1600 Williams Blvd.	70062	504-468-1506	504-468-8980	8:00 am - 5:00 pm (Mon - Fri)
New Orleans	Downtown	318 Baronne Street	70112	504-561-1051	504-586-8958	8:00 am - 5:00 pm (Mon - Fri)

Total Louisiana 4

Maine

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Augusta	Augusta	219 Capitol Street, Suite 2	04330	207-629-5005	207-629-5220	8:00 am - 5:00 pm (Mon - Fri)
Bangor	Bangor	34 Gilman Road	04401	207-941-8300	207-947-3134	7:30 am - 5:00 pm (Mon - Fri)
Bridgton	Bridgton	10 Hospital Drive	04009	207-647-6063	207-647-6013	8:00 am - 12:00 pm (Tues.) 12:45 pm - 4:30 pm (Fri.)
Lewiston	Lewiston	59 East Avenue	04240	207-784-1680	207-783-9649	7:30 am - 5:00 pm (Mon - Fri)
Norway	Norway	29 Winter Street	04268	207-743-7399	207-743-1589	8:00 am -4:30 pm (Mon. Wed.) 1:00 pm -4:30 pm (Tues.) Closed (Thurs.) 8:00 am - 11:30 am (Fri.)
Portland	Portland	1600 Congress Street	04102	207-774-7751	207-828-5140	7:30 am - 5:00 pm (Mon - Fri)

Total Maine 6

Maryland

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Baltimore	Arbutus	1419 Knecht Avenue	21227	410-247-9595	410-247-7553	7:00 am - 12:00 am (Mon-Sat)
Baltimore	Downtown	100 South Charles Street, Suite 150	21201	410-752-3010	410-539-7023	8:00 am - 5:00 pm (Mon - Fri) 7:00 am - 12:00 pm (Sat.)
Baltimore	Dundalk	1833 Portal Street	21224	410-633-3600	410-633-3604	7:30 am - 5:00 pm (Mon - Fri)
Baltimore	Rosedale	8101 Pulaski Highway, Ste. H	21237	410-687-6462	410-687-2261	7:00 am - 7:00 pm (Mon - Fri) 7:00 am - 12:00 pm (Sat)
Baltimore	Advanced Medical Specialists Baltimore	8101 Pulaski Highway, Ste. H	21237	410-574-6588	410-238-7906	7:00 am - 10:00 am(Mon) 12:00 pm - 4:00 pm (Mon) 8:00 am - 5:00 pm (Thurs) 12:00 pm - 4:00 pm (Fri)
Columbia	Columbia	6656 Dobbin Road	21045	410-381-1330	410-381-5585	7:30 am - 5:00 pm (Mon - Fri)
Elkridge	Jessup	7377 Washington Blvd., Ste. 101	21075	410-379-3051	410-379-3074	7:30 am - 5:00 pm (Mon - Fri)
Elkridge	Advanced Medical Specialists Jessup	7377 Washington Blvd., Ste. 103	21076	410-579-2750	410-579-2776	7:30 am - 5:00 pm (Mon - Fri)
Glen Burnie	BWI Airport	811 Cromwell Park Dr, Ste. 104 -105	21061	410-553-0110	410-553-0197	7:30 am - 5:00 pm (Mon - Fri)
Landover	Landover	8700 Central Avenue	20785	301-499-4655	301-499-0902	7:30 am - 5:00 pm (Mon - Fri)
Lanham	Lanham	4451 G Parliament Place	20706	301-459-9113	301-459-1214	7:00 am - 8:00 pm (Mon - Fri) 7:00 am - 12:00 pm (Sat)
Timonium	Timonium	1840 York Road, Ste. E	21093	410-252-4015	410-252-7410	7:30 am - 5:00 pm (Mon - Fri)

Total Maryland 12

Massachusetts

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
East Boston	Logan	One Harborside Drive	02128	617-568-6500	617-568-6573	8:00 am - 5:00 pm (Mon - Fri)
Greenfield	Greenfield	489 Bernardston Road	01301	413-772-5055	413-774-9954	8:00 am - 5:00 pm(Mon-Thurs) 8:00 am - 3:00 pm (Friday)
Springfield	Springfield	140 Carando Drive	01104	413-746-4006	413-746-3230	8:00 am - 5:00 pm (Mon - Fri)
Wilmington	Wilmington	66B Concord Street	01887	978-657-3826	978-657-5705	8:00 am - 5:00 pm (Mon - Fri)

Total Massachusetts 4

Michigan

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Allen Park	Fairlane	17500 Federal Drive, Ste. 750	48101	313-982-1370	313-982-1376	8:00 am - 5:00 pm (Mon - Fri)
Ann Arbor	Ann Arbor	3131 S. State Street	48108	734-213-6285	734-213-6482	8:00 am - 6:00 pm (Mon - Fri)
Brighton	Brighton	7960 West Grand River, Ste. 100	48114	810-225-9800	810-225-9807	7:30 am - 5:30 pm (Mon - Fri)
Chesterfield	Chesterfield	50110 Gratiot Avenue	48051	586-949-6336	586-949-0206	7:00 am - 7:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat)
Detroit	Jefferson	2151 East Jefferson Avenue	48207	313-259-7990	313-259-7294	24 hours / 7 days
Fraser	Fraser	33089 Groesbeck Hwy.	48026	586-296-2800	586-296-6190	24 hours / 7 days
Grand Rapids	Grand Rapids North	933 Three Mile Road NW, Ste. 110	49544	616-785-2619	616-785-2623	8:00 am - 5:00 pm (Mon - Fri)
Grand Rapids	Grand Rapids South	436 44th Street SE, Ste. A	49548	616-531-9750	616-531-9710	24 Hours 7:00 am (Mon) - 4:00 pm (Sat)
Lansing	Lansing	1115 S. Pennsylvania, Ste. 101	48912	517-346-4700	517-346-4855	7:00 am – 11:00 pm (Mon-Fri)
Livonia	I-96	28196 Schoolcraft Road	48150	734-425-4600	734-425-1185	24 hours / 7 days
Livonia	Livonia	34095 Plymouth Road	48150	734-513-2000	734-513-7263	8:00 am - 5:00 pm (Mon -Fri)
Livonia	Advanced Medical Specialists West	34087 Plymouth Road	48150	734-458-8369	734-458-8659	8:00 am - 5:00 pm (Mon - Fri)
Novi	Novi	40000 Grand River Avenue, Ste. 105	48375	248-478-1616	248-478-9450	7:00 am - 11:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat)
Pontiac	Pontiac	1915 N. Perry Street	48340	248-276-3999	248-276-3998	24 hours / 7 days
Romulus	Airport	11700 Metro Airport Center Ste 104	48174	734-955-7000	734-955-7006	24 hours / 7 days
Romulus	Romulus	29750 Ecorse Rd.	48174	734-326-1374	734-326-1433	8:00 am - 5:00 pm (Mon - Fri)
Southfield	Southfield	26185 Greenfield Road	48075	248-569-2040	248-569-2048	8:00 am - 5:00 pm (Mon - Fri)
Sterling Heights	Sterling Heights	40732 Van Dyke Road	48313	586-977-1510	586-977-3261	7:00 am - 11:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat)
Taylor	Taylor	21107 Eureka Road	48180	734-287-3415	734-287-4213	7:00 am - 11:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat)
Troy	Troy	627 East Maple Road, Ste. 200	48083	248-524-1912	248-524-3901	7:00 am - 11:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat)
Warren	Advanced Medical Specialists East	14061 13 Mile Road, Ste. 1	48088	586-294-7077	586-294-7144	8:00 am - 5:00 pm (Mon - Fri)
Warren	Warren	11569 E. 12 Mile Road	48093	586-582-0018	586-582-0108	7:00 am - 11:00 pm (Mon - Fri) 8:00 am - 4:00 pm (Sat)

Total Michigan 22

Missouri

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Fenton	Fenton	128 Matrix Commons	63026	636-349-6850	636-349-6641	8:00 am - 5:00 pm (Mon - Fri)
Grandview	Grandview	12220A South Blue Ridge Blvd.	64030	816-763-1755	816-763-1855	8:00 am - 5:00 pm (Mon - Fri)
Hazelwood	Airport	463 Lynn Haven	63042	314-731-0448	314-731-0495	7:30 am - 5:00 pm (Mon - Fri)
Kansas City	Downtown	720 Oak Street	64106	816-842-1146	816-283-3603	7:00 am - 5:30 pm (Mon - Fri)
Kansas City	KC Executive Park	6401 Front Street	64120	816-241-0603	816-241-6276	7:30 am - 5:00 pm (Mon - Fri)
Kansas City	Prospect	6400 Prospect Avenue Ste. 332	64132	816-523-7770	816-523-5302	7:30 am - 4:30 pm (Mon - Fri)
Maryland Heights	Westport	83 Progress Parkway	63043	314-434-8174	314-434-8706	8:00 am - 8:00 pm (Mon - Fri) 8:00 am - 1:00 pm (Sat.)
N. Kansas City	KC North	599 Armour Road	64116	816-421-0750	816-421-0802	8:00 am - 8:00 pm (Mon - Fri) 8:00 am - 1:00 pm (Sat.)
Springfield	Springfield	3000 E. Division	65802	417-863-7445	417-863-0384	8:00 am - 7:00 pm (Mon - Fri) 8:00 am - 12:00 pm (Sat.)
St. Charles	St. Charles	1551 Wall Street, Suite 100	63303	636-947-1666	636-947-4185	8:00 am - 5:00 pm (Mon - Fri)
St. Louis	Midtown	6726 Manchester Road	63139	314-647-0081	314-647-5485	8:00 am - 6:00 pm (Mon - Fri)
St. Louis	North Broadway	8340 N. Broadway	63147	314-385-9563	314-385-9350	8:00 am - 5:00 pm (Mon - Fri)
St. Louis	Soulard	1617 South 3rd St.	63104	314-421-2557	314-421-2046	7:30 am - 5:00 pm (Mon - Fri)

Total Missouri 13

Nebraska

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Lincoln	Lincoln	4900 N. 26th Street Ste. 104	68521	402-465-0010	402-465-0015	8:00 am - 5:00 pm (Mon - Fri)
Omaha	East	2900 F Street	68107	402-731-7990	402-731-8138	8:00 am - 5:00 pm (Mon - Fri)
Omaha	West	9602 M Street	68127	402-331-8555	402-331-8820	8:00 am - 5:00 pm (Mon - Fri)

Total Nebraska 3

Nevada

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Carson City	Carson City	3488 Goni Road, Bldg E Suite 141	89701	775-887-5030	775-887-5040	8:00 am - 5:00 pm (Mon - Fri)
Henderson	Henderson	149 N. Gibson Road, Ste. H	89014	702-558-6275	702-856-3198	8:00 am - 5:00 pm (Mon - Fri)
Las Vegas	Paradise	3900 Paradise, Suite V	89169	702-369-0560	702-369-3496	8:00 am - 5:00 pm (Mon - Fri)
Las Vegas	Polaris	5850 S. Polaris Rd., Ste. 100	89118	702-739-9957	702-739-9370	24 hours / 7 days
Las Vegas	Meade	2952 Meade Avenue	89102	702-871-1721	702-871-5127	8:00 am - 5:00 pm (Mon. - Fri)
Las Vegas	Advanced Medical Specialists Las Vegas	2200 South Rancho	89102	702-677-3544	702-871-3002	8:00 am - 5:00 pm (Mon - Fri)
North Las Vegas	North	3945 W. Cheyenne Ave. Ste. 208	89032	702-648-8116	702-648-8259	8:00 am - 5:00 pm (Mon - Fri)
North Las Vegas	Brooks	151 W. Brooks Avenue	89030	702-399-6545	702-642-1767	8:00 am - 5:00 pm (Mon - Fri)
Reno	Downtown	1530 E. 6th Street	89512	775-322-5757	775-322-5776	8:00 am - 5:00 pm (Mon - Fri)
Sparks	Sparks	255 Glendale Avenue, Ste. 12	89431	775-356-8181	775-332-8060	7:00 am - 6:00 pm (Mon - Fri) 9:00 am - 1:00 pm (Sat.)

Total Nevada 10

New Hampshire

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Concord	Concord	1 Pillsbury Street	03301	603-223-2300	603-228-9730	8:00 am - 5:00 pm (Mon - Fri)
Londonderry	Londonderry	156 Harvey Road	03053	603-644-3330	603-644-3332	8:00 am - 5:00 pm (Mon - Fri)
Nashua	Nashua	14A Broad Street	03064	603-889-2354	603-889-2793	8:00 am - 5:00 pm (Mon - Fri)

Total New Hampshire 3

New Jersey

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Bellmawr	Bellmawr	210 Benigno Blvd.	08031	856-931-0691	856-931-9253	8:00 am - 5:00 pm (Mon - Fri)
Clifton	Clifton	283 Piaget Avenue	07011	973-772-3930	973-772-1498	8:00 am - 5:00 pm (Mon - Fri)
Edison	Edison	135 Raritan Center Parkway	08837	732-225-5454	732-417-0003	7:00 am - 5:00 pm (Mon - Fri)
Elizabeth	Elizabeth	595 Division Street	07201	908-289-5646	908-351-1099	7:00 am - 7:00 pm (Mon - Fri) 8:00 am - 2:00 pm (Sat.)
Jersey City	Jersey City	574 Summit 4th Floor	07306	201-656-7678	201-656-0664	8:00 am - 5:00 pm (Mon - Fri)
Mount Laurel	Mount Laurel	817 East Gate Drive, Ste. 1B	08054	856-778-1090	856-778-9191	7:30 am - 6:00 pm (Mon - Fri)
Newark	Newark	375 McCarter Highway	07114	973-643-4969	973-643-3657	8:00 am - 5:00 pm (Mon - Fri)
Pennsauken	Pennsauken	7204 North Park Drive	08109	856-663-7690	856-663-9269	8:00 am - 5:00 pm (Mon - Fri)
Secaucus	Secaucus	30 Seaview Drive	07094	201-319-1611	201-319-1233	7:00 am - 7:00 pm (Mon - Fri)
South Plainfield	South Plainfield	116 Corporate Boulevard, Ste. E	07080	908-757-1424	908-757-5678	8:00 am - 5:00 pm (Mon - Fri)
Teterboro	Teterboro	150 North Street	07608	201-393-9199	201-393-9008	8:00 am - 5:00 pm (Mon - Fri)

Total New Jersey 11

New Mexico

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Albuquerque	Commons	3811 Commons Ave. NE	87109	505-345-9599	505-998-4207	8:00 am - 5:00 pm (Mon - Fri)
Albuquerque	Encino	801 Encino Place N.E., Ste. E-12	87102	505-842-5151	505-842-5676	8:00 am - 5:00 pm (Mon - Fri)
Albuquerque	North Pointe	5700 Harper N.E., Ste. 110	87109	505-823-9166	505-858-0030	8:00 am - 5:00 pm (Mon - Fri)
Las Cruces	Las Cruces	2170 East Lohman Ave., Ste. A,B,C	88001	505-524-8888	505-524-8132	8:00 am - 5:00 pm (Mon - Fri)
Santa Fe	Santa Fe	720 St. Michaels Drive, Ste. C	87505	505-438-9402	505-471-9240	7:30 am - 5:30 pm (Mon - Fri)

Total New Mexico 5

New York

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Albany	Albany	10B Madison Avenue Extension	12203	518-452-7030	518-452-7370	8:00 am - 5:00 pm (Mon - Fri)
Rochester	Rochester	687 Lee Road, Suite 208	14606	585-458-7910	585-458-7507	8:00 am - 5:00 pm (Mon - Fri)
Total New York	2					

N. Carolina

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Charlotte	Downtown	1410 W. Morehead Suite 200	28208	704-338-1268	704-338-9358	8:00 am - 5:00 pm (Mon - Fri)
Charlotte	North	2835 Jeff Adams Dr. Ste. A	28206	704-342-9011	704-342-3812	7:30 am - 6:00 pm (Mon - Fri)
Charlotte	Randolph	2711 Randolph Road, Ste. 301	28207	704-330-1700	704-330-1716	8:00 am - 5:00 pm (Mon - Fri) 9:00 am - 2:00 pm (Sat.)
Charlotte	Westinghouse	646 Westinghouse Blvd.	28273	704-588-0885	704-588-2616	7:30 am - 10:00 pm (Mon - Fri)
Durham	Durham	5400 South Miami Blvd., Ste. 112	27703	919-941-1911	919-941-1901	7:30 am - 6:00 pm (Mon - Fri)
Raleigh	Raleigh	4909 Green Road	27616	919-790-0288	919-790-0723	7:30 am - 6:00 pm (Mon - Fri)
Winston-Salem	Winston-Salem	4410 Providence Lane #I	27106	336-896-9999	336-759-2020	8:00 am - 5:00 pm (Mon - Fri)
Total N. Carolina	7					

Ohio

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Akron	Downtown	1450 Firestone Pkwy	44301	330-724-3345	330-724-5299	8:00 am - 5:00 pm (Mon - Fri)
Cincinnati	Norwood (Oakley)	4623 Wesley Ave. Ste. C	45212	513-841-1122	513-366-4432	7:00 am - 7:00 pm (Mon - Fri) 9:00 am - 1:00 pm (Sat.)
Cincinnati	Sharonville	2884 E. Kemper Rd.	45241	513-771-2233	513-612-3572	8:00 am - 8:00 pm (M, W, TH) 8:00 am - 5:00 pm (T, F) 8:00 am - 12:00 pm (Sat)
Cleveland	Downtown	5500 S. Marginal Road	44103	216-426-9020	216-426-9025	7:00 am - 7:00 pm (Mon - Fri)
Cleveland	South Central	4660 Hinckley Industrial Parkway	44109	216-749-2730	216-749-2735	7:00 am - 7:00 pm (Mon - Fri)
Dayton	Dayton	228 Troy Street	45404	937-228-8132	937-228-7185	7:00 am - 5:00 pm (Mon - Fri)
Oakwood Village	Forbes	7730 First Place, Ste. D	44146	440-735-0438	440-735-0484	8:00 am - 5:00 pm (Mon - Fri)
Willoughby	Willoughby	3900 Ben Hur Avenue	44094	440-975-4185	440-975-4195	8:00 am - 5:00 pm (Mon - Fri)
Total Ohio	8					

Oklahoma

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Oklahoma City	Meridian	200 Quadrum Drive	73108	405-942-8767	405-942-7033	8:00 am - 5:00 pm (Mon - Fri)
Oklahoma City	North	36 West Memorial Road, Ste. C3	73114	405-755-3110	405-755-3159	8:00 am - 5:00 pm (Mon - Fri)
Oklahoma City	South	7100 S. I-35 Service Road, Ste. 7	73149	405-632-1002	405-632-3131	8:00 am - 5:00 pm (Mon - Fri)
Oklahoma City	West Reno	6101 West Reno, Ste. 800	73127	405-495-3085	405-495-3089	7:00 am - 9:00 pm (Mon - Fri)
Tulsa	Tulsa North	1541 North Sheridan Road	74115	918-836-5406	918-832-8618	8:00 am - 7:00 pm (Mon - Fri)
Tulsa	Tulsa South	9515 E. 51st Street, Ste. G	74145	918-622-7488	918-622-7071	8:00 am - 5:00 pm (Mon - Fri)
Tulsa	Tulsa West	5682 W. Skelly Drive	74107	918-446-1891	918-446-1894	8:00 am - 5:00 pm (Mon - Fri)
Total Oklahoma	7					

Oregon

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Lake Oswego	Southwest	6405 SW Rosewood Ste. B	97035	503-675-7603	503-675-7611	8:00 am - 5:00 pm (Mon - Fri)
Portland	Airport	12518 NE Airport Way, Ste. 110	97230	503-256-2992	503-258-0717	8:00 am - 5:00 pm (Mon - Fri)
Portland	Swan Island	3449 N. Anchor Street, Ste. 300A	97217	503-283-0013	503-283-0785	7:00 am - 5:00 pm (Mon - Fri)
Total Oregon	3					

Pennsylvania

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Harrisburg	Harrisburg East	4400 Lewis Road, Ste. G, H	17111	717-558-6708	717-558-6709	7:00 am - 6:00 pm (Mon - Fri)
Lancaster	Lancaster	113 Butler Avenue	17601	717-391-3087	717-391-6752	8:00 am - 5:00 pm (Mon - Fri)
Mechanicsburg	Mechanicsburg	4910 Ritter Road	17055	717-795-1819	717-795-2757	8:00 am - 5:00 pm (Mon - Fri)
Philadelphia	Airport	7000 Holstein Avenue	19153	215-365-7510	215-365-7568	8:00 am - 5:00 pm (Mon - Fri)
Philadelphia	Germantown	2 Penn Blvd., Ste. 220	19144	215-438-5390	215-848-3617	8:00 am - 5:00 pm (Mon - Fri)
Philadelphia	Northeast	2010 Levick St.	19149	215-537-4755	215-537-4406	8:00 am - 5:00 pm (Mon - Fri)
Pittsburgh	Aspinwall	15 Freeport Road, Ste. 104	15215	412-784-1551	412-784-1722	7:00 am - 5:00 pm (Mon - Fri)
Pittsburgh	Robinson	4390 Campbells Run Road	15205	412-429-9675	412-429-8203	8:00 am - 5:00 pm (Mon - Fri)
Pittsburgh	University Center	120 Lytton Street, Ste. 275	15213	412-621-5430	412-621-5460	8:00 am - 5:00 pm (Mon - Fri)
Pittsburgh	West End	1600 West Carson Street	15219	412-391-1137	412-391-2146	8:00 am - 5:00 pm (Mon - Fri)
Plymouth Meeting	Plymouth Meeting	850 Germantown Pike	19462	610-275-3884	610-275-3898	7:00 am - 7:00 pm (Mon - Fri) 8:00 am - 12:00 pm (Sat.)
Reading	Reading	4201 Pottsville Pike	19605	610-921-5811	610-921-8345	7:00 am - 5:00 pm (Mon - Fri)
Wilkes-Barre Township	Wilkes-Barre	268 Highland Park Blvd.	18702	570-822-8831	570-820-7740	8:00 am - 5:00 pm (Mon - Fri)
York	York	2141 Pennsylvania Avenue	17404	717-764-1008	717-764-1017	7:00 am - 6:00 pm (Mon - Fri) 7:00 am - 12:00 pm (Sat.)

Total Pennsylvania *14*

Rhode Island

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Pawtucket	Pawtucket	203 Concord Street, Suite 301	02860	401-722-8880	401-723-9320	8:00 am - 5:00 pm (Mon - Fri)
Warwick	Warwick	2191 Post Road, Suite 3	02886	401-738-8100	401-732-2763	8:00 am - 5:00 pm (Mon - Fri)

Total Rhode Island *2*

S. Carolina

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Charleston	Charleston South	4115 Dorchester Road	29405	843-554-6737	843-554-3356	8:00 am - 5:00 pm (Mon - Fri)
N. Charleston	Charleston North	8780 Rivers Ave, Ste. 200, Bldg. B	29406	843-572-0810	843-572-0817	8:00 am - 5:00 pm (Mon - Fri)

Total S. Carolina *2*

Tennessee

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Madison	Rivergate	1719 Gallatin Road	37115	615-870-0143	615-870-5524	8:00 am - 5:00 pm (Mon - Fri)
Memphis	Airport	2831 Airways Blvd. Bldg. A Ste. 102	38132	901-348-0200	901-348-0046	8:00 am - 8:00 pm (Mon - Fri)
Memphis	President's Island	1005 Harbor Avenue	38113	901-946-1636	901-774-1268	8:00 am - 5:00 pm (Mon - Fri)
Memphis	Southeast	3965 Mendenhall Road, Ste. 6 & 7	38115	901-365-1800	901-365-1862	8:00 am - 5:00 pm (Mon - Fri)
Murfreesboro	Murfreesboro	1203-A Memorial Blvd.	37129	615-895-4855	615-895-8939	8:00 am - 5:00 pm (Mon - Fri)
Nashville	Advanced Medical Specialists Nashville	2410 Franklin Rd.	37204	615-297-1902	615-297-0415	8:00 am - 5:00 pm (Mon - Fri)
Nashville	Central	342 21st Avenue North	37203	615-321-5698	615-321-5538	8:00 am - 5:00 pm (Mon - Fri)
Nashville	Elm Hill - East	2531 Elm Hill Pike	37214	615-883-6995	615-883-3473	7:30 am - 6:00 pm (Mon - Fri) 9:00 am - 1:00 pm (Sat)
Nashville	South	4300 Sidco Drive	37204	615-837-4360	615-837-6973	8:00 am - 5:00 pm (Mon - Fri)

Total Tennessee *9*

Texas

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Addison	Addison	15810 Midway Road	75001	972-458-8111	972-458-7776	8:00 am - 9:00 pm (Mon - Fri) 10:00 am -6:00 pm (Sat - Sun)
Amarillo	Amarillo	1619 S. Kentucky, Ste. F-600	79102	806-373-2200	806-373-8679	7:00 am - 5:00 pm (Mon - Fri)
Arlington	Arlington	2100 E. Randoll Mill Road	76011	817-261-5166	817-275-5432	8:00 am - 5:00 pm (Mon - Fri)
Austin	Austin North	8868 Research Blvd., Ste. 601	78758	512-467-7232	512-467-7203	8:00 am - 6:00 pm (Mon - Fri)

Austin	Austin South	2171 B. Woodward	78744	512-440-0555	512-448-1113	8:00 am - 5:00 pm (Mon - Fri)
Carrollton	Carrollton	1345 Valwood Parkway, Ste. 306	75006	972-484-6435	972-484-6785	8:00 am - 5:00 pm (Mon - Fri)
Corpus Christi	Lantana	2209 North Padre Island Drive, Ste. M	78408	361-289-5811	361-289-1207	8:00 am - 5:00 pm (Mon - Fri)
Corpus Christi	S.P.I.D.	4025 South Padre Island Drive	78411	361-852-8255	361-852-0212	8:00 am - 5:00 pm (Mon - Fri)
Dallas	Live Oak	4006 Live Oak	75204	214-821-6007	214-821-6149	8:00 am - 5:00 pm (Mon - Fri)
Dallas	Med Center	8267 Elmbrook, Ste. 101	75247	214-630-2331	214-905-1323	7:00 am - 10:00 pm (Mon - Fri) 8:00 am - 5:00 pm (Sat)
Dallas	Redbird	5520 Westmoreland, Ste. 200	75237	214-467-8210	214-467-8192	8:00 am - 5:00 pm (Mon - Fri)
Deer Park	Deer Park Industrial	125 East 8th Street	77536	281-930-8555	281-930-9870	8:00 am - 5:00 pm (Mon - Fri)
El Paso	El Paso East	2400 Trawood, Ste. 104	79936	915-593-1862	915-593-2173	8:00 am - 5:00 pm (Mon - Fri)
El Paso	El Paso Gateway	6320 Gateway Blvd. East	79905	915-772-2111	915-778-6759	8:00 am - 5:00 pm (Mon - Fri)
Fort Worth	Fort Worth/Forest Park	2500 West Freeway (I-30) Ste. 100	76102	817-882-8700	817-882-8707	8:00 am - 9:00 pm (Mon - Fri) 8:00 am - 3:00 pm (Sat)
Fort Worth	Fort Worth/Fossil Creek	4060 Sandshell Drive	76137	817-306-9777	817-306-9780	7:00 am - 7:00 pm (Mon - Fri)
Fort Worth	Forth Worth/South	1132 Everman Parkway	76140	817-293-7311	817-551-1066	8:00 am - 5:00 pm (Mon - Fri)
Garland	Garland	1621 S. Jupiter #101	75042	214-340-7555	214-340-3980	7:00 am - 6:00 pm (Mon - Fri)
Grand Prairie	Grand Prairie	2100 North Highway 360, Ste. 2201	75050	972-988-0441	972-641-0054	8:00 am - 8:00 pm (Mon - Fri) 8:00 am - 3:00 pm (Sat)
Houston	Astrodome	9321 Kirby	77054	713-797-0991	713-797-6431	8:00 am - 5:00 pm (Mon - Fri)
Houston	Downtown	2004 Leeland	77003	713-223-0838	713-223-1310	8:00 am - 5:00 pm (Mon - Fri)
Houston	Hillcroft	6545 Southwest Freeway	77074	713-995-6998	713-995-6580	8:00 am - 5:00 pm (Mon - Fri)
Houston	Houston Hobby	8505 Gulf Freeway, Ste. F	77017	713-944-4442	713-944-4582	8:00 am - 5:00 pm (Mon - Fri)
Houston	I-10 East	10909 I-10 East Freeway	77029	713-973-7943	713-973-7947	7:00 am - 7:00 pm (Mon - Fri) 8:00 am - 12:00 pm (Sat)
Houston	Intercontinental	401 Greens Road	77060	281-873-0111	281-873-0660	8:00 am - 5:00 pm (Mon - Fri)
Houston	McCarty	8799 N. Loop East, Ste. 110	77029	713-674-1114	713-674-5169	8:00 am - 5:00 pm (Mon - Fri)
Houston	Northwest/290	6360 West Sam Houston Pkwy North, Ste. 200	77041	713-280-0400	713-896-0702	8:00 am - 5:00 pm (Mon - Fri)
Houston	Houston Post Oak	1000 North Post Oak, Bldg. G #100	77055	713-686-4868	713-686-5127	7:30 am - 5:00 pm (Mon - Fri.)
Houston	Houston Suburban	12345 Katy Freeway	77079	281-679-5600	281-679-6510	7:00 am - 10:00 pm (Mon - Fri) 8:00 am - 9:00 pm (Sat., Sun.)
Irving	Grauwyler	2233 E Grauwyler Rd., Ste. 110	75061	972-554-8494	972-438-4647	8:00 am - 5:00 pm (Mon - Fri)
Lubbock	Lubbock	160 Slaton Road	79404	806-745-2200	806-745-3267	8:00 am - 5:00 pm (Mon - Fri)
Mesquite	Mesquite	4928 Samuell Blvd.	75149	214-328-1400	214-328-2884	7:30 am - 10:00 pm (Mon - Fri)
Plano	Plano	701 E. Plano Parkway, Ste. 103	75074	972-578-2212	972-881-7666	8:00 am - 9:00 pm (Mon - Fri) 10:00 am -6:00 pm (Sat - Sun)
Round Rock	Round Rock	117-B Louis Henna Blvd., Ste. 200	78664	512-255-9634	512-255-9645	8:00 am - 5:00 pm (Mon - Fri)
San Antonio	Downtown (Central)	400 East Quincy	78215	210-472-0211	210-472-0214	8:00 am - 5:00 pm (Mon - Fri)
San Antonio	East	3453 North Hwy. 35, Ste. 110	78219	210-226-7767	210-226-9656	8:00 am - 5:00 pm (Mon - Fri)
San Antonio	North	10200 N. Broadway, Ste. 200	78217	210-654-8787	210-654-3008	8:00 am - 5:00 pm (Mon - Fri)
San Antonio	Northeast	12702 Toepperwein, Ste. 104	78233	210-653-4420	210-653-3183	8:00 am - 5:00 pm (Mon - Fri)
San Antonio	West	1904 Grandstand Drive, Ste. 400	78238	210-520-8070	210-521-7688	8:00 am - 5:00 pm (Mon - Fri)
Waco	Waco	4205 Franklin Avenue	76710	254-772-2777	254-772-2770	8:00 am - 5:30 pm (Mon - Fri)

Total Texas 40

Utah

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Salt Lake City	Salt Lake City	1735 South Redwood Road, Ste. 115	84104	801-973-4434	801-973-4414	7:30 am - 5:30 pm (Mon - Fri)
Sandy	Sandy	385 West 9000 South	84070	801-562-5200	801-562-4382	8:00 am - 5:00 pm (Mon - Fri)

Total Utah 2

Vermont

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Berlin	Barre	654 Granger Road, Suite 1	05641	802-223-7499	802-223-4120	8:00 am - 5:00 pm (Mon - Fri)
South Burlington	Burlington	110 Kimball Avenue, Suite 115	05403	802-658-5756	802-865-0042	8:00 am - 5:00 pm (Mon - Fri)

Total Vermont 2

Virginia

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Alexandria	Alexandria	5590 General Washington Dr.	22312	703-914-6718	703-914-0132	8:00 am - 5:00 pm (Mon - Fri)
Richmond	Central	4301 West Broad Street	23230	804-358-0361	804-358-4286	8:00 am - 5:00 pm (Mon - Fri)
Richmond	South	9211 Burge Ave.	23237	804-275-7200	804-743-2525	8:00 am - 5:00 pm (Mon - Fri)
Sterling	Dulles	45305 Catalina Court, Suite 103	20166	703-435-7656	703-435-7641	8:00 am - 5:00 pm (Mon - Fri)

Total Virginia 4

Wisconsin

City	Center Name	Address	Zip	Phone	Fax	Hours of Operation
Brookfield	West	2455 North 124th Street	53005	262-782-9326	262-782-9353	8:30 am - 11:00 pm (Mon - Fri)
Madison	Madison East	1619 North Stoughton Road	53704	608-244-1213	608-244-5508	8:30 am - 5:30 pm (Mon - Fri)
Madison	Madison West	358 Junction Rd.	53717	608-829-1888	608-829-2818	8:30 am - 5:30 pm (Mon - Fri)
Milwaukee	Downtown	215 N. 35th St.	53208	414-931-7600	414-271-9951	7:00 am - 5:30 pm (Mon - Fri)
Milwaukee	Northwest	8923 W. Brown Deer Road	53224	414-355-4300	414-355-4608	8:30 am - 5:30 pm (Mon - Fri)
Milwaukee	South	5007 S. Howell Avenue	53207	414-483-7777	414-483-7914	8:30 am - 5:30 pm (Mon - Fri)
New Berlin	New Berlin	15465 West Howard Avenue	53151	262-786-4422	262-786-5488	8:30 am - 5:30 pm (Mon - Fri)
Racine	Racine	1147 Warwick Way	53406	262-886-3997	262-886-1273	8:30 am - 5:30 pm (Mon - Fri)

Total Wisconsin 8

Revised: 12/11/2007

ATTACHMENT 4

UTILITY CLEARANCE LOG(s)/CHECKLISTS

ATTACHMENT 4
PRE-DRILLING/EXCAVATION CHECKLIST AND UTILITY CLEARANCE LOG

PROJECT:			
LOCATION:		**DATE:**	
UTILITY LOCATOR:		**UTILITY LOCATOR PHONE #:**	
DATE OF LOCATOR REQUEST:		**LOCATOR CALL REFERENCE #:**	

Instructions: This checklist is to be completed by STANTEC personnel prior to initiation of field activities as a safety measure to insure that all underground utility lines, other underground structures and above-ground power lines are clearly marked in the area selected for boring or excavation. **DRILLING OR EXCAVATION WORK MAY NOT PROCEED UNTIL ___public and private utility clearance__(fill in the name of the utility service) HAS BEEN CONTACTED AND THIS CHECKLIST HAS BEEN COMPLETED. IF ANY OF THE QUESTIONS ANSWERED BELOW ARE ANSWERED "NO", THEN PROJECT MANAGER MUST BE CONTACTED AND CONCERNS/ISSUES DISCUSSED**. Document the reason for a "NO" answer on the back of this form.

Type of Utilities and Structures	**Not Present**	**Present**	**How Marked** (Flags, paint on pavement, wooden stakes, etc.)
Petroleum product line			
Septic tank/drain field			
Other			

YES	**NO**	**PRE-MOBILIZATION**
		Is a scaled site plan, map or drawing showing the proposed borehole locations attached to this form?
		Does each borehole location allow for clear entry and exit, adequate workspace, and a clear path for raising the mast and operating the drill rig and all support equipment? Ensure 20 feet of clearance distance between the mast and electrical lines (STANTEC H&S Policy and 29 CFR 1926.550). Check with the power utility company.
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 10 feet from any subsurface or above-ground utilities shown on client's building plans? STANTEC PM check here ☐ if plans not provided by client (therefore not applicable to this job).
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 10 feet from any subsurface or above-ground utilities shown on public right-of-way street improvement or other public property plan or site map? PM check here ☐ if not applicable to this job.
		Has the Site Representative, familiar with the site, such as a construction manager, indicated no knowledge of any subsurface or above-ground utilities within 10 feet of the proposed borehole locations? Is the Site Representative qualified to make such a determination?
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 10 feet from any subsurface utilities identified during a geophysical survey? Applicable: Yes / No
		Have all Utility Locating Service providers notified by the public line locator marked out their facilities in the vicinity of the borehole locations or otherwise notified us that they do not have any facilities near the proposed borehole locations?
		Are all proposed borehole locations and associated areas of pavement cutting at least 10 feet from a visual line connecting two similar looking manhole covers?
		Are all proposed borehole locations and associated areas of pavement cutting at least 10 feet from a visual line perpendicular to the street from the water, gas, and electrical meters?
		Are all proposed boring locations and associated areas of pavement cutting clear of pavement joints, curbs, crash posts, or other engineered structures?
		Does the pavement lack signs of previous excavation (e.g. no pavement subsidence, no differences in pavement texture or relief, no pavement patching)? If there are signs, determine the purpose of the previous excavation and act accordingly.
		Before drilling have you hand dug/used a water jet VacTron unit/tile probe/etc., to dig a hole 5 feet below grade if possible, and is the diameter of the hole at least 2 inches greater than the outer diameter of the drilling auger?
		Does the soil you encountered in the hand-dug hole appear to be native material (i.e. free of clean gravel, clean sand, aggregate base [gravelly sand with ~10% fines], or other non-native looking material)?
		Have you made sure that you have identified all the expected utilities or have made sure that you can explain any missing utilities?

Have the above concerns been discussed with the STANTEC Project Manager? Yes / No
Have the above concerns been discussed with the client? Yes / No
Have you made a reasonable effort to resolve the above issues? Yes / No
Approval to proceed provided by: Client Representative Name ____________________ Title and Date: ____________
Approval to proceed provided by: STANTEC Representative Name ____________________ Title and Date: ____________
STANTEC Field Technician Name: ____________________ Title and Date: ____________

ATTACHMENT 5

MONITORING

ATTACHMENT 5a
EQUIPMENT CALIBRATION/CHECK LOG(S)

DATE	INSTRUMENT/ MODEL NO.	SERIAL NO.	BATTERY CHECK OK?	ZERO ADJUST OK?	CALIBRATION GAS (PPM)	READING (PPM)	LEAK CHECK	PERFORMED BY	COMMENTS

* Submit copies of logs to Director of Industrial Hygiene & Health and Safety, Philip A. Platcow, CIH within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (617) 232-7355 or via email at pplatcow@Stantec.com

ATTACHMENT 5b
AIR MONITORING LOG(S)

Instrument(s) Used: Make: ______________________ Model: ______________________

DATE	TIME	LOCATION/SOURCE (Personal/Area Sampling)	WORK ACTIVITY DURING SAMPLING (Be specific)	Measurement (Units)	WHAT DID YOU DO BECAUSE OF THE RESULT? (PPE Change/Activity Change/Nothing Needed)	SAMPLED BY

* Submit copies of logs to Director of Industrial Hygiene & Health and Safety, Philip A. Platcow, CIH within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (617) 232-7355 or via email at pplatcow@Stantec.com

ATTACHMENT 6

SAFE DRIVING PROCEDURES

Too tired to drive?

A road safety initiative of RACV, Rural Ambulance Victoria and Metropolitan Ambulance Service

Driver Fatigue Checklist

Before you drive, answer these questions to make sure you are not too tired to drive.

	Yes	No
Have you been getting full nights of restful sleep over the past week? *When you don't get enough sleep you accrue sleep debt. The only way to repay the debt is by sleeping.*	☐	☐
Are you setting off on a trip after a good night's sleep, rather than after a full day at work? *Being awake for 17 hours has the same effect on driving as having a BAC (Blood Alcohol Concentration) of .05, doubling your risk of crashing. After 24 hours the BAC equivalent is 0.1, equating to a 7 times greater risk of crashing than someone who is well rested.*	☐	☐
Are you planning to start your trip after 6am, rather than starting out earlier when you would normally be asleep? *Your body naturally wants to sleep between about 2am and 6am greatly increasing your risk of crashing at these times.*	☐	☐
Have you allowed time in your trip to stop and rest if you feel tired? *Regular breaks every 2 hours can help maintain vigilance, however the only way to combat fatigue is to sleep.*	☐	☐
Do you stop and have a Powernap if you feel tired while driving? *Stopping for a 15 to 20 minute sleep or Powernap when you are tired is effective in alleviating the short term effects of fatigue, but ensure you allow time to recover from your sleep before commencing to drive.*	☐	☐
Are you sure that you do not suffer from a sleeping disorder, such as sleep apnoea? *5% of drivers suffer from the most common sleep disorder, sleep apnoea. Men over 50, particularly those overweight, are most at risk.*	☐	☐

If you have answered "no" to any of these questions you may be at risk of fatigue.

RACV

Too tired to drive?

What is fatigue?

Driver fatigue contributes to more than 25 per cent of all road crashes in Victoria.

Two main causes:

- lack of quality sleep
- driving at times when you would normally be asleep.

Protect yourself from having a fatigue-related crash by:

- making sure you regularly get enough sleep
- being aware of the fatigue high crash risk times when driving between 1am-6am
- not starting a long trip after a long day's work
- planning your trip so you can take regular breaks
- seeking medical advice if you often feel sleepy
- being aware of the effects of any medication taken

Once you're on the road:

- regular rest breaks to help keep you alert, but if you feel tired, the only way to keep safe is to stop and sleep
- eat proper and well balanced meals, preferably at your normal meal times

If you feel tired when driving, take a Powernap (sleep for 15 to 30 minutes),
but allow time to recover from your sleep before commencing to drive.

Don't be fooled by myths about fatigue! The following common beliefs about fatigue are untrue:

myth - Coffee is the best way to combat fatigue.
Coffee only provides short-term benefits; once its effects wear off, you suffer from sleep rebound, which is a major cause of crashes.

myth - Playing music will help keep me alert
This is only a short-term benefit.

myth - Plenty of fresh air through the window will help keep me alert.
This is only a short-term benefit.

myth - Young people need less sleep.
In fact, drivers under 25 years of age are over-represented in fatigue crashes.

myth - I know when I am tired, or when I am having 'sleep attacks'
The danger is that you only find out how tired you are when it's too late.

The only cure for fatigue is sleep

ATTACHMENT 6a
JOURNEY HAZARD ASSESSMENT CARD(S)

JOURNEY HAZARD ASSESSMENT CARD

STOP! THINK! GO!

Name ____________________________ Date ______________

STOP

Do I need to make this journey? ☐ Yes ☐ No

STOP

Where am I traveling? How long will I be driving?
And do I have an ETA with a contact person?
Have I communicated area hazards and safest mode of transport?

THINK

How can I ensure that I have a safe journey?

THINK

Am I well rested an alert for the journey? ☐ Yes ☐ No

THINK

Have I done a complete vehicle walk around and ensured that the vehicle is safe and ready for travel? ☐ Yes ☐ No

ELEMENTS OF THE DRIVING STANDARD

- Has vehicle been inspected? ☐ Yes ☐ No
  - Will passengers be transported? ☐ Yes ☐ No
  - Has cargo been secured? ☐ Yes ☐ No
- Driver's License is current? ☐ Yes ☐ No
  - Appropriately rested and alert? ☐ Yes ☐ No
- Journey risks have been identified? ☐ Yes ☐ No
  - Seatbelts are in working order? ☐ Yes ☐ No
  - Medically fit for driving? ☐ Yes ☐ No

HAVE A SAFE TRIP!

DRIVING IS RISKY BUSINESS!

JOURNEY HAZARD ASSESSMENT CARD

STOP! THINK! GO!

Name ______________________ Date ___________

STOP

Do I need to make this journey? ☐ Yes ☐ No

STOP

Where am I traveling? How long will I be driving?
And do I have an ETA with a contact person?
Have I communicated area hazards and safest mode of transport?

THINK

How can I ensure that I have a safe journey?

THINK

Am I well rested an alert for the journey? ☐ Yes ☐ No

THINK

Have I done a complete vehicle walk around and ensured that the vehicle is safe and ready for travel? ☐ Yes ☐ No

ELEMENTS OF THE DRIVING STANDARD

- Has vehicle been inspected? ☐ Yes ☐ No
  - Will passengers be transported? ☐ Yes ☐ No
  - Has cargo been secured? ☐ Yes ☐ No
- Driver's License is current? ☐ Yes ☐ No
  - Appropriately rested and alert? ☐ Yes ☐ No
- Journey risks have been identified? ☐ Yes ☐ No
  - Seatbelts are in working order? ☐ Yes ☐ No
  - Medically fit for driving? ☐ Yes ☐ No

HAVE A SAFE TRIP!

DRIVING IS RISKY BUSINESS!

ATTACHMENT 6b
DAILY VEHICLE INSPECTION CHECKLIST(S)

Daily Vehicle Checklist

Employee Name:___________________Region/Business Unit:___________________

Date: _________ Time:______________Vehicle Color: _________________________

Job:____________________________ Vehicle Make/Model: ___________________

Job #: ____________________________Vehicle License Plate Number: __________

Vehicle Mileage End:__________________ STANTEC Vehicle ☐

Vehicle Mileage Start: _________________ Rental Vehicle ☐

Total Miles Driven: ____________________ Personal Vehicle ☐

Perimeter Walk Around:	Item is OK	Item is NOT OK
Check for signs of vandalism, negligence, damage or unusual conditions		
Check all tires for excessive and unusual wear and proper inflation – include the spare tire if it is easily accessible		
Check under vehicle for signs of leaking fluids		
Check wiper blades (Do they work? Need replacement?)		
Check all light systems – brake, head, back-up, running, turn signals, emergency flashers		
Check to make sure doors, truck/toolbox lids, tailgates all open and close properly (Make sure you have keys to any toolboxes that you may need to access)		
Check Gauges on Dashboard:	Item is OK	Item is NOT OK
Fuel Level		
Oil light		
Engine Coolant Temperature Gauge		
Service Indicator Lights		
Battery Charge Indicator		
Inside Vehicle:	Item is OK	Item is NOT OK
Make sure seatbelts are present for all who will be riding in the vehicle		
Secure all cargo in the vehicle so that items will not become projectiles in the event of sudden stops or collisions		
Adjust the seat position, rearview and side mirrors		
Adjust temperature controls, vents, radio, etc.		

Notify the vehicle manager or rental company if you feel that any deficiencies are unsafe and DO NOT drive the vehicle!

SIGNATURE: ____

Daily Vehicle Checklist

Employee Name:____________________Region/Business Unit:___________________

Date: _________ Time:______________Vehicle Color: __________________________

Job:______________________________Vehicle Make/Model: _____________________

Job #: ___________________________ Vehicle License Plate Number: ___________

Vehicle Mileage End:___________________ STANTEC Vehicle ☐

Vehicle Mileage Start: __________________ Rental Vehicle ☐

Total Miles Driven: _______________________ Personal Vehicle ☐

Perimeter Walk Around:	Item is OK	Item is NOT OK
Check for signs of vandalism, negligence, damage or unusual conditions		
Check all tires for excessive and unusual wear and proper inflation – include the spare tire if it is easily accessible		
Check under vehicle for signs of leaking fluids		
Check wiper blades (Do they work? Need replacement?)		
Check all light systems – brake, head, back-up, running, turn signals, emergency flashers		
Check to make sure doors, truck/toolbox lids, tailgates all open and close properly (Make sure you have keys to any toolboxes that you may need to access)		
Check Gauges on Dashboard:	Item is OK	Item is NOT OK
Fuel Level		
Oil light		
Engine Coolant Temperature Gauge		
Service Indicator Lights		
Battery Charge Indicator		
Inside Vehicle:	Item is OK	Item is NOT OK
Make sure seatbelts are present for all who will be riding in the vehicle		
Secure all cargo in the vehicle so that items will not become projectiles in the event of sudden stops or collisions		
Adjust the seat position, rearview and side mirrors		
Adjust temperature controls, vents, radio, etc.		

Notify the vehicle manager or rental company if you feel that any deficiencies are unsafe and DO NOT drive the vehicle!

Signature: ____

ATTACHMENT 6c
JOURNEY MANAGEMENT PLAN(s)

PURPOSE

The purpose of this Journey Management Procedure (JMP) is to prevent losses associated with motor vehicle related incidents including: injuries to drivers, passengers and pedestrians, damage to motor vehicles and damage to third party property. By communicating potential safety risks before mobilizing to a site, a motor vehicle operator will be able to prepare for and avoid potential hazards.

SCOPE

This JMP applies to all vehicles assigned for the support of site operations, including company owned and personal use vehicles. This JMP does not apply to vendors (such as UPS, FedEx. etc.) not under contract with STANTEC or their supplier. This JMP does not address hazards that are external to the site access/egress and on the onsite project operations.

SPECIAL NOTE

Because the site, weather and traffic conditions may change frequently the JMP shall be maintained and updated separate from the Site Health and Safety Plan.

Responsibilities

Contract Project Manager

The contract project manager is responsible to ensure that the site has a current Journey Management Plan.

Field Manager

The field manager is responsible to create and keep current a JMP that is appropriate for the site conditions. It is also the field manager's role to ensure each vehicle operator has a JMP that describes the conditions for his vehicle and equipment prior to mobilizing to the site. A common JMP may be used for several vehicles or as conditions dictate a separate JMP may be specific or unique to an individual vehicle.

Vehicle Operator

The assigned vehicle operator shall not mobilize to the site without first receiving the JMP. It is also the vehicle operator's responsibility to read and become familiar with the description and stipulations of the JMP prior to mobilizing to the site. DO NOT mobilize to the site to get clarification to the JMP. Because driving conditions may vary, vehicle operators shall also notify the field manager of any hazards not identified on the JMP so that the field manager can update the JMP. Because traffic conditions may change frequently on a project, the JMP shall be maintained and updated separate from the Site Health and Safety Plan.

Scope of this JMP

Describe the types of vehicles and equipment that are within the scope of this JMP such as: This JMP shall include the operation and use of the following vehicles and equipment: Vehicles to transport personnel to and from the site, Drill Rigs, Roll off boxes, Vacuum Trucks, support equipment such as trailers, backhoes, front end loaders, rollers, etc. All vehicle operators shall be responsible for ensuring their vehicles are maintained and being familiar with and obeying all laws related to vehicle operation.

General Hazards

Describe the conditions/hazards that are more general such as those related to weather or time of day, lighting and the use of headlights and vehicle emergency flashers, the use of private services to manage traffic signs and barricades. You may want to describe the preferred walking routes for site workers. Special note to the vehicle operator that it is their sole responsibility to read and become familiar with the description and stipulations of the JMP prior to mobilizing to the site. All drivers will avoid distractions including but not limited to using cell phones in any form or two way radios while driving.

Site Specific Hazards

Describe the conditions/hazards that are site specific such as those related to pedestrian traffic, bus stops, school zones, local traffic conditions, train tracks, and other local conditions. You may want to describe the preferred walking routes for site workers. This is a bulk facility; trucks are continuously entering and exiting the site, discuss further during tail-gate health and safety meeting..

Directions: Access to the Site

Describe the recommended safe direction to gain access to the site and recommended direction to leave the site. This description shall take into consideration conditions and limitations caused by: local traffic conditions, road conditions, presence or lack of curb and gutter, bus stops, school zones, pedestrian walk ways, traffic lights, train tracks, etc. Specific directions may vary depending on the time of day if there are specific hazards such as school recesses, or local business traffic due to shift changes. People should enter and exit the site via designated driveways and sidewalks, discuss further during tail-gate health and safety meeting.

Directions: Leaving the Site

Describe the recommended safe direction to leave the site. This description shall take into consideration conditions and limitations caused by: local traffic conditions, road conditions, bus stops, pedestrian walk ways, traffic lights, etc.: discuss during tail-gate health and safety meeting.

Site Specific Restrictions and Controls

Directions to reference attached site sketch. Describe any site conditions that might be relevant such as height restrictions due to the business canopy, overhead power/phone lines. Describe any parking limitations or the number and size of vehicle restrictions. Describe the procedures used for positioning/backing vehicles and equipment such as: All vehicles with limited vision shall not be positioned into place or backed without a spotter to assist the vehicle operator. If relevant describe how 3rd party pedestrian walkways will be used and maintained. Describe as appropriate the roles and responsibilities of maintaining exclusion zone barricades, traffic control signs and markers, etc: discuss during tail-gate health and safety meeting.

This Journey Management Plan is approved for use:

From:	Time:	To:	Time:

Journey Management Plan Created and Maintained by

Field Manager : Cell:

Contract Project Manager: Cell:

CHANGES TO THE JOURNEY MANAGEMENT PLAN

Date	Name	Change/Comment (be specific)

As appropriate create a sketch of the site. It can be helpful in clarifying access/egress routes, parking and positioning of equipment, traffic cones and other delineators.

Site Sketch

Because this is a sketch it can not be interpreted as accurate to scale.

ATTACHMENT 6d
VEHICLE COLLISION KIT

STANTEC Vehicle Collision Kit

The following items should be enclosed in an envelope in the glove box of all STANTEC vehicles:

- Vehicle Registration Card
- Vehicle Insurance Card with name and phone number of agent
- Name of Preferred Body Shop or Maintenance Facility to take damaged vehicle (usually nearest Dealership)
- Owners Manual
- Disposable Camera
- Note Pad and Pen

WHAT TO DO AFTER A COLLISION:

Auto collisions: Even the most careful drivers may be involved. Knowledge of what to do **after** the collision can make the experience a little less frightening and decrease the chance of unnecessary complications.

After a Collision

- Check for injuries. Life and health are more important than damage to vehicles.
- Make note of specific damages to all vehicles involved.
- Write down the names, addresses and license numbers of persons involved in the collision. Also, write a description of the other vehicles.
- Call the police, even if the collision is minor.
- Jot down names and addresses of anyone who may have witnessed the collision. This can prevent disagreement concerning how the collision actually happened.

Other Do's and Don'ts

- DO jot down details about the collision, the location, and circumstances such as weather conditions and visibility.
- DO notify your insurance agent about the collision immediately.
- DON'T sign any document unless it is for the police or your insurance agent.

Remember that a STANTEC incident investigation form must also be completed following any collision. The collision must be reported to the STANTEC Project Manager in addition to the following people:

Marguerite Shuffelton, Director of Human Resources:
Office 619-718-9430
Cell 619-925-8365
Home: 760-749-9603

Phil Platcow, Director of Industrial Hygiene/Health and Safety:
Office: 617-232-7355
Cell: 617-899-5403
Home: 617-739-1224

Michael Allen Philipp, West Region Health & Safety Manager
Office (619) 296-6195 X240 Fax (619) 296-6199
Cell (619) 985-4340
Home (858) 391-0347

Gay Matteson, STANTEC Contracts
Office (425) 372-1672
Fax (425) 372-1700

COLLISION FORM

Driver's Name: ____________________ Driver's Lic. No. ______________ Lic. Plate No. __________
Make of Vehicle: ______________ Model: ____________ Yr. ____________ VIN No. ___________
Date: ___________________________ Time: _______________________
Location of Collision: ____
Specific Damages to the vehicle you were driving: ____
____
____
____
____
____

Conditions:

Pavement ☐ Dry ☐ Wet ☐ Ice ☐ Snow Weather _________________ Visibility ___________
Traffic Control ☐ Lights ☐ Signal ☐ None – indicate any traffic control on the schematic you draw
Police Investigation ☐ Yes ☐ No Officer Name and Badge No. ______________________________
Name of Department: ____
* Request a copy of the police report for submission to the insurance company
Were citations issued? ☐ Yes ☐ No If yes, to whom and for what violation? ___________________

Other Motorists involved in the incident:

Name: ___________________ Address: ____
Phone Number: ___________________ Drivers License Number: ___________________________
Lic. Plate No. _________________________ Make of Vehicle ____________________________
Model ___________________ Yr. ____________________________ VIN No. _______________
Owner of Vehicle ________________________ Insurance Company Name: ____________________
Policy and Phone Number: ___________________________________ Vehicle Speed ___________
Direction of Travel: ☐ N ☐ E ☐ S ☐ W Description of Damage ______________________________

Name: ___________________ Address: ____
Phone Number: ___________________ Drivers License Number: ___________________________
Lic. Plate No. _________________________ Make of Vehicle ____________________________
Model ___________________ Yr. ____________________________ VIN No. _______________
Owner of Vehicle ________________________ Insurance Company Name: ____________________
Policy and Phone Number: ___________________________________ Vehicle Speed ___________
Direction of Travel: ☐ N ☐ E ☐ S ☐ W Description of Damage ______________________________

Other Person(s) who witnessed the incident:

Name: _________________________________ Phone Number: ___________________________
Address: ____

Name: _________________________________ Phone Number: ___________________________
Address: ____

Name: _________________________________ Phone Number: ___________________________
Address: ____

Property Damage other than Vehicles:

Owner ______________________________ Address ______________________________

What was damaged ____

____

Location of Property ____

____

List all Persons Involved:

Name ______________________________ Phone No ______________________

Address ____

☐ Your Vehicle ☐ Other Vehicle ☐ Pedestrian Injured? ☐ No ☐ Yes, Describe ______________

Name ______________________________ Phone No ______________________

Address ____

☐ Your Vehicle ☐ Other Vehicle ☐ Pedestrian Injured? ☐ No ☐ Yes, Describe ______________

Name ______________________________ Phone No ______________________

Address ____

☐ Your Vehicle ☐ Other Vehicle ☐ Pedestrian Injured? ☐ No ☐ Yes, Describe ______________

Name ______________________________ Phone No ______________________

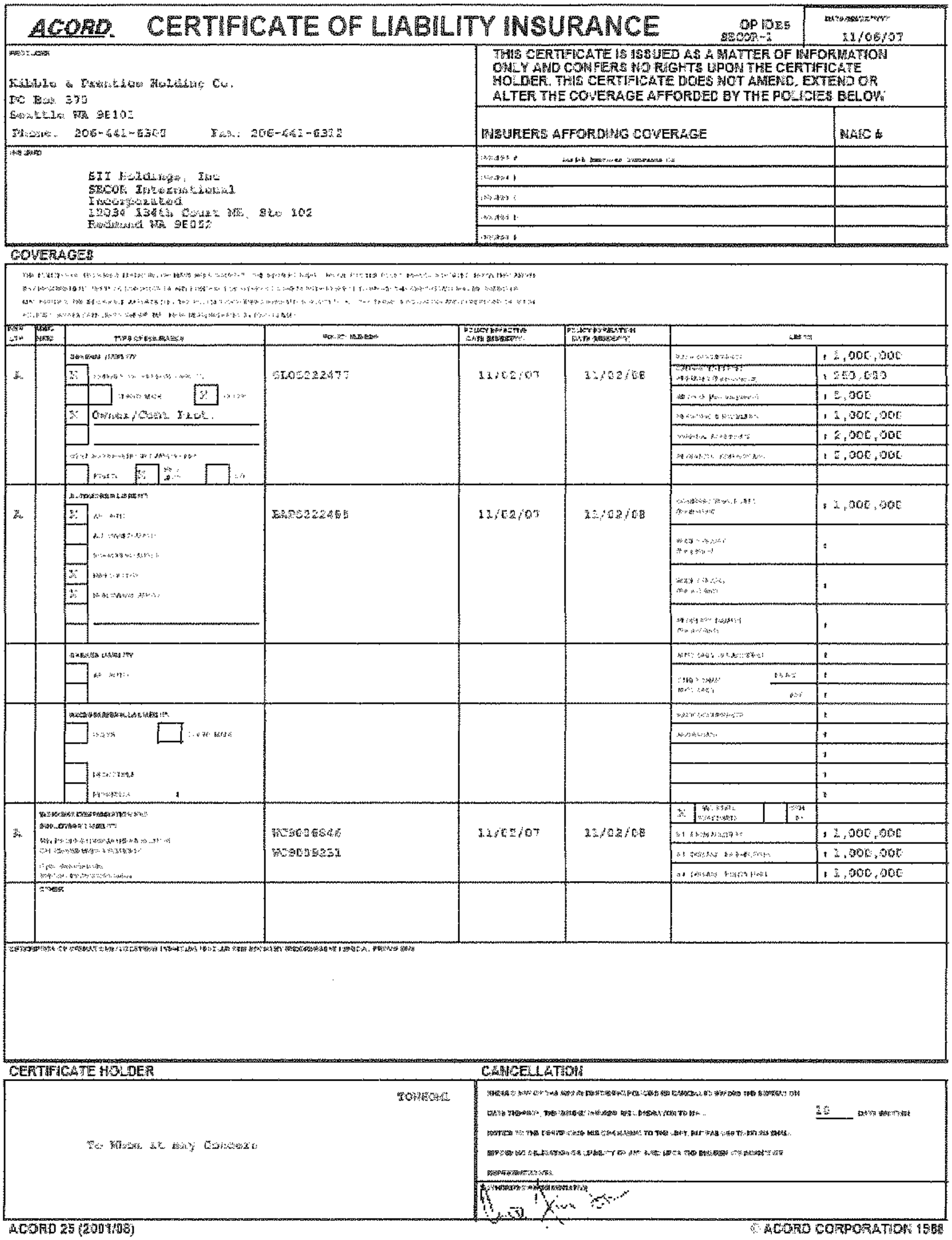
Address ____

☐ Your Vehicle ☐ Other Vehicle ☐ Pedestrian Injured? ☐ No ☐ Yes, Describe ______________

Brief Description of Photos Taken:

Use this paper to draw a schematic of the collision – indicate North on schematic for reference
Describe what happened below the schematic

IF AN ACCIDENT OCCURS AFTER STANTEC'S NORMAL WORKING HOURS PLEASE REPORT YOUR CLAIM TO KIBBLE & PRENTICE INSURANCE AGENT, PHONE NO 425-454-2445, FAX NO 425-646-9616 - AFTER HOURS PHONE NO 425-681-1349



ACORD CERTIFICATE OF LIABILITY INSURANCE

OP ID ES
SECOR-1

11/06/07

Kibble & Prentice Holding Co.
PO Box 390
Seattle WA 98101
Phone: 206-441-6300 Fax: 206-441-6312

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURERS AFFORDING COVERAGE	NAIC #

SII Holdings, Inc
SECOR International
Incorporated
12034 134th Court NE, Ste 102
Redmond WA 98052

COVERAGES

A		☒ ☐ ☒ ☒ Owner/Cont Prot. ☐ ☐ ☒ ☐	GLO5222477	11/02/07	11/02/08		$ 1,000,000
							$ 250,000
							$ 5,000
							$ 1,000,000
							$ 2,000,000
							$ 2,000,000
A		☒ ☐ ☐ ☒ ☒ ☐	BAP5222495	11/02/07	11/02/08		$ 1,000,000
							$
							$
							$
		☐ ☐					$
							$
							$
		☐ ☐ ☐ ☐ $					$
							$
							$
							$
							$
A			WC9026846 WC9035231	11/02/07	11/02/08	☒	
							$ 1,000,000
							$ 1,000,000
							$ 1,000,000

CERTIFICATE HOLDER

TOWHOL

To Whom It May Concern

CANCELLATION

10 DAYS WRITTEN

ACORD 25 (2001/08)

© ACORD CORPORATION 1988

Attachment 6

Incident Investigation Report

Consider using the Root Cause Analysis PROACTIVELY to avoid incidents and near misses.

INCIDENT TYPE (To be filled in by Human Resources Department)

Date of Incident:

☐ Fatality
☐ Lost Workday
☐ LW Restricted Duty
☐ OSHA Medical or Illness w/o LW
☐ First Aid
☐ Industrial Non-Recordable
☐ Non-Industrial
☐ Off-the-Job Injury
☐ MVA
☐ Fire
☐ Spill/Leak
☐ Product Integrity
☐ Equipment
☐ Business Interruption
☐ General Liability
☐ Criminal Activity
☐ Notice of Violation
☐ Near Miss

The STANTEC Project Manager, Human Resources and Corporate Health & Safety must be informed immediately after stabilizing the victim(s)/site as the result of an incident or near miss. The investigation of the incident or near miss by the employee's supervisor or Site Health and Safety Officer must also begin immediately. This report must be completed as soon as possible, in most cases within the week of the incident. It must be reviewed and signed by the Principal and e-mailed or faxed to the Vice President of Human Resources, and Corporate Health and Safety (numbers at end), even if employee is not available to review and sign. Employee or employee's doctor must submit a copy of the doctor's report to Human Resources within 24 hours of the initial exam and any subsequent exams. Contact information at end of report.

EMPLOYER (Include sub-contractors, or other employers on our sites)

Company Name:

Work Location Address where incident occurred:

Project Name:

EMPLOYEE

Name:

Employment Status: ☐ Full-Time ☐ Part-Time ☐ Hourly-As-Needed

How long in present job?

INJURY OR ILLNESS INFO

Where did incident / near miss occur? (number, street, city, state, zip):

County:

On Employer's premises? ☐ Yes ☐ No

Specific activity the employee was engaged in when the incident / near miss occurred:

All equipment, materials, or chemicals the employee was using when the incident / near miss occurred (e.g., the machine employee struck against or which struck employee; the vapor inhaled or material swallowed; what the employee was lifting, pulling, etc.):

Describe the specific injury or illness (e.g., cut, strain, fracture, skin rash, etc.):

Body part(s) affected (e.g., back, left wrist, right eye, etc.):

Name and address of Health Care Provider (e.g., physician or clinic):

Phone No.:

If hospitalized, name and address of hospital:

Phone No.:

Date of injury or onset of illness(MM/DD/YYYY) / /

Time of event or exposure: ☐ AM ☐ PM

Time employee began work: ☐ AM ☐ PM

Did employee lose at least one full shift's work?
☐ No ☐ Yes, 1st date absent (MM/DD/YYYY) / /

Has employee returned to work? ☐ Regular work ☐ Restricted work ☐ No, still off work ☐ Yes, date returned (MM/DD/YYYY) / /

Did employee die? ☐ No ☐ Yes, date (MM/DD/YYYY) / /

Date employer notified of incident / near miss: (MM/DD/YYYY) / /

To whom reported:

Other workers injured/made ill in this event? ☐ Yes ☐ No

Description of Incident / Near Miss: (Describe fully the incident / near miss events. Tell exactly what happened and how it happened so that someone could recreate the incident or near miss. Use extra paper if you need.)

Weather (Fog, rain, ice, sunshine, windy, extreme temperatures – report in degrees F or C)

Motor Vehicle Accident (MVA) - You may also have to fill out an insurance form-Call Corporate Contracts Dept. (425) 372-1600

Professional Driver? ☐ Yes ☐ No

Total Years Driving: | Company Vehicle? ☐ Yes ☐ No | Operation Type: | Accident Situation:

Truck Transportation: | Years with Carrier: | Vehicle Type: | Equipment #:

Accident Location (street, city, state):

Hazardous Material? ☐ Yes ☐ No | Reportable? ☐ Yes ☐ No | No. of Vehicles Towed | No. of Injuries: | No. of Fatalities:

Spill/Leak/Product Quality

Product Name		Quantity		Product 2 Name		Quantity		Product 3 Name		Quantity	

Agency Notifications

Estimated Cost of Incident $

Third Party Incidents

Name of Owner		Address		Telephone	

Description of Damage:

Witness Name		Address		Telephone	
Witness Name		Address		Telephone	

Root Cause and Contributing Factors: Conclusion (Describe in Detail Why Incident / Near Miss Occurred)

1

2

3

Root Cause(s) Analysis (RCA) - Use proactively to avoid Incidents and Near Misses.

1) Deficiency in task related ability or knowledge
2) Deficiency in Standard Operating Procedures or Job Safety Analysis
3) Deficiency in the transference of information concerning the Standard Operating Procedures or JSA steps.
4) Deficiency or lack of the proper tools or equipment.
5) Proper execution requires increased time or effort.
6) Improper procedures and performance is accepted and allowed.
7) Previous improper performance of a task did not result in adverse results.
8) Beyond the control of the Supervisor/worker(s).

#	RCA #	Solution(s): How to Prevent Incident / Near Miss From Reoccurring	Person Responsible	Due Date	Closure Date

Investigation Team Members

Name	Job Title	Date

Results of Solution Verification and Validation - after implementing solutions to make sure they work.

Reviewed By

Name	Job Title	Date

Acknowledgment Signatures for Injuries/Illnesses

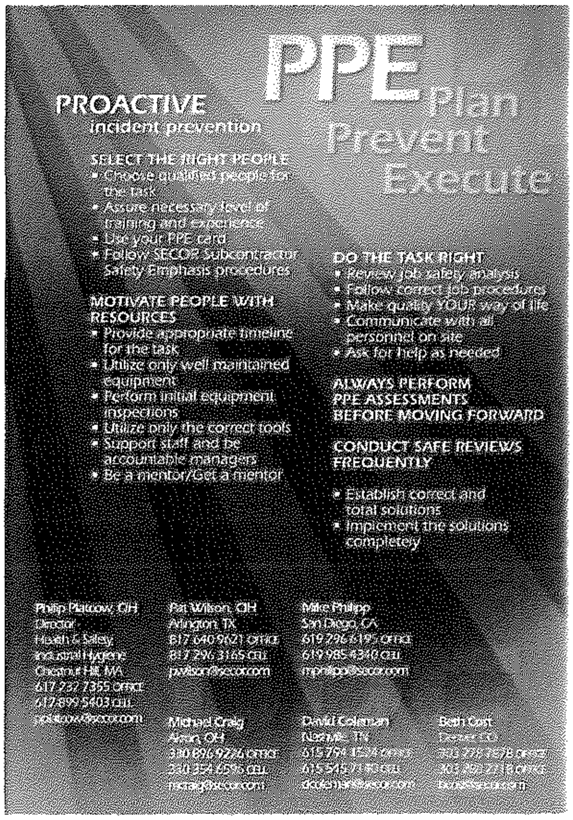
Title	Signature	Date
Director of HR: Marguerite Shuffelton		
Director of IH/H&S: Alice Larsen		
NAME:		
Regional Managers:		
Frank Aceto		
Oren Gottlieb		
Jim Grasty		
Sr. Vice President: Jim Baumgardner		
Chief Executive Officer: Jim Vais		

Contact information.
Call Human Resources and Corporate H&S Immediately.

HR: Mary Harris Phone: 619-718-9429, Fax: 619-296-2006, E-Mail: mharris@Stantec.com. After hours or weekends, please call Marguerite Shuffelton Cell: 619-925-8365 or Home 760-749-9603.

Health & Safety: Call Alice Larsen and Michael Philipp
Alice Larsen: 617-232-7355; fax 801-340-8657 Email: pplatcow@Stantec.com.
After hours or weekends, cell: 617-899-5403 or Home 617-739-1224; and
Mike Philipp 619-296-6195; fax 619-296-6199 Email: mphilipp@Stantec.com. After hours or weekends, cell: (619) 985-4340

Fax report to all three.



PPE Plan Prevent Execute

PROACTIVE
incident prevention

SELECT THE RIGHT PEOPLE
- Choose qualified people for the task
- Assure necessary level of training and experience
- Use your PPE card
- Follow SECOR Subcontractor Safety Emphasis procedures

MOTIVATE PEOPLE WITH RESOURCES
- Provide appropriate timeline for the task
- Utilize only well maintained equipment
- Perform initial equipment inspections
- Utilize only the correct tools
- Support staff and be accountable managers
- Be a mentor/Get a mentor

DO THE TASK RIGHT
- Review job safety analysis
- Follow correct job procedures
- Make quality YOUR way of life
- Communicate with all personnel on site
- Ask for help as needed

ALWAYS PERFORM PPE ASSESSMENTS BEFORE MOVING FORWARD

CONDUCT SAFE REVIEWS FREQUENTLY
- Establish correct and total solutions
- Implement the solutions completely

Philip Platcow, CIH
Director
Health & Safety
Industrial Hygiene
Chestnut Hill, MA
617 232 7355 office
617 899 5403 cell
pplatcow@secor.com

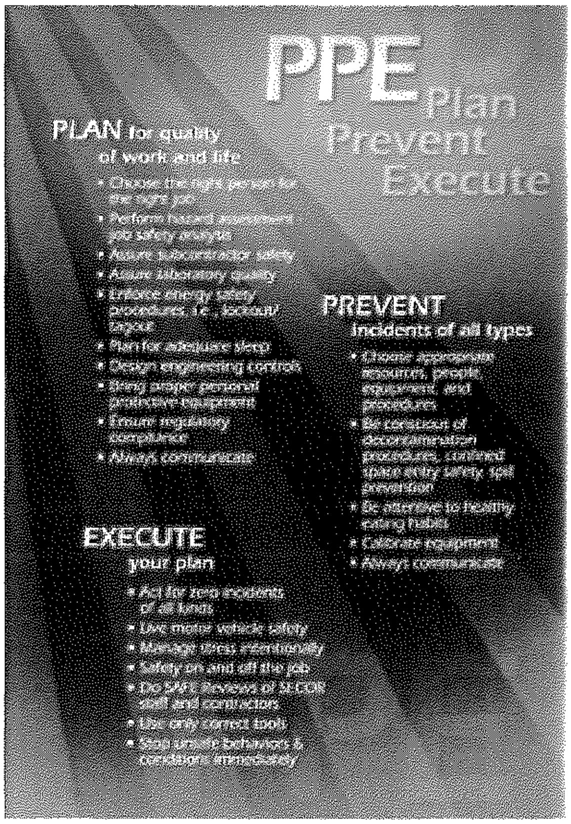
Pat Wilson, CIH
Arlington, TX
817 640 9621 office
817 296 3165 cell
pwilson@secor.com

Mike Philipp
San Diego, CA
619 296 6195 office
619 985 4340 cell
mphilipp@secor.com

Michael Craig
Akron, OH
330 896 9274 office
330 354 6596 cell
mcraig@secor.com

David Coleman
Nashville, TN
[illegible]
dcoleman@secor.com

Beth Cost
Denver CO
[illegible]



PPE Plan Prevent Execute

PLAN for quality of work and life
- Choose the right person for the right job
- Perform hazard assessment job safety analysis
- Assure subcontractor safety
- Assure laboratory quality
- Enforce energy safety procedures, i.e., lockout/tagout
- Plan for adequate sleep
- Design engineering controls
- Bring proper personal protective equipment
- Ensure regulatory compliance
- Always communicate

PREVENT incidents of all types
- Choose appropriate resources, people, equipment, and procedures
- Be conscious of decontamination procedures, confined space entry safety, spill prevention
- Be attentive to healthy eating habits
- Calibrate equipment
- Always communicate

EXECUTE your plan
- Act for zero incidents of all kinds
- Live motor vehicle safety
- Manage stress intentionally
- Safety on and off the job
- Do SAFE Reviews of SECOR staff and contractors
- Use only correct tools
- Stop unsafe behaviors & conditions immediately

Attachment 6

ATTACHMENT 7

PERMITS

ATTACHMENT 8

PHYSICAL AND BIOLOGICAL CONCERNS

Heat Exhaustion

What are the symptoms?

HEADACHES; DIZZINESS OR LIGHTHEADEDNESS; WEAKNESS; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; UPSET STOMACH; VOMITING; DECREASED OR DARK-COLORED URINE; FAINTING OR PASSING OUT; AND PALE, CLAMMY SKIN

What should you do?

- Act immediately. If not treated, heat exhaustion may advance to heat stroke or death.
- Move the victim to a cool, shaded area to rest. Don't leave the person alone. If symptoms include dizziness or lightheadedness, lay the victim on his or her back and raise the legs 6 to 8 inches. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or applying a wet cloth to the person's skin.
- Call 911 for emergency help if the person does not feel better in a few minutes.

Heat Stroke–A Medical Emergency

What are the symptoms?

DRY, PALE SKIN WITH NO SWEATING; HOT, RED SKIN THAT LOOKS SUNBURNED; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; SEIZURES OR FITS; AND UNCONCIOUSNESS WITH NO RESPONSE

What should you do?

- Call 911 for emergency help immediately.
- Move the victim to a cool, shaded area. Don't leave the person alone. Lay the victim on his or her back. Move any nearby objects away from the person if symptoms include seizures or fits. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) if alert enough to drink something, unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or wiping the victim with a wet cloth or covering him or her with a wet sheet.
- Place ice packs under the armpits and groin area.

How can you protect yourself and your coworkers?

- Learn the signs and symptoms of heat-induced illnesses and how to respond.
- Train your workforce about heat-induced illnesses.
- Perform the heaviest work during the coolest part of the day.
- Build up tolerance to the heat and the work activity slowly. This usually takes about 2 weeks.
- Use the buddy system, with people working in pairs.
- Drink plenty of cool water, about a cup every 15 to 20 minutes.
- Wear light, loose-fitting, breathable clothing, such as cotton.
- Take frequent, short breaks in cool, shaded areas to allow the body to cool down.
- Avoid eating large meals before working in hot environments.
- Avoid alcohol or beverages with caffeine. These make the body lose water and increase the risk for heat illnesses.

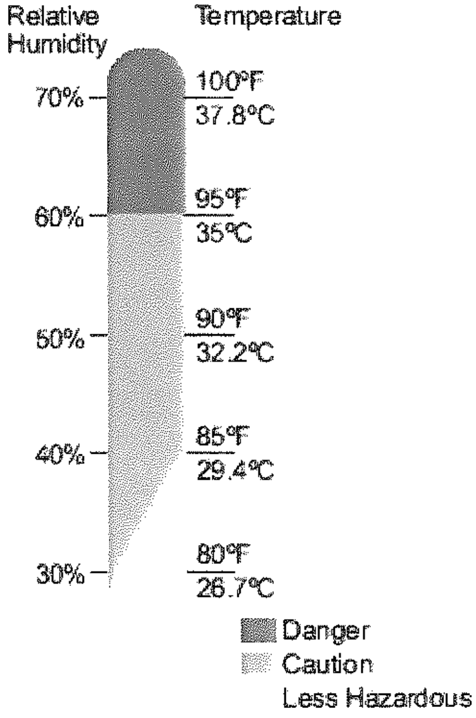
What factors put you at increased risk?

- Taking certain medications. Check with your health-care provider or pharmacist to see if any medicines you are taking affect you when working in hot environments.
- Having a previous heat-induced illness.
- Wearing personal protective equipment such as a respirator or protective suit.

The Heat Equation

HIGH TEMPERATURE + HIGH HUMIDITY + PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, **serious** heat illnesses may occur. The most severe heat-induced illnesses are heat exhaustion and heat stroke. If left untreated, **heat exhaustion** could progress to **heat stroke** and possible **death.**



U.S. Department of Labor
Occupational Safety and Health Administration

OSHA 3154
2002

HEAT STRESS

INTRODUCTION

Operations involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities have a high potential for inducing heat stress in employees engaged in such operations. Outdoor operations conducted in hot weather, such as construction, refining, asbestos removal, and hazardous waste site activities, especially those that require workers to wear semi-permeable or impermeable protective clothing, are also likely to cause heat stress among exposed workers.

CAUSAL FACTORS

Age, weight, degree of physical fitness, degree of acclimatization, metabolism, use of alcohol or drugs, and a variety of medical conditions such as hypertension all affect a person's sensitivity to heat. However, even the type of clothing worn must be considered. Prior heat injury predisposes an individual to additional injury. It is difficult to predict just who will be affected and when, because individual susceptibility varies. In addition, environmental factors include more than the ambient air temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

DEFINITIONS

The American Conference of Governmental Industrial Hygienists (2002) states that workers should not be permitted to work when their deep body temperature exceeds 38°C (100.4°F).

Heat is a measure of energy in terms of quantity.

A **calorie** is the amount of heat required to raise 1 gram of water 1°C (based on a standard temperature of 16.5 to 17.5°C).

Conduction is the transfer of heat between materials that contact each other. Heat passes from the warmer material to the cooler material. For example, a worker's skin can transfer heat to a contacting surface if that surface is cooler, and vice versa.

Convection is the transfer of heat in a moving fluid. Air can be described as a fluid. Air flowing past the body can cool the body if the air temperature is cool. On the other hand, air that exceeds 35°C (95°F) can increase the heat load on the body.

Evaporative cooling takes place when sweat evaporates from the skin. High humidity reduces the rate of evaporation and thus reduces the effectiveness of the body's primary cooling mechanism.

Radiation is the transfer of heat energy through space. A worker whose body temperature is greater than the temperature of the surrounding surfaces radiates heat to these surfaces. Hot surfaces and infrared light sources radiate heat that can increase the body's heat load.

Globe temperature is the temperature inside a blackened, hollow, thin copper globe.

Metabolic heat is a by-product of the body's activity.

Natural wet bulb (NWB) temperature is measured by exposing a wet sensor, such as a wet cotton wick fitted over the bulb of a thermometer, to the effects of evaporation and convection. The term natural refers to the movement of air around the sensor.

Dry bulb (DB) temperature is measured by a thermal sensor, such as an ordinary mercury-in-glass thermometer, that is shielded from direct radiant energy sources.

HEAT DISORDERS AND HEALTH EFFECTS

HEAT STROKE

Heat Stroke occurs when the body's system of temperature regulation fails and body temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. **Heat stroke is a medical emergency.** The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict. If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased (as long as the temperature of the air is less than 95° F) to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible.

The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment. Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

HEAT EXHAUSTION

The signs and symptoms of heat exhaustion are headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a real potential medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest.

HEAT CRAMPS

Heat Cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused by both too much and too little salt. Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (±0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced.

Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments. Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Studies have shown that drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

HEAT COLLAPSE

Heat Collapse ("Fainting"). In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable. To prevent heat collapse, the worker should gradually become acclimatized to the hot environment.

HEAT RASHES

Heat Rashes are the most common problem in hot work environments. "Prickly heat", as heat rashes are sometimes called, is manifested as red papules on the skin and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

HEAT FATIGUE

A factor that predisposes an individual to heat fatigue is lack of acclimatization. The use of a program of acclimatization and training for work in hot environments is advisable. Acclimatization can take several weeks depending on the individual involved and the difference in temperature between the location from which the person is coming and the temperature to which he/she is going. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, mental, or vigilance jobs. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

CONTROLMEASURES FOR HEAT STRESS

Ventilation, air-cooling, fans, shielding, and insulation are the five major types of engineering controls used to reduce heat stress in hot work environments. Heat reduction can also be achieved by using power assists and tools that reduce the physical demands placed on a worker.

However, for this approach to be successful, the metabolic effort required for the worker to use or operate these devices must be less than the effort required without them. Another method is to reduce the effort necessary to operate power assists. The worker should be allowed to take frequent rest breaks in a cooler environment.

ACCLIMATIZATION

The human body can adapt to heat exposure to some extent. This physiological adaptation is called acclimatization. After a period of acclimatization, the same activity will produce fewer cardiovascular demands. The worker will sweat more efficiently (causing better evaporative cooling), and thus will more easily be able to maintain normal body temperatures.

FLUID REPLACEMENT

Cool (50°-60°F) water or any cool liquid (except alcoholic beverages, tea and coffee) should be made available to workers to encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. Ample supplies of liquids should be placed close to the work area. Although some commercial replacement drinks contain salt, this is not necessary for acclimatized individuals because most people add enough salt to their summer diets.

GENERAL VENTILATION

General ventilation is used to dilute hot air with cooler air (generally cooler air that is brought in from the outside). This technique clearly works better in cooler climates than in hot ones. A permanently installed ventilation system usually handles large areas or entire buildings. Portable or local exhaust systems may be more effective or practical in smaller areas.

AIR TREATMENT/AIR COOLING

Air treatment/air cooling differs from ventilation because it reduces the temperature of the air by removing heat (and sometimes humidity) from the air.

Air conditioning is a method of air-cooling, but it is expensive to install and operate. An alternative to air conditioning is the use of chillers to circulate cool water through heat exchangers over which air from the ventilation system is then passed; chillers are more efficient in cooler climates or in dry climates where evaporative cooling can be used.

Local air cooling can be effective in reducing air temperature in specific areas. Two methods have been used successfully in industrial settings. One type, cool rooms, can be used to enclose a specific workplace or to offer a recovery area near hot jobs. The second type is a portable blower with built-in air chiller. The main advantage of a blower, aside from portability, is minimal set-up time.

Another way to reduce heat stress is to increase the airflow or convection using fans, etc. in the work area (as long as the air temperature is less than the worker's skin temperature). Changes in air speed can help workers stay cooler by increasing both the convective heat exchange (the exchange between the skin surface and the surrounding air) and the rate of evaporation. Because this method does not actually cool the air, any increases in air speed must impact the worker directly to be effective.

If the dry bulb temperature is higher than 35°C (95°F), the hot air passing over the skin can actually make the worker hotter. When the temperature is more than 35°C and the air is dry, evaporative cooling may be improved by air movement, although this improvement will be offset by the convective heat. When the temperature exceeds 35°C and the relative humidity is 100%, air movement will make the worker hotter. Increases in air speed have no effect on the body temperature of workers wearing vapor-barrier clothing.

HEAT CONDUCTION

Heat conduction methods include insulating the hot surface that generates the heat and changing the surface itself.

Simple engineering controls, such as shields, can be used to reduce radiant heat i.e. heat coming from hot surfaces within the worker's line of sight. Surfaces that exceed 35°C (95°F) are sources of infrared radiation that can add to the worker's heat load. Flat black surfaces absorb heat more than smooth, polished ones. Having cooler surfaces surrounding the worker assists in cooling because the worker's body radiates heat toward them.

With some sources of radiation, such as heating pipes, it is possible to use both insulation and surface modifications to achieve a substantial reduction in radiant heat. Instead of reducing radiation from the source, shielding can be used to interrupt the path between the source and the worker. Polished surfaces make the best barriers, although special glass or metal mesh surfaces can be used if visibility is a problem.

Shields should be located so that they do not interfere with airflow, unless they are also being used to reduce convective heating. The reflective surface of the shield should be kept clean to maintain its effectiveness.

ADMINISTRATIVE CONTROLS/SAFE WORK PRACTICES

Training is the key to good work practices. Unless all employees understand the reasons for using new, or changing old, work practices, the chances of such a program succeeding are greatly reduced. NIOSH (1986) states that a good heat stress training program should include least the following components:

- Knowledge of the hazards of heat stress;
- Recognition of predisposing factors, danger signs, and symptoms;
- Awareness of first-aid procedures for, and the potential health effects of, heat stroke and heat exhaustion;
- Employee responsibilities in avoiding heat stress;
- Dangers of using drugs, including therapeutic ones, and alcohol in hot work environments;
- Use of protective clothing and equipment; and
- Purpose and coverage of environmental and medical surveillance programs and the advantages of worker participation programs.

Hot jobs should be scheduled for the cooler part of the day, and routine maintenance and repair work in hot areas should be scheduled for the cooler seasons of the year.

Measurement is often required of those environmental factors that most nearly correlate with deep body temperature and other physiological responses to heat. At the present time, the Wet Bulb Globe Temperature Index (WBGT) is the most used technique to measure these environmental factors. WBGT values are calculated by the following equations:

WET BULB GLOBE TEMPERATURE INDEXES (WBGI)

Indoor or outdoors with no solar load

$$WBGT = 0.7NWB + 0.3GT$$

Outdoors with solar load

$$WBGT = 0.7NWB + 0.2GT + 0.1DB$$

Where: WBGT = Wet Bulb Globe Temperature Index
NWB = Natural Wet Bulb Temperature
DB = Dry Bulb (air) Temperature
GT = Globe Thermometer Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry-bulb thermometer. The measurement of environmental factors shall be performed as follows:

1. The range of the dry and the natural wet-bulb thermometers should be -5°C to +50°C, with an accuracy of ±0.5°C. The dry bulb thermometer must be shielded from the sun and the other radiant surfaces of the environment without restricting the airflow around the bulb. The wick of the natural wet bulb thermometer should be kept wet with distilled water for at least one-half hour before the temperature reading is made. It is not enough to immerse the other end of the wick into a reservoir of distilled water and wait until the whole wick becomes wet by capillarity. The wick must be wetted by direct application of water from a syringe one-half hour before each reading. The wick must cover the bulb of the thermometer and an equal length of additional wick must cover the stem above the bulb. The wick should always be clean, and new wicks should be washed before using.

2. A globe thermometer, consisting of a 15 cm (6-inch) in diameter hollow copper sphere painted on the outside with a matte black finish, or equivalent, must be used. The bulb or sensor of a thermometer (range -5°C to +100°C with an accuracy of ±0.5°C) must be fixed in the center of the sphere. The globe thermometer should be exposed at least 25 minutes before it is read.

3. A stand should be used to suspend the three thermometers so that they do not restrict free airflow around the bulbs and the wet-bulb and globe thermometer are not shaded.

4. It is permissible to use any other type of temperature sensor that gives a reading similar to that of a mercury thermometer under the same conditions.

5. The thermometers must be placed so that the readings are representative of the employee's work or rest areas, as appropriate.

Once the WBGT has been estimated, employers can estimate workers' metabolic heat load and use the ACGIH method to determine the appropriate work/rest regimen, clothing, and equipment to use to control the heat exposures of workers in their facilities.

PERSONAL PROTECTIVE EQUIPMENT

REFLECTIVE CLOTHING

Reflective clothing, which can vary from aprons and jackets to suits that completely enclose the worker from neck to feet, can stop the skin from absorbing radiant heat. However, since most reflective clothing does not allow air exchange through the garment, the reduction of radiant heat must more than offset the corresponding loss in evaporative cooling. For this reason, reflective clothing should be worn as loosely as possible. In situations where radiant heat is high, auxiliary-cooling systems can be used under the reflective clothing.

AUXILIARY BODY COOLING

1. Commercially available **ice vests**, though heavy, may accommodate as many as 72 ice packets, which are usually filled with water. Carbon dioxide (dry ice) can also be used as a coolant. The cooling offered by ice packets lasts only 2 to 4 hours at moderate to heavy heat loads, and frequent replacement is necessary. However, ice vests do not encumber the worker and thus permit maximum mobility. Cooling with ice is also relatively inexpensive.

2. **Wetted clothing** is another simple and inexpensive personal cooling technique. It is effective when reflective or other impermeable protective clothing is worn. The clothing may be wetted terry cloth coveralls or wetted two-piece, whole-body cotton suits. This approach to auxiliary cooling can be quite effective under conditions of high temperature and low humidity, where evaporation from the wetted garment is not restricted.

3. **Water-cooled garments** range from a hood, which cools only the head, to vests and "long johns," which offer partial or complete body cooling. Use of this equipment requires a battery-driven circulating pump, liquid-ice coolant, and a container.

Although this system has the advantage of allowing wearer mobility, the weight of the components limits the amount of ice that can be carried and thus reduces the effective use time. The heat transfer rate in liquid cooling systems may limit their use to low-activity jobs; even in such jobs, their service time is only about 20 minutes per pound of cooling ice. To keep outside heat from melting the ice, an outer insulating jacket should be an integral part of these systems.

4. **Circulating air** is the most highly effective, as well as the most complicated, personal cooling system. By directing compressed air around the body from a supplied air system, both evaporative and convective cooling are improved. The greatest advantage occurs when circulating air is used with impermeable garments or double cotton overalls.

One type, used when respiratory protection is also necessary, forces exhaust air from a supplied-air hood ("bubble hood") around the neck and down inside an impermeable suit. The air then escapes through openings in the suit. Air can also be supplied directly to the suit without using a hood in three ways:

- by a single inlet;
- by a distribution tree; or
- by a perforated vest.

In addition, a vortex tube can be used to reduce the temperature of circulating air. the cooled air from this tube can be introduced either under the clothing or into a bubble hood. The use of a vortex tube separates the air stream into a hot and cold stream; these tubes also can be used to supply heat in cold climates. Circulating air, however, is noisy and requires a constant source of compressed air supplied through an attached air hose.

One problem with this system is the limited mobility of workers whose suits are attached to an air hose. Another is that of getting air to the work area itself. These systems should therefore be used in work areas where workers are not required to move around much or to climb. Another concern with these systems is that they can lead to dehydration. The cool, dry air feels comfortable and the worker may not realize that it is important to drink liquids frequently.

RESPIRATOR USAGE

The weight of a self-contained breathing apparatus (SCBA) increases stress on a worker, and this stress contributes to overall heat stress. Chemical protective clothing such as totally encapsulating chemical protection suits will also add to the heat stress problem.

SUMMARY

Heat stress offers significant challenges when work needs to be performed under hot ambient conditions. However, a well thought-out program can substantially reduce the chances of heat stress. A combination of engineering and administrative controls along with effective use of personal protective equipment can protect employees from suffering the effects of heat stress

Bee/Wasp Precautions

Revision Date: April 13, 2004

PURPOSE

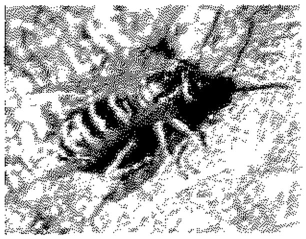
Bees and similar organisms such as wasps, hornets and yellow jackets can cause significant injury, pain and/or discomfort during our work. This precaution has been developed to help avoid injury.

APPLICATION

We can encounter these organisms during a number of our tasks such as:

- Opening well vault covers
- Opening core or sample boxes
- Performing O & M in system compounds
- Working in tall grass, weeds and brush
- Performing site assessments (indoors and outdoors)

Yellow Jackets



Yellow Jackets are found throughout the United States. Yellow Jackets feed on insects, spiders and a wide variety of other food items. They are medium-sized, stout-bodied, and black with bright yellow bands. Yellow-jackets construct globular paper nests, usually in underground cavities. Favorite nesting places include rodent burrows, compost piles and wall voids.

Yellow Jackets are scavengers and frequently are found foraging around compost piles and garbage receptacles. Their activity can be discouraged in the vicinity of patios, parks, picnic and other recreational areas by covering all food and disposing of waste in covered containers.

Paper Wasps

Paper wasps are about 1" in length, have a spindle-shaped body and are marked with a brown and yellow pattern. Paper wasps construct umbrella-shaped, single-layered nests with exposed cells. Nests may be built in trees and shrubs but frequently are found under building overhangs, in attics, barns, garages and sheds. These wasps are not considered overly aggressive and usually pose a threat only when their nests are disturbed. However, foraging wasps can cause considerable annoyance as they fly in and about entrances of buildings.

Honey Bees

Honey bees may become troublesome when they swarm or build colonies in or near residential areas. Honeybees occasionally invade homes and establish a colony, building combs of wax containing honey, pollen and brood in wall spaces. Once established, a colony is difficult to remove because it usually involves structural modification of the building. To be effective, the honey and wax should be removed along with the bees or the site will remain attractive to other swarms.

Bumble Bees

These bees most commonly become a problem when they establish nests close to a sidewalk or near building foundations. Bumble bees are large, robust bees covered with dense black and yellow hairs.

They commonly reach one inch in length. Bumble bees usually are not overly aggressive, but will sting if molested. To avoid confrontations with bumble bees, stay clear of patches of flowers visited by adults. These bees can be controlled by spraying or dusting insecticides on their nests.

Retreatment may be necessary.

WHAT TO DO?

Naturally, there are many kinds of bees, and other insects for that matter, about which we should be concerned. The following are some good rules of thumb to keep in mind.

1. The best way to avoid being stung is to avoid the insect. Remember, almost all of these insects sting to protect their colony.
2. Keep your eyes and ears open for swarms.
3. Look for insects flying in or out of openings such as a crack in the wall, an open pipe end or a well vault lid.
4. Be careful of tall grass as some bees build their hives at ground level.
5. Be careful of pointed structures, especially in barns, storage sheds, outbuildings as bees often build hives in those structures.
6. Avoid wearing citrus or floral aftershaves or perfumes, they are sensitive to odors.
7. Wear light colored clothing, experience shows these insects are attracted to dark colors.
8. Fill in cracks or crevices, close open ends of pipes
9. Once you rile up these insects, the best thing you can do is run away as fast as possible. Do not retrieve nearby belongings. Do not run into traffic. Do not stand still, you can't fool them. Do not try to fight them, such as flail you arms or slap at them. This will upset them more. Just keep running. Africanized bees have chased people for more than a ¼ of a mile. Any covering for your body, especially your head and face, will enhance your escape. If nothing else pull your shirt up over your face. A few bites on your belly and chest won't be as bad as a few bites to your face and eyes can be. Although tempting, do not jump into water. They will wait for you to come up for air.
10. Staff should know if they are allergic to bee stings and carry an epi-pen with them.
11. Project managers should find out who on their staff are allergic and emphasize the importance of them obtaining and carrying an epi-pen.

INSECT STING REACTIONS

Insect sting reactions can be classified into three types - a normal reaction, a toxic reaction, and an allergic reaction. A normal reaction, lasts only a few hours, involves pain, redness, swelling, itching, and warmth at the site of the sting. A toxic reaction lasts for several days, results from multiple stings and causes muscle cramps, headache, fever, and drowsiness. An allergic reaction is similar to a toxic reaction but is triggered with only one sting.

An allergic reaction can involve one or more of the following: hives, itching, and swelling in areas other than the sting site; tightness in the chest and difficulty in breathing; a hoarse voice or swelling of the tongue; dizziness or a sharp drop in blood pressure; and unconsciousness or cardiac arrest.

FIRST AID

In the event that someone is bitten by these insects, do the following.

1. Wash the bite area with soap and water.
2. Meat tenderizer, which contains an enzyme that breaks down the venom, and/or a baking soda paste also may be applied to the sting site to help relieve pain. Several over-the-counter sting remedies are available at pharmacies.
3. If you have been bitten over fifteen times or are having symptoms other than pain and swelling, seek emergency medical assistance immediately.
4. Use your epipen if you are allergic.
5. Have Benadryl in your first aid kit.

QUESTIONS?

Call Alice Larsen, CIH, Director of Industrial Hygiene and Health & Safety if you have questions (617) 232-7355 or email pplatcow@Stantec.com.

ATTACHMENT 9

MATERIAL SAFETY DATA SHEETS

ATTACHMENT 10

SUBCONTRACTOR'S HEALTH AND SAFETY PLAN

(<u>Instructions to Project Manager and Subcontractor</u>: Please ensure that all subcontractors provide their own site-specific HASP for their portion of the work. This should be attached behind this page so that it blends smoothly with the STANTEC portion of the HASP. The subcontractor's HASP must be site-specific and discuss all of the hazards to which their employees may be exposed, and the appropriate means they will follow to avoid the exposure to the extent possible. STANTEC's HASP can be used as a guide for developing the subcontractor's HASP, but cannot be used exclusively since the subcontractor's employees may face exposures and risks not covered by the STANTEC HASP.

Subcontractors must understand that our team goal is zero incidents of all types. If the subcontractor has any questions, he/she may contact Alice Larsen, STANTEC's Director of Health and Safety at (617) 232-7355 for guidance and direction. Cooperation on this requirement is greatly appreciated.)

ATTACHMENT 11

DAILY PRODUCTION HEALTH & SAFETY BRIEFING

ATTACHMENT 11

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:

Start Time:

Issues Discussed:

1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**

Attendees

Print Name and Company	Signature

Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

ATTACHMENT 11

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:	
Start Time:	
Issues Discussed:	
1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

ATTACHMENT 11

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:	
Start Time:	
Issues Discussed:	
1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

ATTACHMENT 11

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:	
Start Time:	
Issues Discussed:	
1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

ATTACHMENT 11

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:	
Start Time:	
Issues Discussed:	
1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

Attachment 11

DISCUSSION IDEAS FOR THE DAILY PRODUCTION H&S MEETING

- ☐ Emergency response plan, emergency vehicle (full of fuel) and muster point
- ☐ Route to medical aid (hospital or other facility)
- ☐ Work hours, is night work planned?
- ☐ Hand signals around heavy equipment
- ☐ Traffic control
- ☐ Pertinent Legislation and Regulations
- ☐ Above and below ground utilities (energized or de-energized)
- ☐ Material Safety Data Sheets (MSDS)
- ☐ To who, what, why, and when to report an incident
- ☐ Fire extinguisher and first aid kit locations
- ☐ Excavations, trenching sloping and shoring
- ☐ Personal protective equipment (PPE) and training
- ☐ Safety equipment and training
- ☐ Emergency telephone and telephone numbers (may not be 911)
- ☐ Eye wash stations and washroom locations
- ☐ Energy lock-out/tag-out procedures. Location of "kill Switches" etc.
- ☐ Weather restrictions
- ☐ Site security. Site hazards. Is special waste present?
- ☐ Traffic and people movements
- ☐ Working around machinery (both static and mobile)
- ☐ Sources of ignition, static electricity etc.
- ☐ Stings, bites, large animals and other naturally related injuries
- ☐ Working above grade
- ☐ Working at isolated sites
- ☐ Decontamination procedures (both personnel and equipment)
- ☐ Falls, trips, sprains and lifting injuries (how to prevent)
- ☐ Right to refuse unsafe work
- ☐ Adjacent property issues (residence, business, school, day care center)

Attachment 11

ATTACHMENT 12

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

ATTACHMENT 12
HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM
(All STANTEC and subcontractor personnel must sign.)

"Zero Tolerance for Incident of ANY Kind. Work Together to Ensure A SAFE and High Quality Project

This Health and Safety Plan has been developed for the purpose of informing STANTEC employees of the hazards they are likely to encounter on the project site, and the precautions they should take to avoid those hazards. Sub-contractors and other contractors at the site must develop their own Health and Safety Plan to address the hazards faced by their own employees. STANTEC has provided a copy of this Plan to contractors in the interest of full disclosure of hazards of which we may be aware, and to satisfy STANTEC's responsibilities under the Occupational Safety and Health Administration (OSHA) Hazard Communication standard. Similarly, contractors are required to inform STANTEC of any hazards of which they are aware or that the contractor's work on site might possibly pose to STANTEC employees, including (but not limited to) the Material Safety Data Sheets for chemicals the contractor may bring on-site. This plan should NOT be understood by contractors to provide information on all of the hazards to which a contractor's employees may be exposed as a result of their work.

I further certify that I have received training and medical surveillance according to the Health and Safety Plan and the OSHA Standard on Hazardous Waste Operations and Emergency Response (29 CFR 1910.120):

All parties conducting site activities are required to coordinate their activities and practices with the project Site Health and Safety Officer. Your signature below confirms that you have read and understand the hazards discussed in this Plan, and understand that sub-contractors and contractors must develop their own Health and Safety Plan for their employees. You also understand you could be prohibited by the Site Health and Safety Officer or other STANTEC personnel from working on this project for not complying with any aspect of this Health and Safety Plan.

Name	Title	Signature	Company	Date

Name	Title	Signature	Company	Date

Attachment 12

ATTACHMENT 13

HASP MODIFICATION LOG

ATTACHMENT 13
HASP MODIFICATION LOG

HASP SECTION	DESCRIPTION OF REVISION	REVISION DATE	APPROVED BY

APPENDIX B

Groundwater Sampling and Analysis Plan

GWSAP Renton 2008.doc

ConocoPhillips Renton Terminal
2423 Lind Avenue SW, Renton, Washington

GROUND WATER SAMPLING AND ANALYSIS PLAN (GWSAP)

August 11, 2008

CONTENTS

CONTENTS (Continued)

APPENDIX A

GWSAP Renton 2008.doc

APPENDIX B

1.0 INTRODUCTION

The following groundwater sampling and prepared on behalf of ConocoPhillips (COP) covers the procedures for collecting representative samples and/or field data from ground water monitoring wells at the Renton Terminal, Renton, Washington. The intent of this document is to provide technical procedures for obtaining valid, defensible ground water data. The plan is limited to sampling requirements and does not include monitoring well placement, design and construction, or well development procedures. This work plan meets the criteria for groundwater sampling, analysis, and reporting consistent with the EPA Assurance Guidance.

2.1 Health and Safety Plan

A health and safety plan (HASP) is required for all ground water sampling events conducted at the Renton Terminal and will be in place prior to commencement of field drilling activities. In addition, each laboratory facility should have their own standard laboratory health and safety plan as required by current OSHA regulations.

2.2 Sample Event Preparation and QA/QC

2.2.1 General Event Preparation

The laboratory performing the groundwater analysis shall supply all necessary coolers, pre-cleaned containers, trip blanks, chemical preservatives, packaged refrigerant, labels, custody seals, chain-of-custody and shipping forms. All field data shall be entered on a Field Information Log (see Pages A.1 through A.6 in Appendix A). Any changes to the monitoring plan and/or procedures need to be given to the laboratory prior to the field sampling personnel arriving on the site. A specific contact person will be established at both the Renton Terminal facility and contract laboratory for communication between the two (2) parties.

2.2.2 Sample Container Selection

Each sample container needs to be constructed of a material compatible and non-reactive with the material it is to contain. Consult A.7 (Appendix A), *Containerization* *and Preservation of Samples*, to determine the number, type and volume of appropriate containers. As noted in Section 2.2.1, the contract laboratory performing the analysis shall supply all the required containers.

2.2.3 Sample Container Preparation

Sample containers will be purchased as a pre-cleaned product or cleaned in the laboratory in a manner consistent with EPA protocol. An example protocol is as follows:

- Bottles, vials, containers, liners and caps hand washed in a laboratory-grade, non-phosphate detergent.
- Rinse three (3) times with distilled water.
- Rinse with a chemically pure or reagent grade 10% nitric acid solution.
- Rinse three (3) times with organic-free water.
- Oven-dried (air-dried for high-density polyethylene containers and caps).

After containers and caps are cool and dry, cap each container and store in a clean and dry environment.

2.2.4 Equipment Preparation Prior to Site Arrival

This section outlines the equipment preparation prior to site arrival for a specific monitoring event. This equipment preparation includes, at a minimum, decontamination procedures for all equipment that will come in contact with the ground water including, but not limited to, pumps, the water level indicator(s) tripod and reel system for lowering/raising bailer device, bailer snap-hook, bailer line, pH/temperature meter, specific conductivity meter, dissolved oxygen meter, ORP meter, turbidity meter, and filtration device. Operation and calibration information for field instruments are contained in Appendix B.

- Water Level Indicator(s) - Water level indicator(s) will be decontaminated prior to initial site arrival by hand washing the sensor probe and entire length of tape in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. While the tape is reeled back onto the carrying spool, the tape and probe will be wiped down with a clean dry paper towel. Water level indicator devices will be checked at the laboratory on an annual basis for proper calibration and prior to each monitoring event by reeling a 50' and 100' length of tape on a clean surface and checking the length with a steel measuring tape. Any discrepancies will be noted as a correction factor on the side of the water level indicator reel.

- Bailer Reel System / Snap-Hook - Reel System components coming into contact with the bailer line (including the stainless steel snap-hook for bailer connection) will be washed with a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water.

- Bailer Line - Monofilament line (or equivalent) will be discarded and replaced between each monitoring well, therefore, no decontamination is required.

- pH / Temperature Meter - Meters will be decontaminated by hand washing the sample cells in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. Meters will then be checked for proper calibration and operation as specified in Appendix B. Any malfunctioning meters will be replaced prior to packing.

- Specific Conductivity Meter - Meters will be decontaminated by hand washing the probes in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. Meters will then be checked for proper calibration and operation as specified in Appendix B. Any malfunctioning meters will be replaced prior to packing.

- Turbidity Meter - Meters will be decontaminated by hand washing the sample cells in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. Meters will then be checked for proper calibration and operation as specified in Appendix B. Any malfunctioning meters will be replaced prior to packing.

- Dissolved Oxygen Meter- Meters will be decontaminated by hand washing the sample cells in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. As discussed in Appendix B, modern DO meters are self-calibrating and do not need routine calibration.

- Oxidation-Reduction Potential Meter- Meters will be decontaminated by hand washing the sample cells in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. As discussed in Appendix B, modern DO meters are self-calibrating and do not need routine calibration.

- Filtration Device - The filter chamber will be disassembled and decontaminated by hand washing in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water. A sufficient number of disposable filtration cartridges will be taken to the site.

In case of equipment failure, it is recommended that back-up instrument will be in the sample crew's possession. If a back-up instrument is not available, then sampling should not proceed until the proper equipment is made available.

2.2.5 Field QA/QC Samples

Field QA/QC samples consist of two (2) primary areas of quality control. The first area is the quality control designed to prevent sample contamination from occurring in the field and/or shipping procedures. This is monitored in the trip blank(s), field blank(s), and any applicable equipment (rinsate) blank(s). A basic description of each is as follows:

- Trip Blank - These samples will be prepared in the laboratory by filling the appropriate clean sample containers with organic-free water and adding the applicable chemical preservative, if any, as indicated on Page A.7. These containers are to be labeled "Trip Blank", the analyses to be performed on each container indicated, and then shipped in the typical transportation cooler to the field and back to the laboratory along with the other sample set containers for a given event. This blank is tested for any contamination that may occur as a result of the containers, sample coolers, cleaning procedures, or chemical preservatives used. Trip blanks will consist of analysis of volatile organics and shall be taken and analyzed for each sampling event at a frequency of a one (1) in twenty (20) per monitoring event or at a minimum of one per event, whichever is greater.

- Field Blank - Field blank containers will be prepared in the field at a routine sample collection point during a monitoring event by filling the appropriate sample containers from the field supply of organic-free water. This field supply water shall be the same water used for cleaning and decontamination of all field purge and sample equipment. This blank is tested to detect contamination that may occur as a result of site ambient air conditions and serves as an additional check for contamination in the containers, sample transport coolers, cleaning procedures, and any chemical preservatives. Field blanks will consist of analysis of volatile organics and shall be taken and analyzed for each sampling event at a frequency of a one (1) in twenty (20) per monitoring event or at a minimum of one per event, whichever is greater..

- Equipment (Rinsate) Blank - These blanks will be prepared in the field immediately following decontamination cleaning procedures on any non-dedicated equipment used for purging, sampling or sample filtration. Following decontamination, field supply organic-free water is passed through the non-dedicated equipment in the same procedure as a groundwater sample. This blank confirms proper field decontamination procedures on non-dedicated equipment utilized in the field. Equipment blanks shall be taken and analyzed for all applicable parameters anytime non-dedicated equipment is used to purge, sample, or sample filtration at a well at a frequency of one (1) in twenty (20) per monitoring event or at a minimum of one (1) per event, whichever is greater.

Other Field QA/QC Samples - A second area of standard field QA/QC samples are field duplicates, matrix spike and matrix spike duplicates.

- Field duplicates are an extra set of samples taken at a particular monitoring point and labeled "Field Duplicate". These are independent samples that are collected as close as possible to the same point in space and time. They are two (2) separate samples taken from the same source, stored in separate containers, and analyzed independently. Field duplicates are useful in documenting the precision of the sampling and analytical process. Samples shall be collected in proper alternating order for the sample point and field duplicate for each parameter (e.g. VOA - VOA, metals - metals, etc.) Field duplicates shall be taken and analyzed at a batch minimum of one (1) in twenty (20) or at a minimum of one (1) per sample event.

- Field samples for matrix spike and matrix spike duplicate analyses are taken in the same manner as field duplicates and allow sufficient volumes of sample to perform matrix spike and matrix spike duplicate analyses.

Matrix spikes are those samples having a known amount of a target analyte added at the lab to the sample prior to sample preparation and analysis. The matrix spike is used to determine the bias of a method in a given sample matrix.

Matrix spike duplicates are intralaboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs at the lab prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix. Matrix spike and matrix spike duplicates will be analyzed at an appropriate frequency as specified in the method requirements.

Appropriate field QA/QC documentation should be recorded in the field notes (e.g. location where field blank was collected). See Pages A.1 – A.6.

2.3 Well Purge

2.3.1 General Well Purge Information

Purging a monitoring well is just as important as the subsequent sampling of the well. Water standing in a monitoring well over a certain period of time may become unrepresentative of formation water because of chemical and biochemical changes that may cause water quality alterations.

2.3.2 Water Level Measurement

Prior to any purge or sampling activity at each monitoring well, a water level measurement is required. As indicated on the Field Information Log (Pages A.1 through A.6), several other water level measurements are to be taken during the course of purge and sampling.

Water level indicator equipment will be constructed of chemically inert materials and will be decontaminated at each well with a non-phosphate detergent followed with deionized water rinses. Water levels will be measured with a precision of ± 0.01 foot. Each monitoring well has a reference elevation point located at the top of the wellhead assembly. This reference point has been is measured by a licensed surveyor in relation to Mean Sea Level (MSL). Basic procedures for water level measurement are indicated on B.11.

Wells with Light Non-Aqueous Phase Liquids (LNAPL) will be measured for free phase thickness of LNAPL with an electronic measuring device. Measurements will include the depth to LNAPL, depth to ground water, and LNAPL thickness. Thorough decontamination of the electronic probe and tape will be done after removal of the probe from the well. Decontamination will include a detergent wash followed by a rinse with distilled water. LNAPL thickness may also be confirmed by carefully lowering a translucent bailer with a ball check valve through the LNAPL layer, retrieving the bailer and measuring the thickness of LNAPL in the bailer.

Ground water monitor wells that measure the same zones must be measured over a period of time short enough to avoid temporal variations in ground water levels that could preclude accurate determination of groundwater flow rate and direction. GWS will take two measurements of water levels and product thickness; prior to purging and again after a 24-hour recovery. GWS may conduct slug tests in select wells to determine hydraulic conductivity values of the aquifer.

In addition to the static water level, a total well depth is required to be measured at each monitoring well during each ground water monitoring event. Taking well depth measurements helps determine the amount of sediment that accumulates within the well. Significant accumulation of sediment can impact the water turbidity during purging and sampling thereby risking bias of certain parameters such as heavy metals. Well depth can be taken with a water level indicator device since the probe is heavy enough to keep the tape measure straight and to "feel" the bottom of the well. Total well depth will be measured prior to well purge to reduce the risk of any contamination from the water level probe during sample collection.

2.3.3 Purge Equipment

Purge equipment may consist of either disposable bailers, dedicated bailers, peristaltic pump with disposable polyethylene tubing, pneumatic pump with disposable polyethylene tubing, or a variable speed centrifugal electrical submersible pump with disposable polyethylene tubing.

2.3.4 Purge Procedures

Should a ground water sample be taken, the sample crew will put on clean disposable gloves and an initial water level will be taken as described in Section 2.3.2. The disposable PVC bailer will then be attached to a polyethylene monofilament (or equivalent) approximately line equal to the specific well total depth. The bailer line, and stainless steel snap-hook should be the only sampling equipment to contact the internal well casing or well water during purge. The bailer will then be lowered gently down to the water column and slowly raised from the water column to prevent agitation and minimize/prevent turbidity. Should a pump be used, the purge rate will be adjusted based upon the amount of drawdown observed in the well.

2.3.5 Purge Volumes

Low yield wells will be purged to dryness. Moderate to high yield wells will be purged a minimum of three (3) well volumes and/or to stabilization of field parameter temperature, specific conductivity, and pH.

- Parameter stabilization is defined as:

  - Specific Conductivity = ± 10% for three (3) consecutive measurements at approximately five (5) minute increments.

  - pH = ± 0.1 standard pH unit for three (3) consecutive measurements at approximately five (5) minute increments.

  - Temperature = ± 10% for three (3) consecutive measurements at approximately five (5) minute increments.

  - Dissolved Oxygen = ± 10% for three (3) consecutive measurements at approximately five (5) minute increments.

  - Oxidation Reduction Potential = ± 10% for three (3) consecutive measurements at approximately five (5) minute increments.

  - Turbidity = ± 10% for three (3) consecutive measurements at approximately five (5) minute increments.

Check water level after purge is complete. Monitoring of temperature, pH, specific conductivity, turbidity, dissolved oxygen, and oxidation-reduction potential for stabilization will be recorded on each Field Log (see Pages A.1 through A.6).

2.3.6 Purge Water Management

On an individual monitor well basis, if purge water is known to be historically contaminated or suspect due to prior monitoring analytical data, the purge water shall be stored in appropriate containers until analytical results are available. After review of these analyses, proper arrangements for disposal or treatment of the water shall be made.

2.4 Monitoring Well Sample Collection

2.4.1 General Sample Collection Information

Sampling should take place as soon as purging is complete in moderate to high yield wells. For wells purged dry, sampling will take place within 24 four hours once the well has sufficient recharge, typically the following day. The time interval between the completion of well purge and sample collection normally should not exceed twenty-four hours. According to recovery curves for some site wells, longer times may be needed for slow recharging wells. If pumps are used (peristaltic, pneumatic or electrical submersible), sampling will follow procedures that minimize turbidity.

2.4.2 Sample Collection Order

Samples will be collected and containerized according of the volatility of the requested analyses. A specific collection order is as follows:

- Field Parameters (Specific Conductivity ⇒ pH ⇒ Temperature ⇒ Turbidity ⇒ Dissolved Oxygen ⇒ Oxidation-Reduction Potential)
- Volatile Organics
- Semi-Volatiles
- Metals
- Inorganics

2.4.3 Sampling Equipment Precautions

If disposable PVC bailers with check valves will be used to sample the monitoring wells; extreme care must be taken when transferring the sample water from the bailer to the sample containers to minimize the disturbance to the sample.

2.4.4 Sample Filtration

If pumped or bailed ground water samples exhibit turbidity values above 25 NTUs, the field geologist will take additional filtered samples at each respective monitor well during sample collection with an in-line .45-micron disposable filter cartridge. Ground water sample field filtering procedures are indicated on Pages B.12 – B.13. When samples are filtered, any acid preservatives will be added after filtration to avoid breaking down clay molecules or placing adsorbed ions into solution, which could result in the generation of artificially high concentrations of metals. Sampling forms will indicate if the samples are filtered or unfiltered.

2.4.5 Sample Preservation

All samples will be containerized and preserved according to Page A.7, *Sample Containerization and Preservation*. Preservation acids may be added to the applicable sample container in the field or pre-preserved to the applicable empty containers at the laboratory prior to sample collection. Methods of preservation are intended to retard biological action, retard hydrolysis of chemical compounds and complexes, and reduce the volatility of constituents. Samples requiring refrigeration to four degrees Centigrade according to Page A.7, will be accomplished by placing the sample containers immediately into coolers containing wet ice or the equivalent and delivering to the analytical laboratory as soon as practical.

2.4.6 Field Measurements

Required field measurements include water levels, total well depth, temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction potential, and turbidity. Water level and total depth measurement procedures are described in Section 2.3.3. Temperature should be measured immediately after collection of the sample. See Appendix B of this plan for pH/temperature, specific conductivity, dissolved oxygen, oxidation-reduction potential, and turbidity procedures and schedule of calibration of these field instruments.

All instruments shall be properly calibrated and checked with standards according to the manufacturer's instructions. Any improper operating instruments must be replaced prior to continuing sample collection operations.

2.5 Record Keeping

2.5.1 Field Logs

All field notes must be completely and accurately documented. All field information will be entered on a Field Information Log (see Pages A.1 through A.6). Included on Pages A.3 and A.6 is an explanation of each requested piece of information and the proper location to enter the data.

An individual field log page is shown on Pages A.1 and A.2. All entries should be legible and made in black, indelible ink. Entry errors will be crossed out with a single line, dated, and initialed by the person making the corrections.

2.5.2 Chain-of-Custody/Sample Container Labels

Proper chain of custody records are required to insure the integrity of the samples and the conditions of the samples upon receipt at the laboratory, including the temperature of the samples at the time of log in. The sample collector shall fill in all applicable sections and forward the original, with the respective sample(s), to the laboratory performing the analysis. Upon receipt of the samples at the laboratory, the sample coordinator is to complete the chain of custody, make a copy for his/her files, and make the original documents part of the final analytical report (see Page A.8 as an example of chain-of-custody).

All sample containers will be labeled to prevent misidentification. The following will be indicated on an adhesive label with a waterproof pen:

- Collector's name, date and time of sampling.
- Sample source.
- Sample Identification number.
- Sample preservatives.
- Test(s) to be performed on the sample.

2.5.3 Sample Summary Log

A quick reference summary sheet referred to as a Field Sample Summary Log (see Pages A.9 and A.10) presents a general overview of the field sampling program. This document is to be prepared prior to a specific sampling event and appropriately filled in with sampling dates each day. The field sample summary log shall be included with the final analytical report as part of the field note documentation section.

2.5.4 Monitor Well Inspection

Inspection of the monitoring well integrity will be performed at a minimum of an annual basis by utilizing the Ground Water Monitoring Well Condition Report (see Page A.11). In addition, during each ground water monitoring event not utilizing the Well Condition Report, visual problems with the monitor well integrity should be noted on the Field Information Log.

2.6 Sample Transport

Samples shall be shipped from the field back to the analytical laboratory either by hand delivery or utilizing an overnight courier service. Samples shall be shipped in sealed insulated shipping containers that maintain the samples at approximately 4°C. Overnight courier shipping containers must be a sturdy water-proof design (ice chests are commonly used) equipped with bottle dividers and cushion material to prevent breakage during shipment. The field crew shall contact the laboratory each time samples are sent to identify the samples being sent and the transportation carrier along with the shipping identification number.

REFERENCES

American Society of Testing and Materials (ASTM), 1986. *Standard Guide for Sampling Groundwater Monitoring Wells.* D 4448 - 850.

American Society of Testing and Materials (ASTM), 1996. *Provisional Standard Guide for Developing Appropriate Statistical Approaches for Ground Water Detection Monitoring Programs.* PS 64-96.

Martin, W.F., Lippitt, J.M., and Protherd, T.G. 1987. *Hazardous Waste Handbook For Health and Safety*, Butterworth Publishers, Stoneham, Massachusetts, pp. 28 - 30.

U.S. Environmental Protection Agency, 1986. *RCRA Groundwater Monitoring Technical Enforcement Guidance Document.* OSWER - 99550.1, Office of Waste Programs Enforcement, Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency, 1992. *RCRA Groundwater Monitoring: Draft Technical Guidance.* EPA/530-R-93-001, NTIC # PB93-139-350, Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency, 1991b. *Handbook - Groundwater, Volume II: Methodology*. EPA/625/6-90/0166.

U.S. Environmental Protection Agency, November 1986. *Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, Third Edition (Revised),* SW-846. Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency, November 1993. *Solid Waste Disposal Facility Criteria Technical Manual.* EPA/530-R-93-017, NTIC #PB94-100-450, Office of Solid Waste and Emergency Response, Washington, D.C..

Texas Natural Resources Conservation Commission (TNRCC), "Texas Administrative Code, Title 30, Chapter 330, Municipal Solid Waste", October 9, 1993 (Effective date).

Texas Natural Resources Conservation Commission (TNRCC), Environmental Trade Fair Conference, 1998, Volume 1, pp. 199-201.

GWSAP Renton 2008.doc

APPENDIX A

FIELD INFORMATION LOG

Facility: ____________________ **Sample Point ID**: ________________________

Location: ___________________ Field Representative: ____________________

Sample Matrix: _______________ Lab Sample #: __________________________

Gascope Calibration: % Gas: ____ % LEL:

Gascope Reading: % Gas: ____ % LEL:

PURGE INFORMATION:

Method of Well Purge: _____________________________ Dedicated: Y / N

Date / Time Initiated: _____________ One (1) Casing Volume, Gal: _____________

Initial Water Level, Feet: ____________ Total Volume Purged, Gal: _____________________

Ground Water Elevation, MSL: _______ Was Well Purged To Dryness: __________________

Well Total Depth, Feet: ____________ Water Level after Purge, Feet: __________________

Casing Diameter, Inches: ____________ Date / Time Completed: _________________________

PURGE DATA:

Time	Purge Rate (gpm/htz)	Cumulative Volume	Temp. (°C)	pH (std units)	Conduct. (μmhos/cm)	Turb. (NTU)	Other (__)

FIELD INFORMATION LOG (continued)

SAMPLING INFORMATION: Sample Point ID: ______________

Method of Sampling: ______________________________ Dedicated: Y / N

Water Level @ Sampling, Feet: _________ Well Collection Sequence Number: _______________

Parameters: Annual ( ) Semi-Annual ( ) Quarterly ( ) Monthly ( ) Other ( )

SAMPLING DATA:

Date/Time	Sample Rate	Temp. (°C)	pH (Std. Units)	Conduct. (µmhos/cm)	Turb. (NTU)	Other ______ (___)
	VOA __________ Other __________					

INSTRUMENT CHECK DATA:

Turbidity Serial #: ________NTU std. = ___ NTUNTU std. = ___ NTU

pH Serial #: ___________ 4.0 std. = ___ 7.0 std. = _____ 10.0 std.=

Conductivity Serial #: ______ ___ umhos/cm = ____ ___ umhos/cm =

GENERAL INFORMATION:

Weather Conditions @ time of sampling:

____

Sample Characteristics:

____

ANALYTE COLLECTION ORDER, CONTAINERS, PRESERVATIVES AND TESTS PERFORMED:

____

____

COMMENTS AND OBSERVATIONS:

____

____

I certify that sampling procedures were in accordance with applicable EPA, State and local protocols.

Date: __/__/__ By: __________________ Company: ______________________________________

FIELD INFORMATION LOG

Facility: ______1______ **Sample Point ID**: ______4

Location: ______2______ Field Representative: _____5

Sample Matrix: ____3____ Lab Sample #: _______6

Gascope Calibration: % Gas: _7__% LEL: _____

Gascope Reading: % Gas: _8__% LEL: _____

PURGE INFORMATION:

Method of Well Purge: _________9__________ Dedicated: Y / N

Date / Time Initiated: ______10______

One (1) Casing Volume, Gal: ______15

Initial Water Level, Feet: ______11______

Total Volume Purged, Gal: _______16

Ground Water Elevation, MSL: ___12____

Was Well Purged To Dryness: ______17

Well Total Depth, Feet: ______13______

Water Level After Purge, Feet: _____18

Casing Diameter, Inches: _____14______

Date / Time Completed: ________19

PURGE DATA:

Time	**Purge Rate (gpm/htz)**	**Cumulative Volume**	**Temp. (°C)**	**pH (std units)**	**Conduct. (µmhos/cm)**	**Turb. (NTU)**	**Other ____ (__)**
20	21	22	23	24	25	26	27

FIELD INFORMATION LOG (continued)

SAMPLING INFORMATION: Sample I.D. 4

Method of Sampling: 28 Dedicated: Y / N

Water Level @ Sampling, Feet: 29 Well Collection Sequence Number: 30

Parameters: Annual ( ) Semi-Annual ( ) Quarterly ( ) Monthly ( ) Other ( )
31

SAMPLING DATA:

Date/Time	Sample Rate	Temp. (°C)	pH (Std. Units)	Conduct. (μmhos/cm)	Turb. (NTU)	Other _____ (___)
32	VOA _________ Other 33	34	35	36	37	38

INSTRUMENT CHECK DATA:

Turbidity Serial #: 39 40 NTU std. = ___ NTU ___ NTU std. = _______ NTU

pH Serial #: 41 4.0 std. = 42 7.0 std. = ____ 10.0 std.= _________

Conductivity Serial #: 43 44 umhos/cm = ____ ___ umhos/cm = _______

GENERAL INFORMATION:

Weather Conditions @ time of sampling: __________45

Sample Characteristics: _________________46

ANALYTE COLLECTION ORDER, CONTAINERS, PRESERVATIVES AND TESTS PERFORMED:

47____

____

COMMENTS AND OBSERVATIONS: ________________48

____

I certify that sampling procedures were in accordance with all applicable EPA, State and local protocols.

Date: __/__/__ By: _______49_________ Company: _____________________________

FIELD INFORMATION LOG EXPLANATION

1. Name of facility to be sampled.
2. City, County, or Township in which the facility is located.
3. Type of sample collected (ground water, surface water, soil, etc.).
4. The official identification of the sample point (e.g. MW-1).
5. All representatives conducting the purging and/or sampling of the given well.
6. Identification number given to the set of samples. This number is generally assigned by the lab.
7. The gascope calibrations for % Gas and % LEL.

8. The gascope readings for % Gas and % LEL of methane.
9. The equipment used to purge (e.g. Rediflo 27; QED air displacement purge pump).
10. Self explanatory.
11. Depth to water as measured with a water level indicator from the official point of reference. The official point of reference is usually from top of the inner casing (riser). This is to be included on the laboratory diskette.
12. The actual elevation of the water surface relative to sea level.
13. Measurement from the surveyed point at the top of the inner casing (riser) to the bottom of the well. To be measured to the nearest hundredth of a foot. To be measured every sampling event.
14. Measurement of the inner diameter of the inner casing. To be measured in inches.
15. The volume of water (in gallons) occupying the well prior to purging. Calculation:

    Volume (gallons) = $(3.14)\ r^2h/231$

    r = radius of the inner casing (in inches)

    h = height of the water column in the well (in inches). Height equals the well total depth minus the initial water level.

    [NOTE: UNITS IN INCHES]
16. The total volume purged from the well prior to sampling. Measured in gallons.
17. Yes or No.
18. Water level measurement taken at the end of purging. If a pump is used for purging, then take the measurement while the pump is on. If a well has been purged to dryness, then write N/A in this space.
19. Self explanatory.
20. Time of a given field data measurement during the purge process. If more than one day is used for purging, then write the new date in the margin next to the time.
21. Timed rate that the well is being purged when the purge field data is being collected. If a rate controlled, electric submersible pump is being used, then also include the Hertz reading on this line.
22. The total volume that has been purged each time the purge stabilization field data is being collected. Measured in gallons.
23. Temperature measured in Celsius to the nearest tenth.

24. pH measured in standard units to the nearest hundredth.
25. Specific conductance measured in micro mhos per centimeter to three (3) or four (4) significant digits.
26. Turbidity measured in nephelometric turbidity units to three (3) significant digits.
27. Any other field parameter measured during the purge process (e.g. dissolved oxygen, eH).

FIELD INFORMATION LOG EXPLANATION

28. Equipment used to sample (e.g. Rediflo27, Well Wizard7 bladder pump). Also indicate if device is dedicated.
29. Measurement of water level from the top of the inner casing measured immediately before sampling.
30. Note sequential number of well in monitor well sample collection order.
31. Type of parameter list used for the sampling event. If other, then record what list is being used.
32. Date and time that sampling begins. Sample field parameters are to be taken separate from purge field parameters. The sample field parameters are to be measured in one (1) replicate unless otherwise stated in state regulations or the site permit.
33. The rate that the sample water is filling the sample bottles (in milliliters per minute).
34. Temperature to be measured only in the field at the time of sampling. Record in degrees Celsius to the nearest tenth.
35. The pH to be written on this line is to be measured only in the field at the time of sampling. Record in standard units to the nearest hundredth.
36. The Specific Conductance to be written on this line is to be measured only in the field at the time of sampling. Record in micro mhos per centimeter to three (3) or four (4) significant digits.
37. The turbidity to be written on this line is to be measured only in the field at the time of sampling. Record in nephelometric turbidity units to three (3) significant units.

38. Any other parameter that is to be measured in the field at the time of sampling.
39. Document turbidity meter manufacturer serial identification number.
40. Turbidity standard to be measured between wells. Record the theoretical standard value in the first line and the measured standard value in the second line. Two (2) different standards can be measured.
41. Document pH meter manufacturer serial identification number.
42. Measure each buffer solution between each well.
43. Document conductivity meter manufacturer serial identification number.
44. Measure each standard solution between each well. Record the theoretical standard solution value in the first line and the measured standard solution value in the second line. Two (2) different standards can be measured.
45. Record any ambient weather conditions that might affect sample.
46. Record general physical characteristics of sample at time of sampling before preservation, filtration, or cooling (e.g. odor, visual turbidity, color, particulate matter).
47. Record the analytes to be tested as per container following the order noted in the sampling section of this SOP. The bottle size and material are also to be recorded along with any preservative. Filtration, if needed, shall also be recorded. Example:

48.

2 - 40 ml(G)/HCl = VOA
1 - Liter (P)/Filt. & HNO3 = Diss. Metals

48. Any comments or observations that reflect anything not covered by this field log that may be important to the sampling event.
49. Record the date signed, the signature of the person who filled out the field log, and the company represented on this line. This line should be filled when the field log has been completed at the well.

CONTAINERIZATION AND PRESERVATION OF SAMPLES

Measurement	Volume,	Containe	Preservative	Max. Holding	Referenc

	(mL)	ra		Times	e
Physical Properties					
Specific Cond. (Field)	100	P, G	None	Det. on Site	1
pH (Field)	50	P, G	None	Det. on Site	1, 2
Total Dissolved Solids	500	P, G	Cool,4°C	7 Days	1
Temperature (Field)	1000	P, G	None	Det. on Site	1
Turbidity (Field)	100	P,G	None	Det. on Site	1

Measurement	Volume, (mL)	Container a	Preservative	Max. Holding Times	Reference
Inorganics, Non-Metallics					
Ammonia	400	P, G	Cool, 4°C H_2SO_4 to pH <2	28 Days	1
Chloride	200	P, G	Cool,4°C	28 Days	1, 2
Sulfate	100	P, G	Cool, 4°C	28 Days	1, 2
Total Alkalinity	200	P, G	Cool, 4°C	14 Days$^{(b)}$	1

Measurement	Volume Require (mL)	Containe ra	Preservative	Max. Holding Times	Referenc e
Metals (except mercury)					
Total	500	P, G	HNO_3 to pH <2	6 Mos	1, 2
Dissolved	500	P, G	Filt. + HNO_3 to	6 Mos	1, 2

			pH <2		

Measurement	Volume Require mL	Container[a]	Preservative	Max. Holding Times	Reference
Organics					
Volatile Organics by GC/MS	100 (2 vials @ 40mL)	G, Teflon septum cap	Cool, 4°C HC1 to pH <2	14 Days	2, 3

NOTES:

a -Plastic (P) or Glass (G). For metals, polyethylene with an all polypropylene cap is preferred.

b -TNRCC Technical Guidance recommends 48 hrs. holding time.

REFERENCES:

1 -Methods for Chemical Analysis of Water and Wastes, March, 1983, USEPA, 600/4-79-020 and additions thereto.

2 -Test Methods for Evaluating Solid Waste, Physical/Chemical Method, November, 1986, Third Edition, USEPA, SW-846 and additions thereto.

3 -"Guidelines Establishing Test Procedures for the Analysis of Pollutant Under the Clean Water Act", Environmental Protection Agency, Code of Federal Regulations (CFR), Title 40, Part 136.

Page ☐ of ☐

Chain of Custody Form

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name		A	
Work Order		Project Number		B	
Company Name	Groundwater Soln.	Bill To Company	Groundwater Soln	C	
Send Report To:	Greg Orr	Invoice Attn:	Greg Orr	D	
Address:	13700 Veterans Memorial Dr. Suite 450	Address:	13700 Veterans Memorial Dr. Suite 450	E F	
City/State/Zip	Houston, TX 77014	City/State/Zip	Houston, TX 77014	G	
Phone	832-249-8150	Phone	832-249-8150	H	
Fax		Fax		I	

No.	Sample Description	Date	Time	Matrix	No. of Bottles	A	B	C	D	E	F	G	H	I	Hold
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Sampler(s): Please Print & Sign	Shipment Method:	Airbill No.:	Required TAT:	Results Due Date:
			10 Wk Days	

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by: (Laboratory)	Date:	Time:

Notes:
TRRP reporting, dry weight corrected results for soils, and LRC/ER for Reportable Data (RD)

QC Package: (Check Box Below)

- Standard QC ☐
- Standard QC + Raw Data ☐
- Level IV - SW846 Methods ☐
- Level IV - CLP SOW ☐

FIELD SAMPLE SUMMARY LOG

Page __ of __

Facility:

Location: ______________________________

Laboratory:

Sample Dates: ______________________

Monitoring Event:

____

Lab #	Sample Point	SAMPLE PARAMETERS/CONTAINER						

Comments:

Legend:

●	● DATE	● N/R	● INS.

●-Required Sample Parameter

Date-Date of Sample Collection (Date/Month/Year)

N/R-Not Requested

INS.-Insufficient Water for Sample

(G)-Glass Container

(P)-Plastic Container

EXAMPLE

FIELD SAMPLE SUMMARY LOG

Page 1 of 1

Facility: ______________

Location: ____________________

Laboratory: ___________________________

Sample Dates: __________

Monitoring Event: _________________________

Lab #	Sample Point	SAMPLE PARAMETERS/CONTAINER						
		VOA	Metals	pH, Cond.				
		2-40 ml$^{(G)}$ Vials	1-Liter$^{(P)}$	1-500 ml$^{(P)}$				
0000	MW-1	● 2/14/93	● 2/14/93	● 2/14/93				
0001	Field Duplicate	● 2/14/93	● 2/14/93	● 2/14/93				
0002	Field Blk.	● 2/14/93	● 2/14/93	● 2/14/93				
0003	Trip Blk.	● 2/13/93	● 2/13/93	● 2/13/93				

Comments:

Legend:

●	● DATE	● N/R	● INS.

●-Required Sample Parameter

Date-Date of Sample Collection (Date/Month/Year)

N/R-Not Requested

INS.-Insufficient Water for Sample

(G)-Glass Container

(P)-Plastic Container

GROUND WATER MONITORING WELL CONDITION REPORT

Facility: ____________ Well ID: ____________ Date: ________________________________

Access:

Accessibility: Good ___ Fair ___ Poor _____

Vicinity of well clear of weeds and/or debris: Yes ___ No _____

Remarks: ____

Concrete Pad:

Integrity of Concrete Pad: Good ___ Inadequate ______

Presence of depressions or standing water around well:

Yes ___ No _____

Remarks:

____

Protective Outer Casing: Material = ____

Condition of Protective Casing: Good ___ Damaged

Condition of Locking Cap: Good ___ Damaged

Condition of Lock: Good ___ Damaged

Condition of Weep Hole: Good ___ Damaged

Remarks: ____

Well Riser: Material =

____

_

Condition of Riser: Good ____ Damaged

Condition of Riser Cap: Good ____ Damaged

Measurement Reference Point: Yes ____ No ______

Remarks: ______________________________

<u>Dedicated Purging/Sampling Device</u>: Type -

Condition: Good ____ Damaged ____ Missing

Remarks: ______________________________

Field Certification: ______________________________

Signed Title Date

GWSAP Renton 2008.doc

APPENDIX B

COMBUSTIBLE GAS METER CALIBRATION / OPERATION PROCEDURES

CALIBRATION PROCEDURES

These are calibration instructions for the MSA Gascope 62S. If you use an equivalent meter, follow the manufacturer's directions.

Calibrate Gascope once prior to initial site measurement or once per month.

1. Gather equipment in calibration kit:

    - Calibration gas cylinder
    - Flow control valve
    - Calibration hose

2. Disconnect sample hose and extension probe from meter.

3. Be sure meter and aspirator bulb are in good working condition. (See Maintenance section of *Gascope Instruction Manual* for details.)

4. Turn meter on (red light will go on). Set both scales to zero.

5. Set RANGE switch to LEL position.

6. Attach flow control valve to calibration gas cylinder.

7. Connect calibration hose to flow control, and then to inlet fitting on meter.

8. Open flow control valve.

9. Take meter reading when needle stops moving.

10. Record reading on Instrument Calibration Record on Field Information Log.

11. Note that meter is correctly calibrated when it reads between 38% - 42% LEL. (If meter won't calibrate, try changing filaments. If this doesn't solve the problem, the meter may need factory service. See the Troubleshooting Guidelines in *Gascope Instruction Manual*).

If you're using 2.5% calibration gas, meter is correctly calibrated when it reads between 48 - 52%.

12. Disconnect calibration hose from meter.

13. Close flow control valve.

14. Remove calibration hose from flow control.

15. Remove flow control valve from calibration gas cylinder.

16. Pump bulb a few times to bring in fresh air and clear meter.

17. Turn meter off. Reconnect the sample hose and extension probe.

MONITORING OPERATION PROCEDURES

1. Take calibrated meter to monitoring well.

2. Turn meter on and wait for "ready" light (about 4 seconds).

3. Clear meter by holding probe in fresh air and pumping the bulb eight (8) to ten (10) times.

4. Set both scales to zero.

5. Switch RANGE to "GAS".

6. Remove cap from outer casing of probe. Remove cap from monitoring probe. Immediately place extension probe into the monitoring well. Do not leave cap off for more than a few seconds before monitoring.

7. Pump the bulb 5 to 7 times.

8. Watch the indicator needle, and take a reading where the needle peaks. This reading is the percentage of gas. Record it on the Field Information Log.

If percentage of gas is *over 5%*, methane exceeds LEL limits. 1) Leave well head area immediately. 2) Notify District Compliance Manager. 3) Wait approximately ten (10) minutes for well to "vent" and repeat monitoring operation procedures steps 1 - 8. If percentage of gas is *less than 5%*, go to step 9.

9. Switch RANGE to "LEL".

10. Pump bulb another three (3) to five (5) times.

11. Watch indicator needle and take a reading where needle peaks.

12. Record the LEL on the Data Sheet on the Field Information Log

0 - 10% LEL Continue
10 - 25% LEL Continue with Caution
> 25% LEL Leave area immediately wait 5 minutes and repeat

13. Remove extension probe from monitoring well.

14. Clear the meter by pumping fresh air eight (8) to ten (10) times through LEL and chamber, and then eight (8) to ten (10) times through percent gas chamber.

MAINTAINING THE GASCOPE 62S

The Gascope needs three (3) kinds of regular maintenance - cleaning, leach checks and flow rate checks.

Cleaning

- Clean case and meter face with a soft cloth dampened with water.

Never purge meter using compressed air.
It may contain oil or water that can damage internal parts.

Leak Checks

- Check for leaks in sampling system
    - Seal inlet fitting with a finger of left hand
    - Squeeze bulb
    - Immediately seal bulb outlet with finger of right hand

  - System is free of leaks if bulb stays deflated
  - Continue checking for leaks if bulb inflates

- Check filament seals

  - Open case and tighten both filaments
  - Repeat the leak test described above
  - Continue checking for leaks if bulb still inflates

- Check bulb

  - Seal inlet fitting with one finger
  - Squeeze bulb
  - Replace the bulb if it inflates in less than 6 minutes

Flow Rate Checks

- Test flow rate after checking for leaks. Proper flow rate is 0.03 - 0.05 cubic feet per hour, or 0.8 - 1.4 liters per minute.

- Squeeze bulb. It should inflate completely in 1 - 2 seconds.

- Replace cotton filter if bulb doesn't inflate within 2 seconds. Use tweezers to remove inlet fitting gasket and filter.

- Disconnect bulb tubing from outlet fitting.

- Remove flow regulating orifice from fitting and make sure it's open.

- Insert No. 23 gauge wire into opening if orifice is clogged.

- Replace bulb and squeeze. If bulb doesn't inflate within 2 seconds, replace flashback arresters. (See *Gascope Instruction Manual* for directions). Gascope may need factory repair if bulb still doesn't inflate after you've replaced flashback arresters.

pH METER CALIBRATION / OPERATION PROCEDURES

(reference EPA Method 9040)

The field pH meter will calibrated each day water samples are collected. Calibration results will be recorded on the Field Information Log.

pH CALIBRATION

Two-Buffer Calibration

This procedure is recommended for precise measurements.

1. Select two buffers which bracket the expected sample pH. The first should be near the electrode isopotential point (pH 7) and the second near the expected sample pH (e.g. pH 4 or pH 10).

2. Rinse electrode first with distilled water and then with pH 7 buffer. Place the electrode in pH 7 buffer.

3. Wait for stable display. Set the meter to the pH value of the buffer at its measured temperature. (ATC @ 25°C = 7.00)

4. Rinse electrode first with distilled water and then with the second buffer. Place the electrode in the second buffer.

5. When the display is table, set the meter to the actual pH value of the buffer as described in the meter instruction manual.

6. If all steps are performed correctly, and the slope is between 92 and 102%, proceed to **pH Measurement**.

For detailed calibration and temperature compensation procedures, consult meter instruction manual.

pH MEASUREMENT

1. Obtain a neat sample from collection device and place electrode directly into sample.

2. Allow reading to stabilize.

3. Record pH reading directly from meter and record on the Field Information Log.

4. Probes are to be decontaminated by multiple rinses with distilled water.

If any of the above procedures does not work, refer to **Troubleshooting** section of instrument instruction manual.

Measuring Hints

1. Always use fresh buffers for calibration. Choose buffers that are no more than 3 pH units apart.

2. Check electrode slope daily by performing a two-buffer calibration. Slope should be 92 to 102%.

3. Between measurements, rinse electrodes with distilled water and then with the next solution to be measured.

4. Stir all buffers and samples.

5. Avoid rubbing or wiping electrode bulb, to reduce chance of error due to polarization.

Interferences

Oil samples and salty samples may leave residues on the electrodes. The probe has to be rinsed thoroughly between all measurements using distilled water to remove salt residues. If oily residues need to be removed, rinse with acetone the distilled water. The electrodes need to be kept wet to ensure proper response.

CONDUCTIVITY / TEMPERATURE METER CALIBRATION / OPERATION PROCEDURES

(reference EPA Method 9050)

CALIBRATION PROCEDURES

Conductivity meters are factory calibrated. Most field models cannot be manually calibrated. Conductivity will be checked using commercial traceable standards in the 1000 and 10,000 µmhos/cm range and recorded on the Field Information Log. Calibration checks outside of a ± 10% range are not acceptable. Replace probe and re-check standards. If calibration check standards are still outside ± 10% range, use alternate meter. Do not proceed with sample collection without acceptable calibration checks.

Temperature measurement is also factory calibrated. Temperature will be checked for calibration by comparison prior to sample event with a laboratory thermometer and respond in a ± 10% range.

TEMPERATURE MEASUREMENT

1. Immerse the Conductivity Cell into the sample.

2. Turn Conductivity/Temperature Selector Knob (lower knob, front panel) to temperature readout (labeled "°C") mode.

3. Record temperature reading directly from meter and record on the Field Information Log.

CONDUCTIVITY MEASUREMENT

The unit of measure is selected using the Conductivity Range Selector Knob (top knob, front panel) either mS/cm (mmhos/cm) or µS/cm (µmhos/cm). Report all values on the Field Information Log in µmhos/cm (µS/cm).

1. Select Conductivity measurement by turning meter Conductivity/Temperature Selector Knob from OFF to Conductivity (labeled "_").

2. Immerse the conductivity cell into the sample.

3. Use the Conductivity Range Selector Knob (top knob, meter front panel) to select the optimum conductivity range for the sample. **Overflow indication ("1") is displayed if range selected is too low.**

4. Record conductivity reading directly from meter and record on the Field Information Log.

5. Probes are to be decontaminated by multiple rinses with distilled water.

Most meters have a fixed temperature coefficient (TC) of 2.1% per °C and a fixed reference temperature of 25°C. These parameters are sufficient for the majority of "natural water" samples.

TURBIDITY METER CALIBRATION / OPERATION PROCEDURES

(reference Standard Methods 180.1)

Turbidity is the physical measurement of light scattered and absorbed verses transmitted through a sample. Turbidity is an indicator of water clarity (the amount of suspended matter found in a sample). Using a nephelometer, the results are expressed a NTU (nephelometer turbidity units).

TURBIDITY MEASUREMENT

1. Collect a representative sample in a clean container. Fill a clean sample cell to the top line, taking care to handle the sample cell by the top only. Cap the cell.

2. Wipe the cell with a soft, lint free cloth to remove water spots and fingerprints.

3. Make sure the instrument is on a flat, steady surface and turn the power on. Select measurement range and turn signal averaging on or off.

4. Place the sample cell in the instrument cell compartment.

5. Press read button.

6. Record turbidity value after lamp icon turns off.

TURBIDITY CALIBRATION

The Hach 2100P Portable Turbidimeter is calibrated with Formazin Primary Standard at the factory. The recommended recalibration time is once every three (3) months with purchased or prepared Formazin Standard.

Routine Calibration Check with Gelex Standards

The 2100P Turbidimeter does not require standardization before every measurement as some turbidimeters do. Periodically, as experience dictates, check the instrument calibration using the appropriate Gelex Secondary Standard. Be sure the Gelex standards are aligned correctly when inserting them (diamond aligns with orientation mark). If the reading is not within 5% of the previously established value, the instrument should be recalibrated with Formazin Primary Standard (see below).

Quarterly Calibration Procedure

1. Rinse a clean sample cell with dilution (deionized) water and fill to the mark with dilution water.

2. Place cell into cell compartment, align orientation marks, close lid and press I/O.

3. Press CAL, the "SO" icons appear and the "O" will flash. Press READ, the instrument will read the blank and calculate a correction factor. If the dilution water is less than or equal to 0.5 NTU, E 1 will appear when the calibration is calculated.

4. The "S1" display will show the value of the first turbidity standard. Using a clean sample cell, fill with the well mixed portion of 20 NTU standard. Insert the align the sample cell in the cell compartment, close the lid and press READ. When finished, the instrument will automatically move to the next standard.

5. Follow the instructions listed above for a 100 NTU and a 800 NTU standard.

6. Press CAL to accept the calibration, the instrument will return to measurement mode.

7. THIS PROCEDURE IS TO BE PERFORMED IN THE LABORATORY EVERY THREE (3) MONTHS, OR AS NEEDED (if not within ± 5% gelex standard checks).

MAINTENANCE

Keep the turbidimeter and accessories as clean as possible and store the instrument in the carrying case when not in use. Avoid prolonged exposure to sunlight and ultraviolet light. Wipe spills up promptly. Wash sample cells with non-abrasive laboratory detergent, rinse with distilled or demineralized water, and air dry. Avoid scratching the cells and wipe all moisture and fingerprints off the cells before inserting them into the instrument. Failure to do so can give inaccurate readings.

DISSOLVED OXYGEN METER

New dissolved oxygen meters are water-resistant, microprocessor- based and calculate Dissolved Oxygen by means of automatic calibration and temperature compensation (ATC). DO measurements can be displayed in parts per million (ppm=mg/l) or in % of saturation. The temperature range typically is indicated in Celsius or Fahrenheit with 0.1 degree resolution. These meters can also allow manual compensation of altitude and salinity values.

OXIDATION-REDUCTION POTENTIAL METER

New ORP meters, like the dissolved oxygen meters, have automatic self-calibration capability for ease of use in the field.

BASIC WATER LEVEL INDICATOR PROCEDURES

The following outlines standard procedure for taking monitor well water levels:

1. Unlock and remove the monitor well protective casing cap. Note and document any problems with the locking cap or lock itself.

2. Put on a pair of clean new disposable gloves and remove the PVC well cap or well seal access port from the top of the PVC riser. Store the PVC well cap or access port in a clean location.

3. Check the on/off button and sensitivity switch with the test button located on the side of the water indicator. A audible beep and light indicate that the device is working properly. The sensitivity switch should be turned to the highest setting and then lowered if required due to highly conductive water (e.g. if the sensitivity is too high the water indicator buzzer will fail to turn off when removed from water column. On the other hand, if the sensitivity is too low the indicator will not detect the water column in a water with low conductivity).

4. Slowly lower the indicator probe into the well until the audible beep/light indicates the probe has contacted the water column. Carefully work the probe up and down to find the exact spot the probe senses the water level.

5. Read the tape measure numbers on the indicator line at the top of the PVC casing. These numbers are in 1/100 of a foot increments. Record the measurement to the closest 1/100 of a foot. This number reflects the distance from the top of the PVC casing down to the water column. A

permanent point is notched in the PVC casing or etched on the permanent well head seal so that the same surveyed reference point is always used. To convert this number to water level relative to Mean Sea Level, subtract the measurement from the surveyed elevation of the monitor well riser reference point.

6. As the probe and line are pulled from the well, the line should be wiped with a fresh distilled/deionized saturated paper towel. The probe should then be washed with the non-phosphate detergent and rinsed with triple distilled/deionized rinse.

GROUNDWATER SAMPLE FIELD FILTRATION PROCEDURES

The following outlines standard procedures for filtration of groundwater monitor well samples:

Equipment:

1. Filter Chamber Pressure Vessel
2. Air Pressure Source (Hand Air Pump)
3. Disposable .45 Micron Filters (High or Low Capacity) Cartridge Type
4. Laboratory Grade Detergent
5. Organic-Free Water

Decontamination:

As stated in Section 2.2.4, the filter chamber will be disassembled and decontaminated by hand washing in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free water prior to site arrival. This will be the same procedure used between each respective monitor well sample collection and filtration.

Procedure:

1. Slowly pour sample water into the clean filter chamber device and screw on lid assembly.

2. Tightly screw in disposable filter cartridge making sure flow direction arrow points away from the filter chamber.

3. Pump air source until low flow rate is initiated from the filter chamber discharge and periodically add pressure to vessel to maintain this flow.

4. Precondition filter(1) and fill appropriate sample containers.

5. Dispose of filter cartridge and decontaminate filter chamber as outlined above.

(1) Filter Preconditioning

The process of preparing a filter medium for filtration follows. A new, unused filter medium is rinsed with a defined volume of medium-specific solvent (e.g. water, acid, etc.) prior to use to remove potential residuals resulting from filter manufacture, packaging and handling. Such residuals, if not removed, may bias sample integrity as a result of filtration. Filter preconditioning also creates a uniform wetting front across the filter surface to prevent channel flow through the filter and increase filter efficiency.

APPENDIX C

Copy of PSCAA Air Permit

Puget Sound Clean Air Agency

Notice of Construction No. 8819

Registration No. 21413

Date MAY 0 8 2003

HEREBY ISSUES AN ORDER OF APPROVAL TO CONSTRUCT, INSTALL, OR ESTABLISH

Soil & groundwater remediation using a Dual-Phase Vacuum Extraction (DPVE) with all the emissions of the DPVE routed through a thermal oxidizer.

APPLICANT	OWNER
Gary Clark **Conoco Phillips Company** **2423 Lind Ave SW** **Renton, WA 98055**	**Conoco Phillips Company** **2423 Lind Ave SW** **Renton, WA 98055**

INSTALLATION ADDRESS

Conoco Phillips Company, 2423 Lind Ave SW, Renton, WA, 98055

THIS ORDER IS ISSUED SUBJECT TO THE FOLLOWING RESTRICTIONS AND CONDITIONS

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Clean Air Agency to the applicant to install or establish the equipment, device or process described hereon at the INSTALLATION ADDRESS in accordance with the plans and specifications on file in the Engineering Division of the Puget Sound Clean Air Agency.

2. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.

3. ConocoPhillips Petroleum (Conoco) shall route all emissions from the Dual-Phase Vacuum Extraction (DPVE) system through the thermal oxidizer. The flow rate of the vapor entering the oxidizer shall not exceed 300 cfm. Conoco shall record the actual flow rate monthly.

4. Conoco shall not operate the DPVE system unless the temperature measured at the outlet of the oxidizer is at least 1,200 degrees F. Conoco shall measure the outlet temperature with a gauge that has an accuracy of +/- 50 degrees F. Conoco shall install and maintain the temperature gauge according to manufacturer's specifications. Conoco shall record the outlet temperature monthly.

5. Conoco shall monitor monthly the concentration of TPH (g) entering and leaving the oxidizer by collecting samples and performing lab analysis. The concentration of TPH (g) in the vapor entering the oxidizer shall not exceed 6,000 ppmv. Conoco shall estimate the Destructive and Removal Efficiency (DRE) of the oxidizer with the pollutant flow entering and leaving the oxidizer. The DRE shall be at least 99% unless the concentration of TPH (g) in the vapor leaving the oxidizer does not exceed 50 ppmv. If the concentration of TPH (g) in the vapor leaving the oxidizer does not exceed 50 ppmv, Conoco shall record the actual value. Conoco shall keep records of the flow rates and pollutant concentrations used to estimate the DRE.

6. Conoco may replace the oxidizer with two carbon drums in series. If Conoco replaces the oxidizer with the two-stage carbon drums, the concentration of TPH(g) in the vapor leaving the first carbon drum shall not exceed 50 ppmv and the flow rate through the carbon drums shall not exceed 300 cfm. Conoco shall record the actual flow rate and concentration monthly.

MAY 08 2003

7. If the concentration of TPH (g) in the vapor entering the oxidizer or two-stage carbon drums is less than 50 ppmv for three consecutive months, Conoco may remove the oxidizer or two-stage carbon drums provided Conoco continues to monitor monthly the concentration of TPH (g) in the vapor entering the stack. If one monitoring result indicates that the concentration of TPH(g) in the vapor entering the stack exceeds 50 ppmv, Conoco shall re-install the oxidizer, two-stage carbon drums or other controls that reduce the exit concentration to below 50 ppmv TPH(g). The flow rate entering the stack shall not exceed 300 cfm. Conoco shall record the actual concentration and flow rate monthly.

8. Conoco shall make records of the monthly monitoring available to Puget Sound Clean Air Agency on request. The records shall include the calibration records of the gauges used to measure the flow rates and the laboratory analysis of the samples.

9. The duration of the project shall not exceed four years from the date of this order.

APPEAL RIGHTS

Pursuant to Puget Sound Clean Air Agency's Regulation I, Section 3.17 and RCW 43.21B.310, this Order may be appealed to the Pollution Control Hearings Board (PCHB). To appeal to the PCHB, a written notice of appeal must be filed with the PCHB and a copy served upon Puget Sound Clean Air Agency within 30 days of the date the applicant receives this Order.

Kwame Agyei
Reviewing Engineer
ns

Steven Van Slyke
Supervising Engineer

7/1

Tim,

Please sign and date this form, make a copy for your records & send it back to me. I can submit it ~~to~~ PSCAA. This has been at the terminal for some time because PSCAA had the wrong applicant and owner. Let me know if you have questions.

Thanks

Martin

ConocoPhillips

Date: 7/3/03

To: Martin Powers

Martin -

Here's the signed NOC. Please make sure the monthly monitoring, sampling, and analytical requirements from PSCAA are well documented.

Thanks

Tim

Notice of Completion

WARNING:

Regulation I, Section 6.09, requires that the owner or applicant notify the Agency of the completion of the work covered by the application and when its operation will begin. This form is provided for your convenience to assist you in complying with this part of the Regulation.

APPLICANT or OWNER SECTION

Mail to:

Puget Sound Clean Air Agency
Plan Review Section
110 Union Street, Suite 500
Seattle, Washington 98101-2038

Gentlemen:

The project described below was completed on February 12, 2003.

Signature of Owner and/or Applicant

Title: Site Manager

Phone: (206) 706-2341

Date: 7/3/03

FOR AGENCY USE ONLY

Notice of Construction No. 8819
Registration No. 21413

Project Description

Soil & groundwater remediation using a Dual-Phase Vacuum Extraction (DPVE) with all the emissions of the DPVE routed through a thermal oxidizer.

☒ Conditions on Reverse Side

Applicant

~~**Gary Clark**~~ Tim Johnson
Conoco Phillips Company
~~**2423 Lind Ave SW**~~ 3977 Leary Way NW
~~**Renton, WA, 98055**~~ Seattle, WA 98107

Owner

Same
~~**Conoco Phillips Company**~~
~~**2423 Lind Ave SW**~~
~~**Renton, WA, 98055**~~

Location

Conoco Phillips Company, 2423 Lind Ave SW, Renton, WA, 98055

☐ Inspector Check ☐ Engineer KA and Inspector check.

Follow up ______ (Estimated completion date plus 7)

Date Inspected ______ Inspector ______

Remarks System was initiated on February 12, 2003 prior to approval of Notice of Construction as directed by Department of Ecology.

CONDITIONS

Form 63-11.1, (5/98)

3. ConocoPhillips Petroleum (Conoco) shall route all emissions from the Dual-Phase Vacuum Extraction (DPVE) system through the thermal oxidizer. The flow rate of the vapor entering the oxidizer shall not exceed 300 cfm. Conoco shall record the actual flow rate monthly.

4. Conoco shall not operate the DPVE system unless the temperature measured at the outlet of the oxidizer is at least 1, 200 degrees F. Conoco shall measure the outlet temperature with a gauge that has an accuracy of +/- 50 degrees F. Conoco shall install and maintain the temperature gauge according to manufacturer's specifications. Conoco shall record the outlet temperature monthly.

5. Conoco shall monitor monthly the concentration of TPH (g) entering and leaving the oxidizer by collecting samples and performing lab analysis. The concentration of TPH (g) in the vapor entering the oxidizer shall not exceed 6,000 ppmv. Conoco shall estimate the Destructive and Removal Efficiency (DRE) of the oxidizer with the pollutant flow entering and leaving the oxidizer. The DRE shall be at least 99% unless the concentration of TPH (g) in the vapor leaving the oxidizer does not exceed 50 ppmv. If the concentration of TPH (g) in the vapor leaving the oxidizer does not exceed 50 ppmv, Conoco shall record the actual value. Conoco shall keep records of the flow rates and pollutant concentrations used to estimate the DRE.

6. Conoco may replace the oxidizer with two carbon drums in series. If Conoco replaces the oxidizer with the two-stage carbon drums, the concentration of TPH(g) in the vapor leaving the first carbon drum shall not exceed 50 ppmv and the flow rate through the carbon drums shall not exceed 300 cfm. Conoco shall record the actual flow rate and concentration monthly.

7. If the concentration of TPH (g) in the vapor entering the oxidizer or two-stage carbon drums is less than 50 ppmv for three consecutive months, Conoco may remove the oxidizer or two-stage carbon drums provided Conoco continues to monitor monthly the concentration of TPH (g) in the vapor entering the stack. If one monitoring result indicates that the concentration of TPH(g) in the vapor entering the stack exceeds 50 ppmv, Conoco shall re-install the oxidizer, two-stage carbon drums or other controls that reduce the exit concentration to below 50 ppmv TPH(g). The flow rate entering the stack shall not exceed 300 cfm. Conoco shall record the actual concentration and flow rate monthly.

8. Conoco shall make records of the monthly monitoring available to Puget Sound Clean Air Agency on request. The records shall include the calibration records of the gauges used to measure the flow rates and the laboratory analysis of the samples.

9. The duration of the project shall not exceed four years from the date of this order.

Puget Sound Clean Air Agency
Notice of Construction Worksheet

NOC Number: **9648**	Reg. No. **21413**	Source Name: **ConocoPhillips**
Received Fee: **6/15/07**	Due Date: **6/16/07**	Source Location **2423 Lind Ave SW, Renton WA 98005**
Engineer **K. Agyei**	Inspector **M. McAfee**	Compliance Issues: **Yes** ○ **No** ○

A. Project Description

Modification
Soil and groundwater remediation using a Dual-Phase Vacuum Extraction (DPVE) and an Air Stripper (AS) batch system with all air emissions of the DPVE and AS routed through a two-stage carbon adsorber before venting to the atmosphere.

B. Fee and Source Information

Paid $750 6/15/07

Source and Owner:	ConocoPhillips Company
Location:	2423 Lind Avenue SW, Renton, WA 98055
Source Contact:	Tim Johnson, ConocoPhillips Company
Source Contact Address:	3977 Leary Way NW, Seattle, WA 98107
Applicant & Consultant:	Matthew Davis, Project Geologist
Consultant Address:	SECOR; 12034 134th Ct NE, Redmond, WA 98052
Consultant Phone:	425 636 6202 (direct); 425 306 0741 (cell)
Consultant Email:	mdavis@secor.com

C. SEPA Review

If Puget Sound Clean Air Agency is the Lead Agency, who was contacted at the City/County? I did not contact anybody at the City of Renton.

Comments:

This is a modification that essentially asks for the extension of the life of Order of Approval 8819. Order of Approval 8819 expires on July 8, 2007 and allows the option of routing the air emissions through an oxidizer or an adsorber. The operators think they no longer need the oxidizer and also want the option of operating the remediation till concentrations of pollutants in the influents get to negligible levels.

I did not contact the City of Renton because the impact of the modified project is even less than the previous NOC 8819 which they had no concerns about. The loading for NOC 8819 was 800 scfm and 30 ppmv. The expected loading for the modified project is about 310 scfm and 36 ppmv.

D. Database Information (Required)

BE Code	460 1098	Code Description	Air Stripper Vapor Extraction System

Year installed	Units installed	Rated capacity	Units of measure
2003	1 of each	800	scfm
Comments (Make, model, etc.)		Two 2000-lb vessels in series	

CE Code	552 48	Code Description	Carbon Adsorber Activated Carbon Adsorbers

Year installed	2003	Units installed	1	Rated capacity, CFM	400

E. Emission Estimate

1. *ACTUAL emissions (@ 400 scfm and 36 ppmv TPH loading)*

Description	Benzene	TPH	Comments
Flow Rate (scfm), A	400	400	Assumed, applicant gave 310
Flow Rate (m3 / min), B	11.3	11.3	B = 0.02832 * A
Influent ppmv, C	1	36	Applicant monitoring data
Influent mg / m3, D	3.2	162	Conversion with NIOSH Guide factors
Influent mg / min, E	36	1835	E = B * D
Influent grams / hour, F	2.2	110	F = (60 * E) / 1000
Influent kilograms / day, G	0.1	2.6	G = (24 * F) / 1000
Influent kilograms / year, H	19	965	H = 365 * G

Effluent kilograms / year, J	2	97	J = 0.1 * H
Effluent pounds / year, K	4	213	K = 2.205 * J

a. 4 lb Benzene emitted per year

b. 213 lb TPH emitted per year

2. *POTENTIAL to emit (@ 400 scfm, 25 ppmv TPH, 0.5 ppmv Benzene)*

Description	Benzene	TPH	Comments
Flow Rate (scfm), A	400	400	Permit Condition
Flow Rate (m3 / min), B	11.3	11.3	B = 0.02832 * A
Effluent ppmv, C	0.5	30	Permit Condition
Effluent mg / m3, D	1.6	135	Conversion with NIOSH Guide factors
Effluent mg / min, E	18	11529	E = B * D
Effluent grams / hour, F	1.1	92	F = (60 * E) / 1000
Effluent kilograms / day, G	0.0	2.2	G = (24 * F) / 1000
Effluent kilograms / year, H	9.5	804	H = 365 * G
Effluent kilograms / life, J	26	2202	J = H / (1 - r); r = 0.999; GP series
Effluent pounds / year, K	21	1772	K = 2.205 * H
Effluent pounds / life. L	57	4856	L = 2.205 * J

a. 21 lb Benzene emitted per year

b. 1,477 lb TPH emitted per year

3. *Facility wide Emissions*

A.) REPORTING SOURCE: NO

B.) SYNTHETIC MINOR: NO

C.) OPERATING PERMIT: NO

F. Applicable Regulations

1. *PUGET SOUND CLEAN AIR AGENCY*

Regulation I, Section 6.03(c)(94): Soil and Groundwater Remediation Projects

2. *State*

WAC 173-460 080 (e): Small Quantity Emission Rates (SQER)

G. Technology Review BACT, RACT, LAER

1. *GENERIC BACT YES, Two 2000-lb carbon drums in series*

H. Ambient Impact Analysis

1. Project expected to emit 4 lb Benzene a year. SQER for Benzene is 20 lb per year

   When controls are removed, the emissions levels could rise to the SQER limit if concentrations do not decay and stay at the permitted levels.

2. Project expected to emit 213 lb TPH a year. The toxic components of TPH besides Benzene are Toluene, Ethyl Benzene, Xylene. The SQER for each of the toxic components of TPH are 43,500 lb a year.

   When controls are removed, the emission levels could rise to 4,856 lb/yr. This is still below the SQER limit for Toluene, Ethyl Benzene, and Xylene.

I. Public Notice Requirement

Not Required. The emission levels are far below SQER levels and do not raise concerns

J. Operating Permit or PSD

Not Applicable

K. Recommended Approval Conditions

3. ConocoPhillips shall route all air emissions from the soil vapor extraction system through the 2-stage carbon adsorber (Adsorber) before venting to the atmosphere. The air flow rate entering the Adsorber shall not exceed 400 scfm. ConocoPhillips shall record the actual flow rate monthly.

4. ConocoPhillips shall monitor the concentration of Total Petroleum Hydrocarbon (TPH) and Benzene in the vapor entering and leaving the first carbon drum in the Adsorber monthly by collecting samples and performing lab analysis. The concentration of TPH in the vapor leaving the first carbon drum in the Adsorber shall not exceed 30 ppmv. The concentration of Benzene in the vapor leaving the first carbon drum in the Adsorber shall not exceed 0.5 ppmv. ConocoPhillips shall keep records of the monitoring.

5. ConocoPhillips may remove the Adsorber and vent directly into the atmosphere if the concentration of TPH in the vapor entering the first carbon drum in the Adsorber stays

below 25 ppmv for three consecutive monitoring AND the concentration of Benzene in the vapor entering the first carbon drum in the Adsorber stays below 0.5 ppmv for three consecutive months, provided ConocoPhillips continues to monitor the concentrations of TPH and Benzene in the vapor entering the stack. If one monitoring indicates the concentration of TPH in the vapor entering the stack exceeds 30 ppmv OR the concentration of Benzene in the vapor entering the stack exceed 0.5 ppmv, ConocoPhillips shall re-install the Adsorber. The flow rate entering the stack shall not exceed 400 scfm.

6. ConocoPhillips shall notify the Puget Sound Clean Air Agency at least seven days before they remove the controls and vent uncontrolled. The notice shall be in writing and include the most recent three months monitoring.

7. ConocoPhillips shall make the records of the monthly monitoring available to the personnel of the Puget Sound Clean Air Agency on request. The records shall include the flow rate and laboratory analysis of the samples.

8. ConocoPhillips shall notify the Puget Sound Clean Air Agency within seven days after the project is completed.

L. Recommendation for Legal Review

No

M. Other Comments

None

Has the source seen this:	**Matt Davis**	Date:	
Done By:	**Kwame Agyei**	Date:	**6/22/07**
Inspector Review:	**Melissa McAfee**	Date:	
Reviewed by: Supervising Engineer		Date:	

APPENDIX D

Dual-Phase Extraction (DPE) System Operation and Maintenance (O&M) and Sampling Plan

1.0 PURPOSE & APPLICABILITY

Remediation sites in the ConocoPhillips Operation and Maintenance (O&M) program require routine O&M to maintain consistent runtime and records. These procedures apply to Dual Phase Extraction systems on a weekly, biweekly, or monthly basis. The schedule is dependent on permit requirements, reporting requirements, or can be stipulated by ConocoPhillips. The procedures listed below were developed so all systems in the ConocoPhillips program have consistency in Dual Phase Extraction O&M. The procedures will include the proper method to collect system operation field data and how to perform routine maintenance. Since the size and type of equipment varies from site to site, site-specific O&M manuals should be referenced for specific readings to be collected and for equipment maintenance frequencies.

2.0 DEFINITIONS

CAP – Corrective Action Plan
COC – Chain of Custody
CPR - Cardiopulmonary resuscitation
DO – Dissolved Oxygen
DTW – Depth to Water
EC – Electrical Conductivity
HASP – Health and Safety Plan
HAZWOPER – Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120)
JSA – Job Safety Analysis
ORP – Oxygen Reduction Potential
PPE – Personal Protective Equipment
RAP – Remedial Action Plan
Site Manager – Person in charge of site, either project engineer or project manager.
SOP – Standard Operation Procedures
Technician - Person in charge of performing work on site
TOC – Top of casing

3.0 HEALTH AND SAFETY CONSIDERATIONS

Prior to departing and on arrival to the site the technician should review the site specific HASP, including the relative JSA forms. Unless specifically stated in the O&M manual, level D protection with the addition of a hard hat is required to be worn at all times during O&M field activities. A respirator may be required depending on air quality readings or work request. When performing work outside of the treatment building or compound the technician should set up an exclusion zone around the work area to protect the technician from traffic hazards. When inside the treatment building or compound, the technician should have a full understanding of all equipment in the treatment building or compound, the dangers associated with each piece of equipment, and proper shutdown procedures in case of emergency.

Level D protection consists of:
- Coveralls
- Boots, chemical resistant, steel toe
- Safety glasses or safety goggles
- Gloves, leather or chemical resistant.
- (Leather gloves when dealing with pinch points and latex or nitrite when there is the possibility of contact with fluid other than clean water)

Additional to level D:
- Hard Hat
- Respirator with appropriate cartridges (If required by work request or by FID or PID readings inside of treatment building or compound/exclusion zone.)

4.0 QUALITY ASSURANCE PLANNING CONSIDERATIONS

Prior to scheduling a technician to perform work the Site Manager will develop and/or review the work request to ensure that the proper data will be collected to meet reporting and permit requirements. In addition, the work request should include O&M tasks. O&M tasks may be summarized in a site-specific O&M checklist. Prior to departing for the site the technician will review the work request and/or O&M checklist and determine the operational and analytical data requirements for each sample point and ensure the required equipment and sample containers are available. The technician will also refer to the work request and recent field notes to ensure any replacement parts needed for repair of the system are available. The technician should check all field and safety equipment prior to traveling to any site to verify all equipment is functioning properly. If any equipment is malfunctioning, the technician shall contact the site manager to determine the course of action.

5.0 RESPONSIBILITIES

Site Manager – Responsible for reviewing CAP, RAP, permits, ensuring staff has an understanding of the requirements of the site-specific HASP, and communicating with ConocoPhillips to determine sampling schedule and locations along with O&M schedule. The Site Manager will also be responsible for preparation of the work request, completion of the COC, review of site plan, and verification that all samples and site visits have been collected within the required time period.

Technician – Responsible for reviewing the work request and determining what points will be sampled, what analysis is needed for each sample point, reviewing the schedule to ensure that all samples are taken on time, and scheduling O&M visits. They are expected to obtain the required equipment, sample containers, and replacement parts needed prior to arriving at the site. The technician is responsible for implementing the site-specific HASP. The technician will also be responsible for collecting representative samples and performing O&M in accordance with the approved site-specific HASP including, but not limited to: wearing the proper PPE, use of SOP for performance of work tasks, taking all required field readings, and delivering samples to the laboratory within the required holding time.

6.0 TRAINING/QUALIFICATIONS

Any person performing work on ConocoPhillips property is required to have current CPR and HAZWOPER certifications. The technician will have a complete understanding of all equipment located in the treatment building or compound, well heads, and any equipment to be used to perform the O&M activities. No new employee will be allowed to work with equipment until a competent employee familiar with the equipment has instructed and observed the new employee operating the equipment and performing an emergency shut down. A log shall be kept recording employees status with certified training for CPR, HAZWOPER, drug screening, and any site-specific training required (e.g. confined spaces, lock out/tag out).

7.0 REQUIRED MATERIALS

Operation and Maintenance
- Work Request including field data sheets and/or O&M checklists
- Traffic cones/materials for exclusive zone setup

Level D protection with addition of hard hat
Respirator (with appropriate cartridges)
Latex or Nitrile gloves
Leather gloves
Well lid opening and lifting tools
Keys for well locks/treatment system building
Voltmeter
Pen
Tools

If O&M includes Monitoring and Sampling:
pH meter with buffers for calibration
EC or specific conductance meter with calibration fluid
DO meter with clean water for calibration
FID or PID with removable carbon tip
ORP meter
DTW gauge
Oil/water interface probe
Temperature gauge
Tedlar bag containers and/or Summa™ canisters
Sample containers
Labels containing non-petroleum based adhesive
Dark container to store air samples (can be a cooler)
Bailers, sample wand, centrifugal pump, peristaltic pump, or a submersible pump
Alconox® solution (or similar low phosphate soap)
Distilled water
Teflon™ or polyethylene tubing
Vacuum box
Monometer or other pressure/vacuum gauge
Barometer
Thermal anemometer or other flow meter (if needed)
Air Pump
Cooler
COC
Ice

8.0 METHOD

The following protocol has been developed to obtain consistent O&M of Dual Phase Extraction systems.

- Planning and Preparation

Review Work Request, Site Plan and Field Data Sheets with Site Manager.

Review Site specific HASP.

Gather all required equipment, supplies and materials.

Check all equipment for proper operation.

Plan route of travel to Site (Trip Hazard Assessment).

- Site Arrival and System Operational Status:(Record all data on Dual Phase Extraction System Field Data Sheet)

  Review site-specific HASP.

  Record arrival time, date, and initials of technician.

  Call into office and check in with site manager.

  Check in with facility manager.

  Call into office and check in with site manager. Verify that analytical is in compliance with permit requirements, shut down system if trigger limits have been reached or breakthrough is detected.

  Inspect surrounding area for any hazards (i.e. fire hazards like accumulating leaves or garbage, fluid leaking from compound, suspicious persons)

  Inspect gate and fence surrounding compound, ensure gate is locked on arrival and inspect for proper function.

  Put on appropriate PPE.

  Setup exclusion zone were needed.

  Inspect treatment building or compound for any hazards.

  Record system status on arrival, ON or OFF. If system is off, follow step 1-4.

    Troubleshoot issue

    Try to restart

    Record why system was down and any repairs made.

    Call site manager if system cannot be restarted.

  Record approximate weather conditions, wind speed, direction, and temperature.

  Record electrical and gas meter reading, hourmeter reading, and barometric pressure.

  Record vacuum/pressure readings for each well and total system where applicable.

  Groundwater section

    Record individual well flows and total system flow where applicable.

Record totalizer reading and determine instantaneous flow, verify compliance with permit.

Record pressures.

- Carbon Vessels, back flush if needed and possible.
- Transfer pump.
- Bag filter, replace as needed.

Soil Vapor section

Record position of dilution valve, where applicable.

Take FID readings at individual wells on manifold, pre-dilution, influent, midpoints, and effluent (refer to Soil Vapor Monitoring and Sampling SOP). Shut down system if breakthrough is verified or if trigger limits are reached.

Record flow rates and percent valves open for each well (refer to Soil Vapor Monitoring and Sampling SOP), ensure that flow rate is in compliance with permit.

Record temperature measurements, if available, at blower and influent vapor temperature prior to entering first carbon vessel.

Record departure time after all work and sampling is performed.

- Equipment Maintenance. **(Follow lockout/tag out procedures to isolate equipment while performing all maintenance activities)**.

Inspect fire extinguisher on a monthly basis and record status in log.

Perform scheduled equipment maintenance in accordance with the site specific O&M Manual.

Check chart recorder paper and change when necessary.

Inspect knockout tank and check level, drain or remove water and sediment as necessary, and determine remaining capacity in drums.

Visually inspect dilution air filter and replace as necessary.

Check integrity of all hoses, fittings, and piping (monthly).

Extraction Blower (monthly) **(follow lockout/tag out procedures to isolate blower while performing all maintenance activities)**:

Check V-belt tension and condition where applicable, adjust or replace as necessary.

Record blower amperage

Grease bearings when needed, according to site-specific equipment manual.

Replace oil when needed, according to site-specific equipment manual.

Process Valve Linkages - clean and oil (monthly).

UV Flame Sensor - remove and inspect, ensure system is off first (monthly).

Check and test all safety override systems (monthly).

- Sampling and monitoring.

Collect vapor samples from influent and effluent vapor streams at pretermined sampling ports as listed on the O&M sampling form (attached). Collect samples in tedlar bags and courier to analytical laboratory the same day for analysis of TPH-G and BTEX using current Ecology-approved methods.

Collect groundwater samples and/or field parameters as required by work request (refer to Groundwater Monitoring and Sampling SOP or Soil Vapor Monitoring and Sampling SOP).

If required by work request, collect depth to water and induced vacuum measurements.

Set up exclusion zone around observation/monitoring well head.

Unbolt or unlock observation/monitoring well lid.

Remove well cap and place on ground bottom up; allow time (10-20 minutes) for wells to equilibrate.

Using an oil/water interface probe or DTW gauge, record depth to water and free-product (if applicable) relative to TOC.

Record induced vacuum if needed using magnehelic gauge or manometer.

Replace well cap, replace lid, and bolt or lock down.

Decontamination procedures.

Arrange a line of six large buckets or tubs and brushes. The buckets should be filled as follows:

- Bucket No. 1 – Alconox® (or similar low phosphate soap) solution.

- Bucket No. 2 – Potable water rinse.
- Bucket No. 3 – Alconox® (or similar low phosphate soap) solution.
- Bucket No. 4 – Potable water rinse.
- Bucket No. 5 – Alconox® (or similar low phosphate soap) solution.
- Bucket No. 6 – Distilled water rinse.

Scrub and rinse all sampling equipment in the sequence listed above. At the last bucket, No. 6, rinse the equipment three times with distilled water.

9.0 QUALITY CONTROL CHECKS AND ACCEPTANCE CRITERIA

The technician and/or site manager will prepare an O&M schedule at the beginning of each month that describes individual site O&M requirements. The technician will try to schedule site visits that require sampling within the first three weeks of each month whenever possible. If the technician is unable to perform all scheduled site visits, the site manager must be notified immediately so that another technician can be scheduled to assist. The technician's schedule should include a site reference number, samples to be collected, required sample containers for each site, and repairs to be made during each visit. The schedule should be given to the site manager during the first week of the month so the site manager can review the schedule and ensure that all site visitation requirements are met. Before the last week of the month, the site manager will review each site and confirm with the technician that the required visits have been made or are scheduled to be performed within the week.

10.0 DOCUMENTATION

Work Request and/or O&M checklist
Site-Specific HASP
Dual Phase Extraction data sheet
Groundwater level data sheet
Groundwater sampling field data sheet
Soil Vapor sampling field data sheet
Groundwater Extraction Monitoring and Sampling SOP
Soil Vapor Extraction Monitoring and Sampling SOP
DO meter calibration and use instructions
pH meter calibration and use instructions
EC meter calibration and use instructions
ORP meter instructions
FID or PID meter calibration and use instructions
COC

Remediation System Operation Log
2423 Lind Ave, Renton WA

SECOR PN: 01CP.03485.45

Date: ____________________ Time: ____________________ Inspected By: ____________________

General Site Status

Motor Control Center checked for switch status and that panels are closed		Hoses Inspected (yes/no):____________________ Comments:____________________	
Flow meters checked for operation and leaks		Tanks inspected for leaks, bio-growth	

SVE System

Operating on Arrival (Yes/No):		Operating on Departure (Yes/No):	

If No, what alarms shut system down:

System Readings	
Hour Meter Reading (hrs)	
Influent Air Temperature	
Total Vacuum Reading (in. H2O)	
Total Flowrate (scfm)	
SVE VOCs (PID)(ppm)	
Air stripper effluent VOCs (PID)(ppm)	
Influent total VOCs (PID)(ppm)	
Effluent total VOCs (PID)(ppm)	
BTWC1, BTWC2	

Quarterly Maintenance Items	
Add/Change oil in SVE blower (yes/no)	
Maintain filter in KO Drum (yes/no)	
Check Float Switch in KO drum	

Wells currently being extracted from

Well	Extracting (air/water)	Vacuum (in H20)	Delivery Pressure	VOCs at well (PID)
RW-2				
RW-3				
RW-7				
LAI-4				
LAI-5				
LAI-6				
LAI-7				
LAI-8				
LAI-9				
HW-1E				
HW-1W				

Water Treatment System

Operating on Arrival (Yes/No):		Operating on Departure (Yes/No):	

If No, what alarms shut system down:

System Readings	
Hour Meter Reading (hrs)	
Alarm Hours (in panel digital display)	
Air stripper vacuum (in H2O)	
Pressure on Carbon vessel (psi)	
Storage tank oil level (water/product)	ft/ ft
Pressure on filter housing (psi)	
Air stripper influent flow meter (gal)	
Air stripper influent flow rate (gal/min)	
Air stripper effluent flow meter (gal)	
Air stripper effluent flow rate (gal/min)	

Monthly Maintenance Items	
Check pressure relief valve operation in air compressor (yes/no)	
Manually drain water in air compressor tank (yes/no)	
Clean Air Stripper (yes/no)	
Change oil in air compressor (yes/no)	
Check settling tank for sludge buildup (yes/no)	
Product in retention pond (yes/no)	
Air compressor selonoid valve operating (y/n)	

Air Samples	SVE INF	AS EFF	Total Inf	Mid 1	Mid 2	Total Eff	PSCAA Discharge Permit No. 9648
Analysis	TPHg, BTEX	TPHg, BTEX	TPHg, BTEX	TPHg, BTEX	TPHg, BTEX	TPHg, BTEX	
Sample Time							
Water Samples	Total Inf	Post AS	Mid	Total Eff			King County Metro Discharge Permit No. 4057-01
Analysis	TPHg&d, BTEX	TPHg&d, BTEX	TPHg, BTEX	TPHg&d, BTEX, PH			
Sample Time							

General Comments (activities conducted changes to system, etc..):