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Confidential Business Information

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*All boring and monitoring well locations were surveyed on March 1, 2005. A new figure will be prepared showing the correct spatial relationship between wells and borings.*

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*the riverbank. Anchor will provide DEQ with a summary of our planned sampling method for your review, prior to attempting to collect the seep samples.*

Please call if you have any questions or additional comments.

Sincerely,

John E. Edwards, R.G., C.E.G.
Anchor Environmental, L.L.C.

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Cc: David Templeton, Anchor
Leslie Schenck; GSBLAW
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ANCHOR ENVIRONMENTAL, L.L.C.

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DEPT OF ENVIRONMENTAL QUALITY
NORTHWEST REGION

May 25, 2005
990056-01

Dana Bayuk, R.G.
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, OR 97201

**Re:** Response to April 20, 2005 DEQ Comments,
Remedial Investigation Workplan (February 2005), Brix Maritime Company
Portland, Oregon, ECSI No. 2364

Dear Dana:

This letter provides Anchor Environmental, LLC's ("Anchor") written response to DEQ's April 20, 2005 comments on the February 2005 Final Remedial Investigation Workplan (Final Workplan) prepared by Anchor on behalf of Brix Maritime (Brix).

The Final Workplan was approved by DEQ in its January 13, 2005 email to Anchor. In that email letter DEQ approved the Workplan and asked Anchor to agree to do some additional work, include that work in the Final Workplan and then issue a Final Workplan. Anchor complied with DEQ's request, and issued the Final Workplan in February 2005. The April 20, 2005 DEQ letter "comments" submitted to Anchor and Brix set forth requests for work scope changes. DEQ's comments are not based upon contingencies previously recognized in the Final Workplan and are, therefore, modifications to the Final Workplan approved by DEQ in January. For clarity's sake, Anchor proposes that any changes that DEQ and Anchor agree to make to the Final Workplan based upon the April 20, 2005 "comments" should be documented as a First Amendment to the Final Workplan dated February 2005.

Anchor and Brix worked diligently with DEQ to finalize the Workplan and must be able to rely upon the finality of DEQ decisions regarding formally submitted documents while understanding that some contingencies will exist. Anchor submitted a Remedial Investigation ("RI")Workplan to DEQ on November 26, 2003 for agency review. The November 2003 submittal was followed by several meetings with DEQ and a site visit by DEQ, at which time the scope of the RI Workplan was discussed. Anchor has communicated with DEQ throughout the process of obtaining Workplan approval. The following sets forth the history of the development of the RI Workplan.

- November 26, 2003: Anchor submits Remedial Investigation Workplan to DEQ

- February 25, 2004: DEQ issues Comment Letter on RI Workplan
- April 22, 2004: site reconnaissance with DEQ
- April 30, 2004: Anchor submits response letter to DEQ's February 2004 comment letter
- May 25, 2004: Anchor meets with DEQ to discuss proposed changes to RI Workplan
- June 24, 2005: Anchor submits electronic redline version of revised RI Workplan to DEQ
- July 26, 2004: DEQ approves RI Workplan with comments
- October 25, 2004: Anchor emails DEQ updated RI Workplan text regarding additional soil borings requested by DEQ
- November 4, 2004: DEQ issues comment letter on updated RI Workplan text and requests additional soil borings and expanded metals testing in soils and groundwater
- December 16, 2004: Anchor responds to DEQ's November 2004 email
- January 11, 2005: Anchor meets telephonically with DEQ to discuss December 2004 scope of work
- January 13, 2005: DEQ approves Anchor's December 2004 scope of work
- February 2005: Anchor agrees to requested changes and submits the Final Workplan to DEQ
- April 20, 2005: DEQ submits "comment" letter regarding Final Workplan

Anchor and Brix are disturbed that following this level of effort, within two months of submitting an approved Final Workplan, DEQ submitted "comments" essentially requiring an amendment to the Final Workplan. Anchor and Brix will undertake in the manner described in this letter most of the additional tasks requested by DEQ in the letter of April 20, 2005 and will submit to DEQ, upon agreement regarding the additional work Anchor will do, a First Amendment to the Final Workplan which will then become the governing document for work at the Site.

In the following sections we have reproduced DEQ's comments from the April 20, 2005 letter. The Anchor response to each DEQ comment is presented in italics.

**Section 3.2.** Consistent with our February 25, 2004 comments letter, and agreements made during a May 25, 2004 meeting, DEQ expects that a survey will be conducted along the facility's waterfront to establish the locations and elevations of 1) groundwater seeps and 2) the contact between the sand unit and the underlying silt unit. This information should be shown on appropriate figure(s) and used when preparing the structural contour map of the top of the silt unit. The survey will also provide a site-specific estimate of the lowest effective shallow groundwater elevation for the site (i.e., when river levels are below the top of silt).

1) *Anchor will attempt to survey the locations of seeps. DEQ should recognize that the observed seeps have not shown free flowing groundwater, but rather are zones of wet soil*

*along the steep riverbank, that become visible during low river level conditions. Some of the wet soil zones exhibit orange discolorations, probably due to iron precipitation. The seeps appear only at low river tide levels, therefore, we expect that the seep water results from drainage of river water that has temporarily infiltrated the riverbank sediments during high tide. We expect, therefore, that the seep discharge likely contains a mixture of perched groundwater and river water.*

2) *The sand fill unit and underlying silt unit are both visible during low river level conditions. Rip rap was placed on the riverbank during site development for erosion protection, so the sand fill is overlain by rip rap. Therefore, the contact of the sand fill and underlying silt is obscured in some areas due to sloughing of the overlaying sand unit and rip rap along the steep slope. Anchor recommends that DEQ visit the Site for a reconnaissance of the riverbank, to assist in understanding the riverbank geologic conditions.*
3) *The survey is further complicated by the steep riverbank slope, slippery silt surface, and loose riprap. Surveying along the steep slope will be completed after Anchor has analyzed the safety issues involved and completed a safety protocol for field staff to follow during the sampling of the seeps .*

**Section 3.3.** Storm water is recognized as a source of contamination to the Willamette River and its sediments. DEQ acknowledges BRIX's ongoing efforts to reduce the potential for site storm water to be a source of impacts to the river. DEQ expects that BRIX will maintain the "best management practices" (BMPs) currently in-place (e.g., use and routine scheduled maintenance and/or replacement of catch basin inserts). DEQ also recommends that BRIX implement the BMPs recommended by the City of Portland, including sweeping paved surfaces to reduce the amount of material entering the catch basins and minimizing outdoor uncovered storage of spare equipment and/or materials. Periodic sweeping of the paved areas could reduce the frequency of maintaining and/or replacing the catch basin filters.

*There is minimal material that comes to rest on the paved surfaces at the Brix facility. Brix will continue to engage in its normal housekeeping practices, which sometimes includes sweeping the paved surfaces at the facility. Brix customarily minimizes outdoor uncovered storage of spare equipment as a component of the normal good housekeeping practices at the facility.*

**Section 3.5.** According to this section and Appendix F of the RI Workplan, PGE owns the two transformers at the BRIX facility having purchased them on January 1, 1979. Additionally, PGE reports that the content of polychlorinated biphenyls (PCBs) in the transformers is unknown. DEQ acknowledges that de-energizing the transformers and

interrupting power would negatively impact the BRIX operation. However, DEQ understood from Anchor's April 30, 2004 letter that if information regarding the PCB content of the transformers was unavailable or could not be determined, then shallow soil sampling would be conducted.

DEQ expects that an approach for collecting and analyzing shallow soil samples around the transformers will be developed and incorporated into the RI Workplan. Lacking information regarding the PCB content of the transformers, this information will be used to confirm whether releases from the transformers have occurred and whether additional work is warranted.

*As described in Anchor's May 12, 2005 PCB Sampling Workplan, soil samples were collected around both pad-mounted transformers. PCBs were not detected in soil around either transformer. Anchor will submit the results of the soil sampling around the transformers with the 2nd Quarter 2005 progress report on or before July 15, 2005.*

**Section 4.1.** Our February 25 letter stipulated that if groundwater seeps (as opposed to petroleum hydrocarbon seeps or sheens) are"...interpreted to be downgradient of the known groundwater plume or contaminant source areas..." representative samples should be collected. Section 3.2 of the RI Workplan indicates that groundwater seeps have been observed downgradient of monitoring well MW-2. Furthermore, polycyclic aromatic hydrocarbons have been detected in groundwater at MW-2. Based on this information, DEQ concludes that the criterion for sampling groundwater seeps has been met and that an approach for collecting and analyzing samples should be developed and included in the RI Workplan.

That said, the RI Workplan suggests it may be infeasible, due to access and safety considerations, to collect samples where groundwater seeps have been observed (i.e., along the northern portion of the facility's waterfront). Although not specifically mentioned, this comment appears to include the groundwater seeps observed near MW-2.

DEQ considers sampling groundwater seeps an important element of the RI. Given the configuration of the BRIX site and its access limitations, groundwater seeps may represent the only sampling locations between waterfront monitoring wells (e.g., MW-2) and the river. The data is needed to further assess the lateral extent of groundwater contamination and would support both the RI and the source control evaluation. As such, DEQ expects that BRIX will make every effort to develop an approach for conducting this work.

The third set of bullets in this section (see Page 14 of the RI Workplan) lists specific items that will be included in the RI Report to facilitate DEQ's review of BRIX site investigation information. During the May 25, 2004 meeting DEQ understood that an evaluation of the influence of precipitation on shallow groundwater fluctuations would be added to the list of items. This information will be used to further evaluate the hydrogeologic conceptual site model for the BRIX facility.

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Oregon
Theodore Kulongoski, Governor

**Department of Environmental Quality**
**Northwest Region Portland Office**
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April 20, 2005

Mr. John Edwards, R.G., C.E.G.
Anchor Environmental, Inc.
6650 SW Redwood Lane, Suite 110
Portland, Oregon 97224

**RE: Remedial Investigation Workplan (February 2005)**
**Brix Maritime Company**
**Portland, Oregon**
**ECSI No. 2364**

Dear John:

The Oregon Department of Environmental Quality (DEQ) has reviewed the *Remedial Investigation Workplan, Brix Maritime Company, Portland, Oregon,* dated February 2005 (the RI Workplan). The RI Workplan was prepared by Anchor Environmental, Inc. (Anchor) on behalf of Brix Maritime Company (BRIX) and submitted to DEQ consistent with the "Voluntary Agreement for Remedial Investigation, Source Control Measures, and Feasibility Study" (DEQ No. LQDVC-NWR-02-03 [the Agreement]). The Agreement became effective May 8, 2002.

DEQ had previously approved a June 2004 version of the workplan with comments. Since that time the scope of work for the BRIX Remedial Investigation (RI) has changed. In addition, information on which other work was dependant is now available. As such, DEQ considers it appropriate to review the RI Workplan in the context of the current scope of work and available information.

DEQ's comments are provided below and have been prepared to: 1) ensure the RI Workplan includes information items agreed to in previous correspondence and/or during meetings, 2) communicate DEQ's understanding of the technical content of certain items included in the RI Workplan, and 3) clarify the information and data collection needs of the RI. DEQ expects that our comments will be incorporated into the RI Workplan and that a final version of the document will be provided for our files within 30 days of your receipt of this letter.

**Section 3.2.** Consistent with our February 25, 2004 comments letter, and agreements made during a May 25, 2004 meeting, DEQ expects that a survey will be conducted along the facility's waterfront to establish the locations and elevations of 1) groundwater seeps and 2) the contact between the sand unit and the underlying silt unit. This information should be shown on appropriate figure(s) and used when preparing the structural contour map of the top of the silt unit. The survey will also provide a site-specific estimate of the lowest effective shallow groundwater elevation for the site (i.e., when river levels are below the top of silt).

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DEQ appreciates the work BRIX is conducting to further investigate environmental conditions at their facility. If you have any questions regarding this letter, please don't hesitate to call me at (503) 229-5543 or email me at bayuk.dana@deq.state.or.us.

Sincerely,

Mr. Dana Bayuk, R.G.
Project Manager
Voluntary Cleanup Program
Lower Willamette Section

Cc: Kim Johannessen, Johannessen & Associates
David Templeton, Anchor Environmental, Inc., Seattle
Frank Williamson, Foss
Rod Struck, DEQ – VCP/LWS
ECSI File No. 2364

Oregon
Theodore Kulongoski, Governor

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April 20, 2005

Mr. John Edwards, R.G., C.E.G.
Anchor Environmental, Inc.
6650 SW Redwood Lane, Suite 110
Portland, Oregon 97224

**RE: Remedial Investigation Workplan (February 2005)**
**Brix Maritime Company**
**Portland, Oregon**
**ECSI No. 2364**

Dear John:

The Oregon Department of Environmental Quality (DEQ) has reviewed the *Remedial Investigation Workplan, Brix Maritime Company, Portland, Oregon,* dated February 2005 (the RI Workplan). The RI Workplan was prepared by Anchor Environmental, Inc. (Anchor) on behalf of Brix Maritime Company (BRIX) and submitted to DEQ consistent with the "Voluntary Agreement for Remedial Investigation, Source Control Measures, and Feasibility Study" (DEQ No. LQDVC-NWR-02-03 [the Agreement]). The Agreement became effective May 8, 2002.

DEQ had previously approved a June 2004 version of the workplan with comments. Since that time the scope of work for the BRIX Remedial Investigation (RI) has changed. In addition, information on which other work was dependant is now available. As such, DEQ considers it appropriate to review the RI Workplan in the context of the current scope of work and available information.

DEQ's comments are provided below and have been prepared to: 1) ensure the RI Workplan includes information items agreed to in previous correspondence and/or during meetings, 2) communicate DEQ's understanding of the technical content of certain items included in the RI Workplan, and 3) clarify the information and data collection needs of the RI. DEQ expects that our comments will be incorporated into the RI Workplan and that a final version of the document will be provided for our files within 30 days of your receipt of this letter.

**Section 3.2.** Consistent with our February 25, 2004 comments letter, and agreements made during a May 25, 2004 meeting, DEQ expects that a survey will be conducted along the facility's waterfront to establish the locations and elevations of 1) groundwater seeps and 2) the contact between the sand unit and the underlying silt unit. This information should be shown on appropriate figure(s) and used when preparing the structural contour map of the top of the silt unit. The survey will also provide a site-specific estimate of the lowest effective shallow groundwater elevation for the site (i.e., when river levels are below the top of silt).

**Section 3.3.** Storm water is recognized as a source of contamination to the Willamette River and its sediments. DEQ acknowledges BRIX's ongoing efforts to reduce the potential for site storm water to be a source of impacts to the river. DEQ expects that BRIX will maintain the "best management practices" (BMPs) currently in-place (e.g., use and routine scheduled maintenance and/or replacement of catch basin inserts). DEQ also recommends that BRIX implement the BMPs recommended by the City of Portland, including sweeping paved surfaces to reduce the amount of material entering the catch basins and minimizing outdoor uncovered storage of spare equipment and/or materials. Periodic sweeping of the paved areas could reduce the frequency of maintaining and/or replacing the catch basin filters.

**Section 3.5.** According to this section and Appendix F of the RI Workplan, PGE owns the two transformers at the BRIX facility having purchased them on January 1, 1979. Additionally, PGE reports that the content of polychlorinated biphenyls (PCBs) in the transformers is unknown. DEQ acknowledges that de-energizing the transformers and interrupting power would negatively impact the BRIX operation. However, DEQ understood from Anchor's April 30, 2004 letter that if information regarding the PCB content of the transformers was unavailable or could not be determined, then shallow soil sampling would be conducted.

DEQ expects that an approach for collecting and analyzing shallow soil samples around the transformers will be developed and incorporated into the RI Workplan. Lacking information regarding the PCB content of the transformers, this information will be used to confirm whether releases from the transformers have occurred and whether additional work is warranted.

**Section 4.1.** Our February 25 letter stipulated that if groundwater seeps (as opposed to petroleum hydrocarbon seeps or sheens) are"...interpreted to be downgradient of the known groundwater plume or contaminant source areas..." representative samples should be collected. Section 3.2 of the RI Workplan indicates that groundwater seeps have been observed downgradient of monitoring well MW-2. Furthermore, polycyclic aromatic hydrocarbons have been detected in groundwater at MW-2. Based on this information, DEQ concludes that the criterion for sampling groundwater seeps has been met and that an approach for collecting and analyzing samples should be developed and included in the RI Workplan.

That said, the RI Workplan suggests it may be infeasible, due to access and safety considerations, to collect samples where groundwater seeps have been observed (i.e., along the northern portion of the facility's waterfront). Although not specifically mentioned, this comment appears to include the groundwater seeps observed near MW-2.

DEQ considers sampling groundwater seeps an important element of the RI. Given the configuration of the BRIX site and its access limitations, groundwater seeps may represent the only sampling locations between waterfront monitoring wells (e.g., MW-2) and the river. The data is needed to further assess the lateral extent of groundwater contamination and would support both the RI and the source control evaluation. As such, DEQ expects that BRIX will make every effort to develop an approach for conducting this work.

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The third set of bullets in this section (see Page 14 of the RI Workplan) lists specific items that will be included in the RI Report to facilitate DEQ's review of BRIX site investigation information. During the May 25, 2004 meeting DEQ understood that an evaluation of the influence of precipitation on shallow groundwater fluctuations would be added to the list of items. This information will be used to further evaluate the hydrogeologic conceptual site model for the BRIX facility.

**Section 4.4.** DEQ expects that the "shoreline monitoring wells" referenced in the first paragraph of this section will include MW-2, MW-3, MW-4, MW-5, and MW-8.

For the purpose of screening site data for the source control evaluation of the BRIX facility, Anchor proposes using DEQ Level 2 Screening Benchmark Values for potential ecological exposure pathway(s) and the US Environmental Protection Agency (EPA) 2002 National Recommended Water Quality Criteria to evaluate potential human health exposure pathways.

EPA and DEQ are currently developing screening criteria for Portland Harbor Joint Source Control Strategy. Agency agreement on screening criteria is expected within the next few weeks and therefore may coincide with the BRIX source control evaluation. DEQ recommends that prior to initiating the source control evaluation, Anchor obtain from DEQ the appropriate screening criteria to reduce the potential for duplication of work efforts.

In addition to EPA/DEQ development of screening criteria, be advised that EPA may be requiring that federal drinking water maximum contaminant levels (MCLs) and drinking water preliminary remediation goals (PRGs) be included as screening criteria for the groundwater pathway.

**Section 5.2.** DEQ understands that in addition to the quarterly reports referenced in this section, an interim submittal will be prepared that compiles the site investigation information listed in Section 4.1 and includes descriptions and interpretations of the data. The interim submittal will form the basis for determining whether the site investigation work completed to date supports the source control evaluation. Subsequent to review and approval of the interim submittal, DEQ understands the source control evaluation will be prepared. Both the interim data compilation document and the source control evaluation will be incorporated into the RI Report.

DEQ requests that the schedule for completing the interim data compilation document be included in this section of the RI Workplan. The submittal dates for the source control evaluation and the RI Report will be established as the document review and approval process proceeds.

**Table 3.** Table 3 compiles monthly observations made regarding 1) the presence of light non-aqueous phase liquids and 2) water level measurements made at each monitoring well. In our February 25th letter, and as Anchor agreed to in their April 30, 2004 response letter, additional information should be provided on the table and assessed when preparing equipotential maps for the site. Given the interpretations of the site geology and hydrogeology, during seasonal declines

in the water table there is the potential for groundwater and/or LNAPL to be retained in the monitoring well end-cap, or trapped in the borehole due to the fine-grained nature of the material surrounding the sand pack. In either case misleading data and interpretations could result.

DEQ requests that Table 3 be revised for future submittals to include the elevations of the top of the silt and the top of the monitoring well end-cap for information purposes. Interpretations and descriptions of historic and future groundwater elevation data should take this information into consideration.

**Table 4.** The "Z" data qualifier shown in the table should be explained in the notes.

**Figures 3, 4, and 5.** The spatial relationships between the locations of monitoring wells MW-2, MW-3, MW-4, and MW-5 shown on figures 3 and 4 do not appear to correspond to those shown on Figure 5. DEQ requests that these figures be reviewed and reconciled in future submittals if appropriate.

**Appendix A, Sampling and Analysis Plan.** The Sampling and Analysis Plan (SAP) provided in Appendix A of the RI Workplan is limited to quarterly groundwater monitoring. The RI Workplan should include a SAP and a Quality Assurance Project Plan that reflects the current scope of work for the BRIX RI, including work that has been completed (e.g., push-probe drilling and soil sampling, monitoring well installation, collecting groundwater samples for analysis of total and dissolved metals) and that will be performed (e.g., shallow soil sampling around electrical transformers, collecting samples from groundwater seeps for analysis of contaminants of interest).

DEQ appreciates the work BRIX is conducting to further investigate environmental conditions at their facility. If you have any questions regarding this letter, please don't hesitate to call me at (503) 229-5543 or email me at bayuk.dana@deq.state.or.us.

Sincerely,

Mr. Dana Bayuk, R.G.
Project Manager
Voluntary Cleanup Program
Lower Willamette Section

Cc: Kim Johannessen, Johannessen & Associates
David Templeton, Anchor Environmental, Inc., Seattle
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April 30, 2004

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**Re:** Response to February 25, 2004 Letter Remedial Investigation Work Plan, Brix Maritime Company, Portland, Oregon, ECSI No. 2364

Dear Dana:

On behalf of Brix Maritime Company (Brix), Anchor Environmental, LLC (Anchor) has reviewed your above referenced February 25, 2004 letter (Letter). Anchor responses to your comments and questions are contained in this letter.

Some of the issues raised in your Letter were discussed during our site reconnaissance on April 22, 2004. In this document all of the DEQ comments from the Letter are restated verbatim, followed by the Anchor comment shown in bold italics.

## COMMENTS TO SECTION 2, BACKGROUND

**Section 2.2 (Site Features), page 3.** In Anchor's "Supplemental Preliminary Assessment Report" dated October 2000, mention is made of two "pad-mounted transformers" located at the facility (see Section 3.2, Transformers). Anchor notes that, "The transformer located south of the office building is not labeled and is therefore assumed to contain PCBs."

Please provide a description of this transformer. Surface soil around the transformer pad should be sampled for polychlorinated biphenyls and diesel-range and oil-range petroleum hydrocarbons to assess the potential for releases to have occurred from the transformer.

***As a first step Anchor will attempt to determine if the transformer could have contained PCB oil by checking the installation and maintenance history of the unit. If we cannot gain further useful information in that regard, we will confer with DEQ to develop a sampling plan.***

## COMMENTS TO SECTION 3, REMEDIAL INVESTIGATION STATUS

**Section 3.1 (Soil), page 7.** This section of the RI Work Plan suggests that soil characterization work previously completed at the site is adequate to address the objectives of the Agreement. DEQ has requested on two previous occasions[1] that BRIX review available soil information to determine if adequate data for gasoline-range, diesel-range, and oil-range petroleum hydrocarbons, and for polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs), have been collected and are representative of impacts to soil. To date the requested evaluation of soil data has not been conducted.

Based on our review of the data, DEQ has identified the following potential analytical data gaps for soil.

- In January 1993 BRIX excavated soil impacted by "lubricating oil" from a leaking transfer line. Soil samples collected from the margins of the soil removal area were analyzed for total petroleum hydrocarbons using USEPA Method 418.1 Modified (418.1M). The concentrations of petroleum hydrocarbons detected using 418.1M exceeded 5,000 milligrams per kilogram (mg/kg or parts per million) in five of nine samples, including a sample obtained from 12 feet below ground surface (bgs) near the source of the release (39,700 mg/kg).

  The current method required to assess the potential impacts to soil by diesel-range petroleum hydrocarbons and oil-range petroleum hydrocarbons is the NWTPH-Dx method. Follow-up testing for contaminants of concern (COC) associated with petroleum hydrocarbons may be required based on the results of analyzing samples using this method. Risk-based decisions involving a petroleum contaminated site[2] depend on this suite of analyses, however none of the samples collected from the margins of the soil removal area in January 1993 were analyzed using current testing methodology.

- During the soil removal work conducted in 1993, "oil" was observed seeping from the sidewalls of the excavation. Measurable thicknesses of oil have been noted in monitoring well MW-3 on numerous occasions since its installation. In DEQ's May 12, 2003 comments letter to the "Progress Report – First Quarter 2003" dated April 15, 2003 (progress report), we indicated that the work plan should include characterization of non-aqueous phase liquids

[1] See DEQ's comment letters dated November 30, 2001 (Attachment A, General Comments, Item B, second bullet) and June 11, 2002 (Comment No. 9 under "Work Plan [Addendum No. 1] for Groundwater Investigation".

[2] See DEQ's "Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites", dated September 22, 2003.

(i.e., "oil") in the subsurface. DEQ considers the occurrence, extent, and movement of "oil" in the subsurface to be considerations for the source control screening assessment.

- In May 2001 additional sampling work was conducted within the margins of the soil removal area. Borings B-27 and B-28 were completed at this time "...to better define the vertical extent of potential petroleum compounds in soil and to collect 'worst case' samples for risk parameter analysis."

  One sample from B-27 was collected at a depth of 3 feet bgs. Diesel-range petroleum hydrocarbons (468 mg/kg) and oil-range petroleum hydrocarbons (6,010 mg/kg) were detected in the sample. Follow-up analysis of the sample did not detect petroleum hydrocarbon COC above the method reporting limit (MRL).

  Three soil samples were collected at depths of 6 feet, 12 feet, and 23 feet bgs in Boring B-28 and submitted for analysis. The detected concentrations of diesel-range petroleum hydrocarbons ranged from 560 mg/kg (6 feet bgs) to 2,340 mg/kg (12 feet bgs). The range of detected oil-range petroleum hydrocarbon concentrations was 8,330 mg/kg (6 feet bgs) to 22,200 mg/kg (12 feet bgs)[3]. Although the soil sample collected from 12 feet bgs exhibited the highest detected concentrations, the sample obtained from 6 feet bgs was submitted for follow-up analysis of COC. It should be noted that data for the samples collected from Boring B-28 at 12 feet and 23 feet bgs are not included in Table 2 of the RI Work Plan.

  In summary, if the concentration trend in Boring B-27 mimicked that observed in Boring B-28, concentrations of petroleum hydrocarbons could increase below 6 feet bgs. If this was the case then the sample with the highest detected concentration may not have been collected and/or submitted for analysis. At Boring B-28 the sample known to have the highest detected concentrations were not analyzed for COC and the objective of evaluating "worst case" was not met at this location (i.e., in the source area of the release).

- The results of soil sampling and analysis preformed in April 1993 indicated that a release of gasoline-range petroleum hydrocarbons occurred near the northwestern corner of the maintenance building. Soil samples collected form Boring B-7 had detected concentrations of gasoline-range petroleum hydrocarbons of 270 mg/kg (10.5 feet bgs), 2,000 mg/kg (15.5 feet bgs), and 13 mg/kg (20 feet bgs). In May 2001 additional borings (e.g., borings B-19, B-21, B-22) were advanced to further assess potential impacts in this portion of the site. The maximum concentration of gasoline-range petroleum hydrocarbons detected in these three borings was 1,370 mg/kg at Boring B-21 at a depth of 5 feet bgs. Follow-up analysis of this sample for the COC of gasoline detected numerous constituent chemicals, one of which exceeded risk-based human exposure screening criteria (benzene, 5.2 mg/kg).

[3] Note that the concentrations of diesel-range petroleum hydrocarbons and oil-range petroleum hydrocarbons detected in the soil collected obtained from 23 feet bgs at boring B-28 were also higher than those detected at 6 feet bgs.



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According to the "Pre-RI Assessment Work Plan" dated May 22, 2002, soil samples collected during the drilling and installation of monitoring wells MW-1 through MW-5 were to be analyzed for gasoline-range petroleum hydrocarbons and diesel-range and oil-range petroleum hydrocarbons. Monitoring well MW-1 was installed in the immediate vicinity of borings B-7 and B-22 to assess potential impacts to groundwater in this portion of the site. Soil samples collected during the drilling of the MW-1 borehole were not analyzed for gasoline-range petroleum hydrocarbons. As mentioned in DEQ's May 12, 2003 comments letter regarding the "Progress Report – First Quarter 2003" dated April 15, 2003, values of gasoline-range petroleum hydrocarbons are included in a number of risk pathways.

Although not mentioned in the RI Work Plan, based on the information summarized above there is the potential for gasoline-range petroleum hydrocarbons to be present in soil beneath the maintenance building at concentrations in excess of 2,000 mg/kg. Given that samples with lower detected concentrations of gasoline-range petroleum hydrocarbons contained COC above risk-based criteria, DEQ anticipates future uplands work will include characterizing residual contamination by gasoline-range petroleum hydrocarbons and associated COC. This work should also include evaluating potential human exposure pathways in this portion of the site.

***DEQ comments on section 3.1 seem to deal primarily with potential soil data gaps related to upland human health risk from historic gasoline and lubricating oil releases. Anchor acknowledges that much of the site characterization work was done prior to the development of the list of fuel related chemicals of concern (COC) in DEQ's September 2003 guidance entitled Risk Based Decision Making for the Remediation of Petroleum Contaminated Sites. For that reason some of the current fuel related COCs in DEQ's September guidance have not been tested in soil at the site. As stated in the RI Work Plan, the focus of this investigation is assessment of pathways that could be impacting the Willamette River, not potential exposure pathways for upland site workers. If DEQ requires future evaluation of upland human health risk at the site, Anchor will reevaluate the suitability of the current soil database for that purpose. For the purpose of evaluating pathways to the River, however, Anchor believes that the current network of monitoring wells is sufficient to assess groundwater pathways to the river. Because the site is completely paved or covered with buildings, with heavy rip-rap along the shore, there is no possible direct pathway for soil particles to impact the Willamette River. Our current groundwater assessment is essentially a comprehensive determination of the upland soil leaching pathway via groundwater to the River.***

**Section 3.2 (Groundwater), page 8.** Anchor notes that groundwater seeps have been observed near the contact between the sand fill and underlying silt during times of low river levels. The locations of the observed groundwater seeps should be surveyed and shown on a representative map. If these seeps are interpreted to be downgradient of the known groundwater plume or contaminant source areas, representative samples should be collected and analyzed for contaminants of interest during quarterly groundwater monitoring events.



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***Because of the steepness of the rip-rap slope, sampling at the seep locations would probably have to be done from a boat during low river conditions. Anchor would like to discuss the need for this information and the sampling logistics further with DEQ.***

**Section 3.3 (Storm Water), page 9.** DEQ and Anchor met on September 5, 2003 to discuss the scope of the RI work plan. During this meeting, DEQ requested additional information be collected and presented in the work plan to allow us to determine if storm water sampling would be required. Specifically, DEQ requests the following information be provided:

- Descriptions of the catch basin design and particulate/oil adsorbent filters;
- Procedures and schedule for catch basin operations, maintenance, and cleanout;
- Observations made during visual inspection of the catch basins (e.g., are sediments present, description of sediments [grain size, color, sheen, odor, debris, etc]).

In addition, a summary of any best management practices implemented at the facility to protect storm water (e.g., lot sweeping; secondary containment; etc.) should be included in the work plan.

***Anchor has never observed the catch basin design or construction details because the catch basins are always covered with particulate filters. We will temporarily remove one of the filters to determine the typical catch basin construction details for DEQ. We will obtain the name of the manufacturer and type of particulate filter from Brix. Brix site personnel observe the filters and replace them when they appear clogged, but they do not record the type of solid material that is caught by the filters. Since the filters are located in staff vehicle parking areas we anticipate that they accumulate typical parking lot debris, such as dirt from vehicle tires, leaves, etc.***

**Section 3.6 (Beneficial Use), page 10.** The RI Work Plan indicates that, "There are no beneficial uses of water with the locality of the facility, aside from the Willamette River." This section of the work plan disregards DEQ's comments to Anchor's September 28, 2001 report[4]. In DEQ's November 30, 2001 comments letter, BRIX was informed that groundwater discharge (i.e., surface water recharge) to the Willamette River is considered a beneficial use of groundwater and should be recognized as such.

***The statement on page 10 was not intended to mean that discharge of groundwater to the River is not a beneficial use. It was only intended to mean that there are no other beneficial uses of site groundwater other than recharge to the river.***

**COMMENTS TO SECTION 4, INVESTIGATION PLAN**

[4] Anchor Environmental, Inc., 2001. "Sampling Results Report in Support of the Preliminary Assessment of the Brix Maritime Company Facility". A report prepared on behalf of Brix Maritime Company. September 28.

**Section 4.1 (Ground Water), page 11.** DEQ concurs with Anchor's proposal to continue the data collection tasks listed in this RI Work Plan section. DEQ would add that, prior to discontinuing groundwater sampling efforts, we expect BRIX to compile and interpret the available geologic, hydrologic, hydrogeologic, and groundwater chemistry data available for the site. The purpose of the data compilation and review is to:

- Assess the hydrogeologic conceptual site model (HCSM) proposed in May 2002 in the context of currently available information (i.e., does data support perched groundwater interpretation?).
- Evaluate the relationship between:
  - Groundwater elevations in monitoring wells and the Willamette River;
  - Groundwater elevations and the elevation of the top of the fine-grained unit;
  - Seasonal groundwater fluctuations and detected concentrations of petroleum hydrocarbons, COC, and "oil" thickness.
- Identify potential ongoing sources of groundwater contamination.
- Present an ecological conceptual site model and the potential pathways for site-related contamination to impact the Willamette River.
- Discuss potential data gaps for the BRIX facility.

The purpose of reviewing the site information collected to date is to determine whether available data sufficiently characterize impacted soil and groundwater, and potential impacts to the Willamette River, to support the source control screening assessment.

To meet the purpose and facilitate our review of the information, DEQ requests that BRIX provide, at a minimum, the following items:

- Geologic cross-sections that graphically depict Anchor's interpretations of the subsurface geology along two transects perpendicular to A-A' (see Figure 6 of the RI Work Plan);
- A structure contour map of the top of the fine-grained unit with the locations of the monitoring wells shown (previously requested by DEQ in our letter dated November 30, 2001);
- An isopach map of the fine-grained unit;
- Monitoring well hydrographs and the elevation of the top of the fine-grained unit;
- Representative equipotential maps for the "dredge fill sand" water-bearing unit, including the locations and elevations of observed groundwater seeps;
- Hydrographs of groundwater elevations and the Willamette River;
- Hydrographs and COC time-concentration plots for monitoring wells;
- Comparison of seasonal groundwater level fluctuations to "oil" thickness at monitoring well MW-3;
- Isoconcentration contour maps for selected COC detected in shallow groundwater;
- Conceptual site exposure model prepared using DEQ's risk-based decision making guidance for USTs (see Figure 2-2, page 19 of the guidance), including consideration of ecological receptors (previously requested by DEQ in our letter dated November 30, 2001).



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DEQ considers it essential that the compilation, review, and interpretation of site data be performed before the source control screening assessment is initiated so that disagreements regarding the adequacy of the data, duplication and/or repetition of efforts, and inefficient use of BRIX's resources are minimized.

***Your suggestions for future data evaluation and interpretation are reasonable and usual for a Remedial Investigation report, with one exception. We cannot prepare an isopach map of the fine grained unit that underlies the dredge fill sand. This is because the fine grained unit has only been penetrated three times (borings B-19, B-22, and B-26) during the investigation. Per our earlier discussions with DEQ the goal of our groundwater investigation has been to monitor the groundwater perched on the fine grained unit, so we have deliberately avoided drilling through the fine grained unit. Because the site COCs are petroleum hydrocarbons and less dense than water, there has been no need to monitor groundwater below the fine grained unit.***

**Section 4.3 (Risk Assessment), page 12.** At this time, DEQ does not agree with the statement "...it is certain that the scoping assessment will conclude that there are not complete pathways...on this site." While much of the site is devoid of suitable, high quality habitat because of hard ground (asphalt, concrete, structures), there are some areas that may provide habitat to terrestrial receptors (birds and small mammals). In addition, the City of Portland's Greenway Overlay may affect future development along the riverbank. The risk assessment should assess whether this overlay may affect future exposure scenarios.

***Anchor believes that your observations during the site reconnaissance will lead you to agree with our conclusion that there is no existing upland ecological habitat whatsoever at the site. This is because the entire site is either paved, covered with buildings, roads, or rip rap. With regard to the potential that a future greenway could affect development at the site, we remind DEQ that this site is zoned industrial, was constructed by Brix in 1979 for it's current use and Brix intends to continue the current operation. The Brix operation, buildings, and other facilities are very close to top of the river bank and establishment of a greenway by the City of Portland would be totally incompatible with the Brix business. The establishment of a greenway is not a reasonably likely potential future use of the site, and therefore should not be considered in the conceptual site model or risk assessment.***

The Agreement states that the upland investigation "shall exclude that portion of the facility that is below the mean high-water mark of the Willamette River." For Portland Harbor upland projects, DEQ has initially defined the high-water mark as 8 feet CRD (9.55 feet NGVD). This value was selected for consistency and to minimize gaps in river bank evaluations. Please be aware that this definition will be combined with site-specific discretionary modifications and/or to upland source control evaluations. Sampling may be required to evaluate potential risks to upland ecological receptors from contaminant exposure during their activities in exposed riverbank areas.

A map should be prepared that depicts both the high-water mark and the shoreline during low water conditions. Additionally, a written description of the beach area should be prepared.



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***Anchor will evaluate this issue with respect to site conditions and discuss it further with DEQ.***

**Section 4.4 (Source Control Screening Assessment), page 12.** See the above comment to Section 4.1 (Ground Water), page 11. The site information review should form the basis for the source control screening assessment.

***Anchor's previous response to DEQ's comment on section 4.1 also applies here.***

## COMMENTS TO SECTION 5, MONITORING AND REPORTING SCHEDULE

**Section 5.1 (Monitoring Schedule), page 13.** As discussed in DEQ's comment to Section 4.1 (Groundwater), page 11, groundwater data collection should continue until available site information has been compiled, reviewed, and interpreted, and agreement has been reached on whether the data supports the source control screening assessment.

***Agreed***

## COMMENTS TO TABLES AND FIGURES

**Table 2.** The data for gasoline-range, diesel-range, and oil-range petroleum hydrocarbons for soil samples collected at depths of 12 feet and 23 feet bgs during the drilling of Boring B-28 are not provided. The data should be added and the table reviewed for completeness.

***Agreed***

**Table 3.** On page 8 in Section 3.2 of the work plan, Anchor reports that, "...some of the wells dry up seasonally, preventing sampling." Table 3 compiles water level measurements made at each monitoring, but does not indicate whether an installation was considered dry for purposes of collecting groundwater elevation data and/or sampling. Notes should be added to the "Comments" column of the table to communicate these observations.

Given the interpretations of the site geology and hydrogeology, during seasonal declines in the water table there is the potential for groundwater to be retained in the monitoring well end-cap, or trapped in the borehole due to the fine-grained nature of the material surrounding the sand pack. In both cases misleading groundwater elevation data could be obtained. DEQ requests that Table 3 and future groundwater elevation data be reviewed considering both scenarios, and that comments regarding the representativeness of the data be provided.

***Agreed***

**Figure 4.** The locations of the monitoring wells in relationship to the soil borings and soil removal area are unclear. Please add the well locations to this figure or a similar figure.

***Agreed***



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When you have completed your review please contact me to schedule a meeting to discuss the issues.

Sincerely,

John E. Edwards, RG, CEG

Anchor Environmental, L.L.C.

Cc: Frank Williamson, FOSS Maritime Company
David Templeton, Anchor
John Renda, RG, Anchor

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2364

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September 30, 2003
099056-01

DEPT OF ENVIRONMENTAL QUALITY
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NORTHWEST REGION

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**Re:** Remedial Investigation Work Plan, Brix, Portland, Oregon

Dear Rod:

The purpose of this letter is to document some key points of the discussion we had during the September 5, 2003 meeting. Anchor staff, John Edwards and John Renda, met with you at DEQ's Northwest Regional office in Portland. The two primary meeting agenda items discussed were; 1. summary of findings from the two new monitoring wells (MW-6 and MW-7), and 2. discussion of potential tasks that could be required to complete the Remedial Investigation (RI) and Source Control Evaluation. Following are summaries of the information discussed at the meeting and Brix plans for future RI investigations.

**New Monitoring Wells MW-6 and MW-7**

Monitoring wells MW-6 and 7 were installed in June 2003 and all of the site wells were sampled July 7, 2003. The quarterly progress report was submitted to DEQ July 15, 2003. The water quality and hydrology data from the July 7, 2003 sampling run was e-mailed to DEQ August 22, 2003. The first round water quality data indicates that the new wells are not impacted by petroleum hydrocarbons and therefore delineate the southern boundary of groundwater impacts. With these new wells, the site has adequate monitoring wells to characterize groundwater quality and complete the remedial investigation. This will be confirmed through continued groundwater monitoring.

**Remedial Investigation and Source Control Evaluation**

In a May 12, 2003 letter, DEQ requested that Brix prepare an RI Proposal or RI Work Plan (Work Plan), as required in the May 2002 Voluntary Agreement (Agreement) for Remedial Investigation and Source Control Measures. During the September 5, 2003 meeting we discussed the following items that are required to be completed as listed in Scope of Work, Attachment B to the Agreement.

**Soils.** Brix former consultant, Hahn & Associates, conducted a site wide characterization of soils. During the RI Anchor has tested selected soils from monitoring well borings. The soil quality data from those investigations are sufficient to complete the RI and evaluate source control measures. We do not plan on doing additional upland soil investigation during this RI. The RI report will contain a complete description of the soil characterization of the site.

**Groundwater.** The RI groundwater monitoring network consists of seven monitoring wells. At least two additional sampling rounds are planned to be completed at the existing wells before the RI report is prepared. The sampling plans will be discussed in the RI Work Plan. Anchor has been conducting monthly visual monitoring of the riverbank to look for evidence of contaminated groundwater seepage or free product discharges. There has been no sign of any contaminated groundwater discharge and Anchor will continue the field monitoring for the remainder of the investigation. We will include some photo records of the condition of the riverbank for inclusion in the RI report.

**Surface Water.** During the September 5, 2003 meeting, DEQ expressed the possible need for monitoring of storm water at the Brix site. Anchor said that the existing catch basins are in vehicle parking areas, not areas of industrial activities, and have particulate filters on the catch basins. Based on those conditions Anchor stated that storm water monitoring is not needed as part of the RI investigation. DEQ requested that the storm water system be described in the RI Work Plan, and said that DEQ would withhold their decision on requiring storm water monitoring until they have reviewed the Work Plan.

**Sediments.** Anchor evaluated Willamette River sediment quality and described our findings in the September 2001 Sampling Results Report in Support of the Preliminary Assessment. Under the Agreement, this RI is required to evaluate potential upland sources of river sediment contamination, but characterization of the nature and extent of Willamette River sediment contamination is beyond the scope of the Agreement.

**Air.** The Agreement asks for identification and characterization of any unpermitted release of hazardous substances to the air from soil, surface water, or groundwater contamination at the facility. Anchor does not believe that there is a complete air contaminant pathway to the Willamette River from potential upland sources of contamination. Future evaluations of air are not planned as part of this RI.

**Beneficial Water Use Determination.** The Agreement asks for identification of current and reasonably likely future land and water uses in the locality of the facility not including those of the Willamette River. There are no surface water bodies on the site. There is no use of ground water on the site. There are no beneficial uses of water within the locality of the facility, aside from the Willamette River. A discussion of current and future zoning, land use, and beneficial water uses will be included in the RI report.

**Sampling and Analysis Plan (SAP).** A SAP for future groundwater monitoring, hydrology measurements, and related groundwater investigations will be included in the RI work plan.

**Health and Safety Plan (HASP).** A HASP covering future groundwater investigations will be included in the RI work plan.

**Source Control Measures.** The Agreement requires Brix to gather sufficient information to evaluate, design, and implement necessary source control measures to protect the Willamette River. The RI work plan will evaluate the need for investigation of the potential contaminant migration pathways of overland transport, storm water runoff, and groundwater contaminant migration. As stated previously, the work plan will describe future planned groundwater investigations.

**Upland Human Health Risk Assessment.** Brix intends to focus the remainder of this RI on evaluation of the need for source control measures to protect the Willamette River. An upland human health risk assessment is not a necessary component for evaluating potential sources of contamination to the river. Therefore Brix does not intend to conduct an upland human health risk assessment under this Agreement.

**Upland Ecological Risk Assessment.** DEQ requested during the meeting that Brix conduct a Level 1 Upland Ecological Risk Assessment. Brix will complete this assessment, which is really just a formality in this case, because there is no exposed soil or plant life onsite due to pavement, riprap, and buildings. This means that the site cannot provide habitat for any threatened or endangered species. The Level 1 Ecological Risk Assessment is primarily a checklist that will be described in the work plan.

**Schedule**

Brix plans to sample and test groundwater from all site monitoring wells in October 2003. We plan to submit a draft RI Work Plan to DEQ by November 14, 2003. The October sampling event is dependent upon groundwater levels at the site. If several of the wells are dry, the sampling event will be postponed until winter rainfall infiltration sufficiently raises the perched groundwater level. A schedule of work plan tasks will be included in the RI work plan.

Please contact me if you have any questions.

Respectfully Submitted,

John E. Edwards, RG, CEG
Anchor Environmental, L.L.C.

Cc: Frank Williamson, Foss Maritime
Don Scaramastra, Garvey, Schubert
David Templeton, Anchor
John Renda, Anchor

Brix 2364 comm

Oregon
Theodore Kulongoski, Governor

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July 22, 2003

John Edwards
Anchor Environmental, Inc.
6650 SW Redwood Lane, Suite 110
Portland, Oregon 97224

**RE: Brix Maritime Site**
**Portland, Oregon**
**ECSI No. 2364**

Dear John:

The Oregon Department of Environmental Quality (DEQ) reviewed the "Progress Report – Second Quarter 2003" for the Brix Maritime Company site. This document was prepared by Anchor Environmental and is dated July 15, 2003. The progress report documents the water level measurements and the recent installation of two groundwater monitoring wells MW-6 and MW-7.

This field work was preformed prior to submittal of a remedial investigation (RI) work plan in an effort to begin collecting the requested groundwater data during this years' wet season. Although the Progress Report does not mention the submittal of a RI work plan, DEQ continues to expect the submittal of the work plan within the next two months. Please refer to DEQ's May 12, 2003 letter for details regarding the content of the work plan. DEQ has no additional comments on this progress report.

If you have any questions, please call me at (503) 229-6915 or email me at brodyheine.bruce@deq.state.or.us.

Sincerely,

Bruce Brody-Heine

Bruce Brody-Heine, R.G.
Project Manager
Cleanup and Portland Harbor Program

Cc: Kim Johannessen, Johannessen & Associates
David Templeton, Anchor Environmental, Inc., Seattle
Frank Williamson, Foss
Rod Struck, DEQ - CU& PH
ECSI File No. 2364

Brix
2364

Oregon
Theodore Kulongoski, Governor

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May 12, 2003

John Edwards
Anchor Environmental, Inc.
6650 SW Redwood Lane, Suite 110
Portland, Oregon 97224

**RE: Brix Maritime Site**
**Portland, Oregon**
**ECSI No. 2364**

Dear John:

The Oregon Department of Environmental Quality (DEQ) reviewed the "Progress Report – First Quarter 2003" for the Brix Maritime Company site. This document was prepared by Anchor Environmental and is dated April 15, 2003. The progress report documents the recent installation of three groundwater monitoring wells. The installation of these wells was delayed until the wet season when higher shallow water table elevations would be present beneath the site. Our comments on information presented in the Progress Report are presented below.

**General Comments**

A. *TPH Soil Analyses.* Soil samples from MW-1 and MW-5 were submitted for only total petroleum hydrocarbon diesel range (TPH-Dx) testing, yet one of the primary contaminants of potential concern is gasoline. The approved work plan specified TPH-G and TPH-Dx would be analyzed if soil impacts were observed. The volatile organic compound (VOC) analytical results identified gasoline constituents in soil samples from these borings. This is a potential problem because DEQ's revised Risk-Based Decision Management guidance includes a TPH-G soil value for several risk pathways.

B. *Groundwater Testing.* Due to an oversight, the report indicates that TPH was not run this quarter. In addition, it does not appear that samples were analyzed for Methyl-tert-butyl-ether (MTBE). Future groundwater testing should include these parameters.

C. *Extent of Contamination.* Based on the recent soil and groundwater data, the gasoline soil and groundwater plume likely extend under the office building to the south. Additional investigation to the south is required to define the extent of contamination in this direction.

D. *Groundwater Monitoring.* The results of the groundwater monitoring indicate the needed for continued monitoring. All existing wells and any new wells installed should be sampled in May, August, and November 2003.

**Specific Comments**

1. *Table 1.* The screen-elevation range for each well should be included on the Table 1, in future documents.

2. *VOC Results Discussion.* The last sentence in this section regarding VOCs being likely biased by sample turbidity is not accurate. Numerous studies have show this is generally not the case.

3. *Future Sampling Approach.* Turbidity problems are reported in groundwater samples. Anchor proposes use of a peristaltic pump for purging and sampling in the future events. If a peristaltic pump is used, DEQ suggests that VOC samples be collected through the peristaltic pump using low-flow sampling techniques.

**Next Steps**

Based on DEQ's review of the available data, DEQ has determined that the release of hazardous substances at the site is a source of contamination that is potentially discharging to the Willamette River. Based on this determination, Brix Maritime is required to complete a remedial investigation at the site in accordance with the Voluntary Agreement for Remedial Investigation between DEQ and Brix Maritime, dated May 8, 2002. Therefore, the following steps are required:

Remedial Investigation (RI) Proposal or RI Work Plan. Results of the recent sampling indicate that the nature and extent of contamination have not been fully defined and that further action is needed to assure protection of human health and the environment. Therefore, in accordance the Agreement, an RI Proposal is required. However, based on the progress made to date, Brix may determine that is more efficient and cost effective to directly prepare an RI Work Plan. The RI proposal or Draft Work Plan should be submitted for DEQ review and approval within 30 days of this letter. This document should include, but not be limited to:

- Fully defining the nature and extent of soil and groundwater contamination;
- NAPL characterization (i.e., delineate the extent of the NAPL during future well installation activities);
- Periodic riverfront inspections for potential NAPL seeps;
- Evaluation of groundwater discharges to the river;
- Completion of the storm water evaluation;
- Evaluation and implementation, if needed, of Source Control Measures; and
- Upland Risk Assessment Work Plan.

Groundwater Monitoring Program. A monitoring program is required to fully characterize the groundwater plume. A brief work plan should be submitted that includes quarterly sampling of all existing wells and any new wells installed. Samples should be collected in May, August, and November 2003. A brief work plan should be submitted for DEQ review and approval within 30 days of this letter.

In addition, I want to notify you that Bruce Brody-Heine will be taking over the DEQ Project Management on this project effective May 15, 2003. I recently accepted a new position as Lead Worker and Northwest Region Cleanup Representative within our Section. I will provide senior peer review on this project. Bruce can be reached at (503) 229-6915.

If you have any questions, please call me at (503) 229-5562 or email me at rodney.struck@deq.state.or.us.

Sincerely,

Rodney G. Struck, R.G.
Project Manager
Cleanup and Portland Harbor Program

Cc: Kim Johannessen, Johannessen & Associates
David Templeton, Anchor Environmental, Inc., Seattle
Frank Williamson, Foss
Bruce Brody-Heine, DEQ CU/PH
ECSI File No. 2364

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July 12, 2002
990056

RECEIVED
JUL 15 2002
DEPT OF ENVIRONMENTAL QUALITY
NORTHWEST REGION

Rodney G. Struck, R.G.
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Progress Report #1 - Brix Maritime Company, Portland, Oregon

Dear Mr. Struck:

This Progress Report was prepared in accordance with Section II (H) of the Oregon Department of Environmental Quality (DEQ) Voluntary Agreement for Remedial Investigation and Source Control Measures (ECSI 2464 No. LQDVC-NWR-02-03). This Progress Report addresses the quarter ending June 30, 2002 and is divided into the following subject areas:

- Actions Taken During the Previous Quarter
- Actions Scheduled for the Next Quarter
- Data Generated in the Previous Quarter
- Summaries of Problems and Action Taken To Resolve Problems

**ACTIONS TAKEN DURING THE PREVIOUS QUARTER**

- Effective May 8, 2002, a Voluntary Agreement for Remedial Investigation and Source Control Measures (ECSI 2464 No. LQDVC-NWR-02-03) was signed.
- A draft Pre-RI Assessment Work Plan was submitted to the DEQ on May 22, 2002.
- DEQ provided comments on the draft Pre-RI Assessment Work Plan on June 11, 2002.
- Anchor Environmental, L.L.C. (Anchor) met with DEQ to discuss the draft Pre-RI Assessment Work Plan on June 19, 2002.
- DEQ approved the proposed locations for 5 monitoring wells at the Brix Maritime property via email on June 27, 2002.

## ACTIONS COMPLETED AND SCHEDULED FOR THE NEXT QUARTER

- Anchor submitted a July 8, 2002 letter to DEQ detailing the responses to DEQ's June 11, 2002 letter.
- DEQ's written approval of the Pre-RI Assessment Work Plan as detailed in Anchor's July 8, 2002 letter to DEQ.
- Five (5) monitoring wells will be installed at the Brix Maritime property on July 17 and 18, 2002 as described in Anchor's July 8, 2002 letter to DEQ.
- These monitoring wells will be developed and sampled during July 2002.
- The reporting requirements in the Pre-RI Assessment Work Plan, as modified by the July 8, 2002 letter, will be met.

## DATA GENERATED IN THE PREVIOUS QUARTER

No field activities were performed and no data were generated.

## SUMMARIES OF PROBLEMS AND ACTION TAKEN TO RESOLVE PROBLEMS

No problems were encountered.

If you have any questions regarding this Progress Report, please do not hesitate to contact me at (503) 670-1108 (e-mail: jedwards@anchorenv.com).

Sincerely,

John Edwards, R.G.
Anchor Environmental, L.L.C.

Cc: Frank Williamson, Foss Maritime
Kim Johannessen, Johannessen & Associates, P.S.
David Templeton, Anchor Environmental
John Renda, RG, Anchor Environmental

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July 12, 2002
990056

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JUL 15 2002
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NORTHWEST REGION

Rodney G. Struck, R.G.
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

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Sincerely,

John Edwards, R.G.
Anchor Environmental, L.L.C.

Cc: Frank Williamson, Foss Maritime
Kim Johannessen, Johannessen & Associates, P.S.
David Templeton, Anchor Environmental
John Renda, RG, Anchor Environmental

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John A. Kitzhaber, M.D., Governor

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July 12, 2002

John Edwards
Anchor Environmental, Inc.
6650 SW Redwood Lane, Suite 110
Portland, Oregon 97224

**RE: Pre Remedial Investigation Approval**
**Brix Maritime Site**
**Portland, Oregon**
**ECSI No. 2364**

Dear John:

The Oregon Department of Environmental Quality (DEQ) has completed its review of your "*Response to June 11, 2002 DEQ Comments*" (Anchor letter dated July 8, 2002). This letter adequately addresses DEQ's comments. Therefore, DEQ approves implementation of the May 22, 2002 "*Pre-RI Assessment Work Plan*" (Anchor Environmental and the March 18, 2002 "*Work Plan (Addendum No. 1) for Groundwater Investigation*" (Hahn and Associates) contingent on implementing the modifications to the above work plans made in your July 8, 2002 letter.

DEQ recommends that dissolved oxygen be measured during groundwater monitoring event to assist in developing the site hydrogeologic conceptual site model by providing data regarding the chemical environment (e.g., oxidation/reduction) at the facility.

Based on our recent telephone conversation, I understand monitoring well installation is scheduled to begin Wednesday July 17, 2002. Please call me at (503) 229-5562 if the schedule has changed. Also please notify me in accordance with the Voluntary Agreement, prior to performing the groundwater monitoring well sampling.

Sincerely,

Rodney G. Struck, R.G.
Project Manager
Cleanup and Portland Harbor Program

Cc: Kim Johannessen, Johannessen & Associates
David Templeton, Anchor Environmental, Inc., Seattle
Frank Williamson, Foss
Bruce Brody-Heine, DEQ CU/PH
ECSI File No. 2364

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July 12, 2002

John Edwards
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6650 SW Redwood Lane, Suite 110
Portland, Oregon 97224

**RE: Pre Remedial Investigation Approval**
**Brix Maritime Site**
**Portland, Oregon**
**ECSI No. 2364**

Dear John:

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Sincerely,

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Project Manager
Cleanup and Portland Harbor Program

Cc: Kim Johannessen, Johannessen & Associates
David Templeton, Anchor Environmental, Inc., Seattle
Frank Williamson, Foss
Bruce Brody-Heine, DEQ CU/PH
ECSI File No. 2364

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July 8, 2002
99056

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JUL 9 2002
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NORTHWEST REGION

Rodney G. Struck, R.G.
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon, 97201-4987

**Re:** Response to June 11, 2002 DEQ Comments,
Pre-Remedial Investigation, Brix Maritime Site, ECSI No. 2364

Dear Rod:

The purpose of this letter is to provide written response to the above referenced comments by DEQ on the May 22, 2002 Pre-RI Assessment Work Plan prepared by Anchor Environmental, L.L.C. (Anchor) on behalf of Brix Maritime Company (Brix). Resolution of the issues addressed in the June 11, 2002 DEQ letter has resulted from various telephone conversations with DEQ, from a meeting on June 19, 2002 with DEQ, and from a revised monitoring well location map sent electronically to DEQ on June 27, 2002.

In your June 11, 2002 letter, DEQ's comments are divided into those addressing the Pre-RI Assessment Work Plan, and those addressing the Work Plan for Groundwater Investigation. The Work Plan for Groundwater Investigation (Hahn Associates, Inc., March 18, 2002) is incorporated by reference into the May 22, 2002 Pre-RI Assessment Work Plan.

**Pre-RI Assessment Work Plan Comments**

1. Page 2. Work Plan Tasks. Paragraph 2. Point of clarification. In our May 5, 2002 teleconference, I indicated that the groundwater work plan was acceptable for review as part of the Pre-RI. This was not intended to imply approval of the work plan.

*We understand your acceptance of this letter will include approval of the Pre-RI Assessment Work Plan.*

2. Page 2. Work Plan Tasks. Paragraph 3. DEQ may require additional monitoring wells be installed, based on the results of the initial groundwater elevation or groundwater quality monitoring to determine if source control or remedial actions are necessary. The Agreement requires that the full nature and extent (vertical and horizontal) of hazardous substance contamination be delineated.

*See response to Comment 2 on the Work Plan for Groundwater Investigation.*

3. Page 3. Deliverables. Paragraph 1. The technical memorandum summarizing the storm water system evaluation described in Paragraph 4 of the previous section is not discussed. Data from the installation of the monitoring wells (boring logs, water level measurements, field sampling sheets, tabulated field and analytical laboratory data, laboratory data sheets, etc.) should be included in the technical memorandum describing the monitoring well installation and sampling.

*Paragraph 4 of the Work Plan Tasks section states that the findings of the stormwater system evaluation will be provided to DEQ in a technical memorandum accompanying the results of the first round of groundwater sampling from the proposed monitoring wells. Data from the installation of the monitoring wells will also be included in the technical memorandum.*

4. Page 4. Schedule. A schedule is not provided for submitting the technical memorandum. This memorandum should be submitted within 30 days from receiving the final laboratory report.

*Agreed. This information may be submitted as part of the quarterly progress report, if the progress report is also due within 30 days of receiving the lab report.*

*During our June 19, 2002 meeting, Anchor pointed out that the stormwater catchments only drain the employee parking area, and are not within the drainage area of any industrial process or material handling areas. Anchor also noted, and DEQ acknowledged, that Brix follows best management practices for stormwater at the site, including maintaining filters in the catchment drains.*

**<u>Work Plan (Addendum No. 1) for Groundwater Investigation</u>**

1. Page 4. Section 4. The following objectives should be included:

    - Define the nature and extent of groundwater contamination; and
    - Assess potential preferential groundwater to surface water pathways at the site.

*Agreed.*

2. Page 5. Section 5.1.1. DEQ believes additional groundwater monitoring wells should be installed and the location of the proposed wells should be modified. DEQ recommends that we meet, as soon as possible, to agree upon potential well locations. It is DEQ's expectation that wells will be installed in the following areas:

- At least one well should be installed in potential source areas (i.e., near B-21, B-27/B-28);
- Approximate location where historic drainages discharged to the river (see 1961 aerial photograph); and
- Other silt low areas, where preferential groundwater discharge pathways may occur.

*Based on a review of site historic aerial photos, the location of pre-fill topographic drainage ways was evaluated to finalize the location of monitoring wells. On June 27, 2002, Anchor provided DEQ with a 1991 aerial photograph of the site with the 1961 pre-fill drainage swales marked on the photograph. The attached map (Figure 1) presents the location of the four proposed monitoring well locations. This map reflects a new location of MW-2 (5 to 10 feet southeast of former boring B-15) to place the well in the potential topographic low in the silt unit, and the addition of a fifth monitoring well to be placed approximately 15 feet map north of B-18. The intent of this additional well is to address DEQ's concerns regarding potential sources to borings B-17 and B-18, and to provide additional groundwater elevation data.*

3. A revised site plan should be prepared that is accurate and to scale. The scale/distances on the current maps do not appear to be consistent with the aerial photographs for the site. Please provide an overlay of the site onto the 1961 aerial photograph to locate additional wells.

*The attached map, Figure 1, with proposed monitoring well locations, is constructed on an aerial photo base dated 1991. The well locations were also evaluated using a 1961 site aerial photo with the photo scale adjusted to match the 1998 photo scale as closely as possible, as described in the response to DEQ comment 2.*

4. Page 5. Section 5.1.2; and Figure 7. Figure 7 shows the proposed well design which extends approximately 2/3 or 10-feet of the well screen into the Silty Clay Unit. The proposed well design is not acceptable to DEQ. In two locations, previous direct-push probes penetrated through a thin silt layer. For example, the sample from GP-19 collected a water sample from a sand layer below a thin silt layer (3-5 feet thick). Based on the conceptual site hydrogeologic model, DEQ recommends that the proposed wells be installed by tagging the silt layer and extending the well screen no more than approximately 2 feet into the top of the silt.

*Anchor understands DEQ concerns that future monitoring wells be constructed to minimize the possibility of cross contamination between the "fill groundwater unit" and the underlying silt. For all future wells where the "fill groundwater unit" is encountered, that unit will be screened with not more than two feet of screen into the underlying silt. Anchor pointed out to DEQ during the June 19, 2002 meeting that the "fill groundwater unit" will likely dry up in late summer or early fall, meaning that*

*some wells cannot be sampled. DEQ was also reminded that the silt underlying the fill is the pre-fill soil surface. The pre-fill soil surface has been very silty where previously encountered in site borings, but it is possible that the pre-fill soils are sandy or clayey in some areas on site. Therefore, the well screen design may vary depending upon the geologic units encountered at each borehole location.*

*At the planned location for well MW-4, there will probably be very little saturated fill; therefore, the well will likely have to be screened primarily in the riverbank alluvium below the road fill.*

5. Page 6. Section 5.2. Groundwater elevations should be monitored on a monthly basis for a 6 to 12 month period.

*We agree that groundwater levels should be measured monthly (no sampling or analysis).*

6. Page 6. Section 5.3. The schedule of the second monitoring event should be defined. The second event should represent anticipated high water level conditions.

*With DEQ's written approval of this letter and the Pre-RI Assessment Work Plan, we anticipate fieldwork to occur on July 17, 2002. Based on previous experience, the groundwater levels in July will be only slightly lower than the spring high groundwater levels. Therefore, we anticipate that the July groundwater data will be representative of the high water table season. By September 2002, the river and groundwater levels are generally near the yearly low elevation, and we plan to sample during late September. Therefore, we will consider the July and September sampling dates as representative of seasonal water table highs and lows.*

7. Page 6, Section 5.3 and Table 1. It is DEQ's expectation that in addition to the groundwater analyses listed in this section that samples collected during the first sampling event will also be analyzed for the following constituents:

    - Volatile Organic Compounds (full list) by EPA Method 8260B (Note: BETX will be included);
    - Total Petroleum Hydrocarbons (Oregon TPH-HCID) and quantified if detected (Oregon TPH-Gx, TPH-Dx); and
    - Total and dissolved lead.

*Even though we do not anticipate that these chemicals are present, we agree to perform the lab tests for the July sampling event. If they are not present, these chemicals will not be included in the fall sampling event.*

8. Page 7. Section 6.1. See Comment No. 3.

*See Response to DEQ Comment 3.*

9. Page 8. Section 6.4. DEQ does not concur with the statement that "...soils have been well characterized" at this time. DEQ requests Brix review the available data set to assess if adequate polycyclic aromatic hydrocarbons (PAHs) and VOC data have been collected to be representative of observed petroleum contamination concentrations in soil. Additional data may be needed. For this investigation, DEQ expects that soil contamination encountered beyond the current understanding of lateral extent be sampled and analyzed for the appropriate contaminants of interest.

*Representative soil samples will be obtained during drilling prior to the installation of the monitoring wells. The soil samples will be screened in the field using visual and olfactory indicators of potential petroleum contamination. The results of the field screening will be logged on the borehole records. If the field screening indicates possible petroleum contamination of soil in an area of the site where previous site investigations had not indicated the presence of soil contamination, a representative sample will be retained from that boring for laboratory testing. If multiple samples from a boring show field evidence of petroleum contamination, the sample with the apparent highest concentrations will be retained for laboratory testing. The designated soil samples will be tested for the same constituents identified in the response to DEQ comment 7.*

10. Page 8. Section 6.5. Monitoring well purging criteria should be revised. Specifically, well purging should continue until water quality parameters stabilize as defined below:

    - pH: +/- 0.1 unit
    - Temperature: +/- 1 $^{0}$ C
    - Specific Conductivity: +/- 10%
    - Dissolved Oxygen: +/- 10%

*The above requested monitoring well purging criteria will be used, with the exception of dissolved oxygen (DO). DO testing is not needed during well purging to determine if representative groundwater is being obtained for sampling.*

11. Page 8. Section 6.5. Please revise the second sentence to read "....with new polyethylene tubing placed near or at the top of the water column."

*New poly tubing will be placed near or at the top of the water column. This is Anchor standard procedure.*

12. Page 9. Section 6.6. Analytical detection limits should be reviewed prior to implementing the field investigation to ensure that the anticipated laboratory detection limits are equal to or less than the anticipated project screening levels (e.g., risk-based concentrations; ecological screening levels).

*We will review the DEQs proposed source control screening concentrations. However, in some cases the screening concentration may be below the laboratory method detection limit. In these situations, we will not consider undetected values (U) above the screening concentrations as a concern.*

13. Appendix A. Please add depth of pump intake to the well purging and well sampling summary sheets.

*Agreed.*

We look forward to receiving DEQ's acceptance of this letter and approval of the May 22, 2002 Pre-RI Assessment Work Plan so that work may proceed.

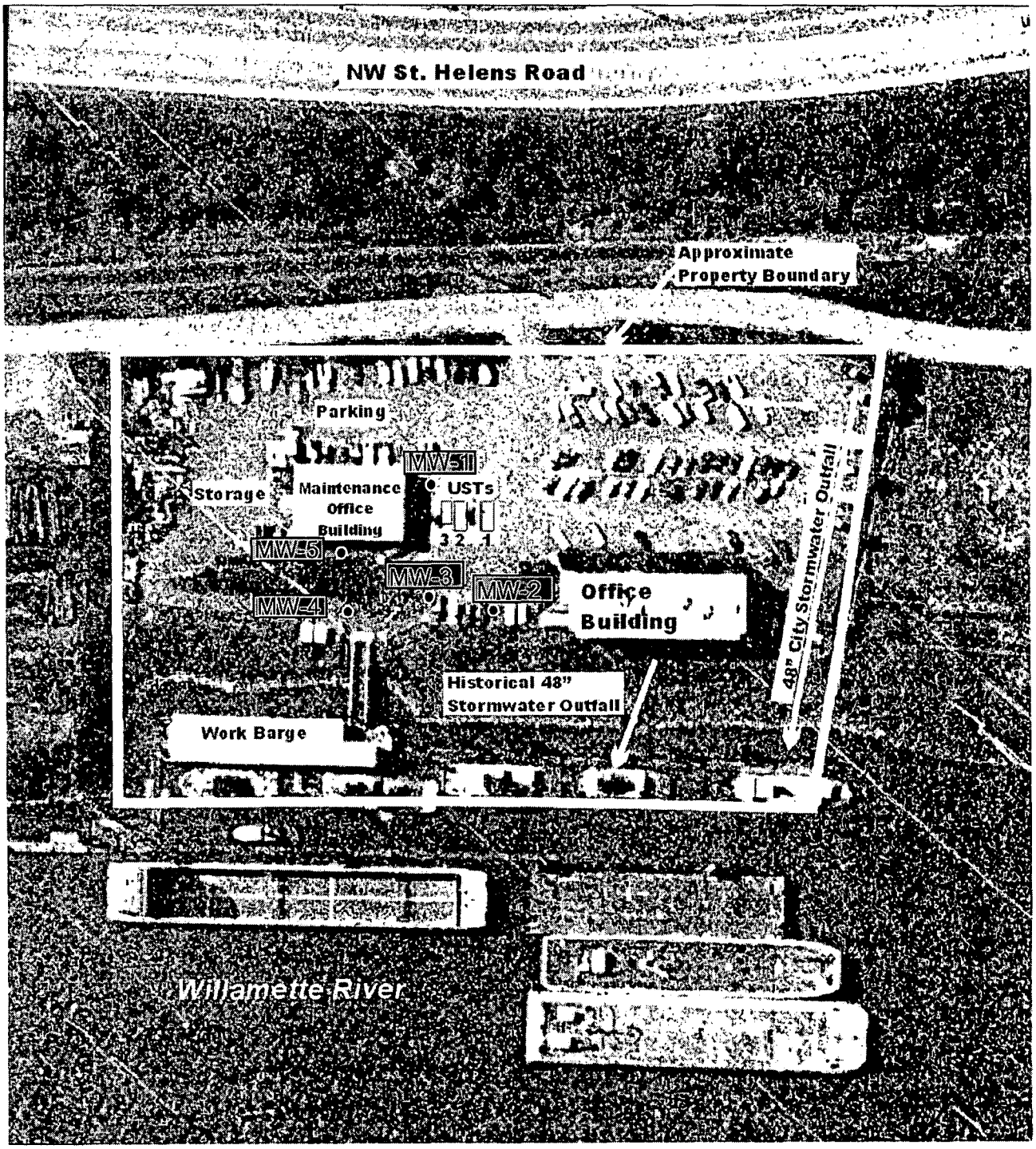
Sincerely,

John Edwards, RG, CEG

Anchor Environmental, L.L.C.

Attachment: Figure 1, Site Map

Cc: Frank Williamson, Foss Maritime
Kim Johannessen, Johannessen & Associates, P.S.
David Templeton, Anchor
John Renda, Anchor




MW-1 Proposed well location

Figure 1
Site Map - Brix Maritime

ANCHOR ENVIRONMENTAL, L.L.C.

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
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June 11, 2002

John Edwards
Anchor Environmental, Inc.
6650 SW Redwood Lane, Suite 110
Portland, Oregon 97224

David Templeton
Anchor Environmental, Inc.
1411 4th Avenue, Suite 1210
Seattle, WA 98101

**RE: DEQ Comments - Pre Remedial Investigation**
**Brix Maritime Site**
**Portland, Oregon**
**ECSI No. 2364**

Dear Mr. Edwards and Mr. Templeton:

The Oregon Department of Environmental Quality (DEQ) has completed its review of the "*Pre-RI Assessment Work Plan.*" This work plan was prepared by Anchor Environmental, Inc. and is dated May 22, 2002. The work plan incorporates by reference the March 18, 2002 "*Work Plan (Addendum No. 1) for Groundwater Investigation*" prepared by Hahn and Associates. DEQ's comments on these documents are provided below.

DEQ requests that a written response be provided to these comments prior to implementing the monitoring well installation and sampling program. Prior to providing a written response, we would like to meet with you to agree upon monitoring well locations. If possible, we would like to meet with you in the next couple of weeks to discuss these comments.

**Pre-RI Assessment Work Plan**

1. Page 2. Work Plan Tasks. Paragraph 2. Point of clarification. In our May 5, 2002 teleconference, I indicated that the groundwater work plan was acceptable for review as part of the Pre-RI. This was not intended to imply approval of the work plan.

2. Page 2. Work Plan Tasks. Paragraph 3. DEQ may require additional monitoring wells be installed, based on the results of the initial groundwater elevation or groundwater quality monitoring to determine if source control or remedial actions are necessary. The Agreement requires that the full nature and extent (vertical and horizontal) of hazardous substance contamination be delineated.

3. Page 3. Deliverables. Paragraph 1. The technical memorandum summarizing the storm water system evaluation described in Paragraph 4 of the previous section is not discussed. Data from the installation of the monitoring wells (boring logs, water level measurements, field sampling sheets, tabulated field and analytical laboratory data, laboratory data sheets, etc.) should be included in the technical memorandum describing the monitoring well installation and sampling.

4. Page 4. Schedule. A schedule is not provided for submitting the technical memorandum. This memorandum should be submitted within 30 days from receiving the final laboratory report.

**Work Plan (Addendum No. 1) for Groundwater Investigation**

1. Page 4. Section 4. The following objectives should be included:

    - Define the nature and extent of groundwater contamination; and
    - Assess potential preferential groundwater to surface water pathways at the site.

2. Page 5. Section 5.1.1. DEQ believes additional groundwater monitoring wells should be installed and the location of the proposed wells should be modified. DEQ recommends that we meet, as soon as possible, to agree upon potential well locations. It is DEQ's expectation that wells will be installed in the following areas:

    - At least one well should be installed in potential source areas (i.e., near B-21, B-27/B-28);
    - Approximate location where historic drainages discharged to the river (see 1961 aerial photograph); and
    - Other silt low areas, where preferential groundwater discharge pathways may occur.

3. A revised site plan should be prepared that is accurate and to scale. The scale/distances on the current maps do not appear to be consistent with the aerial photographs for the site. Please provide an overlay of the site onto the 1961 aerial photograph to locate additional wells.

4. Page 5. Section 5.1.2; and Figure 7. Figure 7 shows the proposed well design which extends approximately 2/3 or 10-feet of the well screen into the Silty Clay Unit. The proposed well design is not acceptable to DEQ. In two locations, previous direct-push probes penetrated through a thin silt layer. For example, the sample from GP-19 collected a water sample from a sand layer below a thin silt layer (3-5 feet thick). Based on the conceptual site hydrogeologic model, DEQ recommends that the proposed wells be installed by tagging the

silt layer and extending the well screen no more than approximately 2 feet into the top of the silt.

5. Page 6. Section 5.2. Groundwater elevations should be monitored on a monthly basis for a 6 to 12 month period.

6. Page 6. Section 5.3. The schedule of the second monitoring event should be defined. The second event should represent anticipated high water level conditions.

7. Page 6, Section 5.3 and Table 1. It is DEQ's expectation that in addition to the groundwater analyses listed in this section that samples collected during the first sampling event will also be analyzed for the following constituents:

    - Volatile Organic Compounds (full list) by EPA Method 8260B (Note: BETX will be included);
    - Total Petroleum Hydrocarbons (Oregon TPH-HCID) and quantified if detected (Oregon TPH-Gx, TPH-Dx); and
    - Total and dissolved lead.

8. Page 7. Section 6.1. See Comment No. 3.

9. Page 8. Section 6.4. DEQ does not concur with the statement that "...soils have been well characterized" at this time. DEQ requests Brix review the available data set to assess if adequate polycyclic aromatic hydrocarbons (PAHs) and VOC data have been collected to be representative of observed petroleum contamination concentrations in soil. Additional data may be needed. For this investigation, DEQ expects that soil contamination encountered beyond the current understanding of lateral extent be sampled and analyzed for the appropriate contaminants of interest.

10. Page 8. Section 6.5. Monitoring well purging criteria should be revised. Specifically, well purging should continue until water quality parameters stabilize as defined below:

    - pH: +/- 0.1 unit
    - Temperature: +/- 1 $^{0}$ C
    - Specific Conductivity: +/- 10%
    - Dissolved Oxygen: +/- 10%

11. Page 8. Section 6.5. Please revise the second sentence to read "....with new polyethylene tubing placed near or at the top of the water column."

12. Page 9. Section 6.6. Analytical detection limits should be reviewed prior to implementing the field investigation to ensure that the anticipated laboratory detection limits are equal to or

less than the anticipated project screening levels (e.g., risk-based concentrations; ecological screening levels).

13. Appendix A. Please add depth of pump intake to the well purging and well sampling summary sheets.

Please call me at your earliest convenience at (503) 229-5562 to schedule a meeting to discuss these comments or if you have any questions regarding our comments.

Sincerely,

Rodney G. Struck, R.G.
Project Manager
Cleanup and Portland Harbor Program

Cc: Kim Johannessen, Johannessen & Associates
Frank Williamson, Foss
Bruce Brody-Heine, DEQ CU/PH
ECSI File No. 2364

ANCHOR
ENVIRONMENTAL, L.L.C.

6650 SW Redwood Lane, #110
Portland, OR 97224
Phone 503.670.1108
Fax 503.670.1128
www.anchorenv.com

RECEIVED
MAY 23 2002
DEPT OF ENVIRONMENTAL QUALITY
NORTHWEST REGION

May 22, 2002
990056-01

Rodney G. Struck, R.G.
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-5263

**Re:** Pre-RI Assessment Work Plan, Brix Maritime Site, Portland, Oregon

Dear Rod:

Anchor Environmental L.L.C. (Anchor Environmental) has prepared this Pre-Remedial Investigation Assessment Work Plan (Work Plan) to guide investigation activities at the Brix Maritime Company (Brix) site in Portland, Oregon. Brix has elected to conduct this Work Plan to determine if a Remedial Investigation (RI) is necessary at the site.

The Work Plan requirements are described in section III of Attachment B to the May 8, 2002 Voluntary Agreement for Remedial Investigation and Source Control Measures (Agreement) between the Oregon Department of Environmental Quality (DEQ) and Brix. The agreement states that the Work Plan shall describe the following:

- Objectives
- Deliverables
- Schedule
- Specific tasks

## OBJECTIVES

The objectives of this Pre-RI Assessment are to determine which media and pathways may be affected by site-related hazardous substances and to determine whether further action is needed to assure protection of present and future public health, safety and welfare, or the environment.

Section III of Attachment B to the Agreement also states that no further work shall be required under this Agreement and SOW if, based on historical information and the results of the Pre-RI Assessment or subsequent facility investigation, DEQ reasonably determines that there is no likely present source and pathway for the release of hazardous substances to surface water or sediments at or from Respondent's facility for which DEQ could require a removal action or remedial investigation under ORS 465.200 *et seq.*

## WORK PLAN TASKS

You and I discussed the Work Plan requirements in a teleconference on May 15, 2002. You said that the review of facility operations and history that is normally required in a Pre-RI Assessment is not needed for this site because the historical information provided to DEQ by Brix in previously submitted documents is satisfactory.

This Work Plan proposes to conduct a groundwater investigation as described in the March 18, 2002 Work Plan for Groundwater Investigation prepared by Hahn and Associates (HAI) for Brix. You indicated in our May 15, 2002 teleconference that the March 18, 2002 Work Plan is satisfactory to DEQ.

The HAI Work Plan includes the installation of four monitoring wells to establish groundwater flow direction and gradient, evaluate seasonal trends in groundwater and surface water elevations, evaluate seasonal trends in groundwater quality, and evaluate the groundwater to surface water pathway. Under this Work Plan, Anchor Environmental will obtain groundwater samples from the wells at least twice, during seasonal high and low water table periods. The groundwater quality data will be compared with DEQ's water quality source control screening criteria when the criteria are finalized. If the concentrations exceed the screening criteria, Brix will propose additional assessment for consideration by DEQ. If the groundwater data pass the screening criteria, the groundwater pathway will not require further investigation under the Agreement.

You also indicated in our teleconference that an evaluation of stormwater as a potential pathway to the river should be addressed in the Work Plan. Stormwater from the employee parking areas is collected and routed to the embankment via two storm water pipes. In addition, two City of Portland stormwater outfalls pass through the property. One of the outfalls was plugged and abandoned in place in 1999 and the other discharges through the property, to the Willamette River. Potential impacts associated with these outfalls are not included in this assessment. Anchor Environmental will evaluate the design and operation of the Brix stormwater collection system to determine if further evaluation of the system is warranted. The findings of the stormwater system evaluation will be provided to DEQ in a technical memorandum accompanying the results of the first round of groundwater sampling from the proposed monitoring wells.

## DELIVERABLES

Preliminary sampling results and other data generated from the Pre-RI Assessment will be presented in quarterly progress reports. Following completion of the Pre-RI Assessment, a report will be prepared covering the findings of the investigation, including figures and tables presenting the results of the sampling and analysis. The report will present conclusions regarding the likelihood of past or present source(s) and pathway(s) for the release of hazardous substances to sediments adjacent to the Brix facility. The report will include a

determination of the need for a Remedial Investigation and whether a re-evaluation of the priority of the Brix facility is appropriate.

## SCHEDULE

Within 30 days of approval of this Work Plan, monitoring wells will be installed at the Brix facility. The monitoring wells will be developed and sampled within one to two weeks of installation. An additional sampling event will occur during low water (September/October 2002). A Pre-RI Assessment report will be submitted to the DEQ within 30 days of receiving the laboratory analytical results for the low water sampling round.

Sincerely,

for

John E. Edwards, R.G., C.E.G.
Anchor Environmental, L.L.C.

Cc: Kim Johannessen, Johannessen & Associates, P.S.
David Templeton, Anchor Environmental, L.L.C.

ESCI -com

Oregon
John A. Kitzhaber, M.D., Governor

**Department of Environmental Quality**
**Northwest Region Portland Office**
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May 8, 2002

Ms. Kim Johannessen
Johannessen & Associates
5413 Meridian Ave. N., Suite C
Seattle, Washington 98103-6138

**Re: Voluntary Agreement for Remedial Investigation and Source Control Measures**
**Brix Maritime Company**
**ECSI 2364**
**LQDVC-NWR-02-03**

Dear Ms. Johannessen:

Enclosed is an executed copy of the Voluntary Agreement for Remedial Investigation and Source Control Measures for the Brix Maritime Company facility located in Portland, Oregon. The Oregon Department of Environmental Quality's acting Administrator of the Northwest Region signed this Agreement today. Therefore, the effective date of this Agreement is May 8, 2002.

DEQ looks forward to working with you to address the environmental concerns at the Brix facility. If you have any questions, please do not hesitate to contact me at (503) 229-5562.

Sincerely,

Rodney G. Struck
Project Manager
Portland Harbor and Voluntary Cleanup Section

Enclosures: Voluntary Agreement
Attachment A: Site Maps
Attachment B: Scope of Work

cc: Mike Rosen, NWR/DEQ w/o enclosures
Eric Blischke, NWR/DEQ w/o enclosures
Bruce Brody-Heine; NWR/DEQ w/o enclosures
Lynne Perry, DOJ w/ enclosures
Norm King, HQ/DEQ w/ enclosures
ESCI File No. 2364 w/ enclosures
John Edwards, Anchor Environmental w/ enclosures
David Templeton, Anchor Environmental w/ enclosures

2364
cm

J&A

JOHANNESSEN & ASSOCIATES, P.S.
ENVIRONMENTAL, LAND USE & REGULATORY LAW

May 2, 2002

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MAY - 6 2002
DEPT OF ENVIRONMENTAL QUALITY
NORTHWEST REGION

Rodney G. Struck, Project Manager
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Brix Maritime Company, 9030 NW St. Helens Road, Portland, Oregon

Dear Mr. Struck:

Enclosed please find the three duplicate originals of the Voluntary Agreement for Remedial Investigation and Source Control Measures, which have been executed by Larry Johnson of Brix Maritime Company. I understand that you will have them signed by DEQ's Northwest Region Administrator and then return a signed original to us. We would appreciate it if you would send an e-mail to Kim Johannessen at *kmj@johanassocs.com* confirming the date the agreement was signed by DEQ.

Please feel free to contact me at (206) 632-2000 if you have any questions.

Sincerely,

Alison J. Avery

Alison J. Avery
Paralegal

AJA:dmn
Enclosures

cc: Brix Maritime Company (*w/o enclosures*)

5413 Meridian Ave. N., Suite C · Seattle, WA 98103-6138
Phone: (206) 632-2000 Fax: (206) 632-2500
E-mail: enviro.law@johanassocs.com

Confidential Business Information

Oregon
John A. Kitzhaber, M.D., Governor

**Department of Environmental Quality**
**Northwest Region Portland Office**
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April 23, 2002

Ms. Kim Johannessen
Johannessen & Associates
5413 Meridian Ave. N., Suite C
Seattle, Washington 98103-6138

**Re: Voluntary Agreement for Remedial Investigation and Source Control Measures**
**Brix Maritime Company**
**ECSI 2364**
**LQDVC-NWR-02-03**

Dear Ms. Johannessen:

Enclosed are three originals of the Voluntary Agreement for Remedial Investigation and Source Control Measures and Scope of Work prepared by the Oregon Department of Environmental Quality (DEQ). This Agreement between DEQ and Brix Maritime Company (Brix) was prepared for the Brix facility located at 9030 N.W. St. Helens Road in Portland, Oregon. These documents reflect the changes requested by you on Brix's behalf, in redline versions of the draft document dated April 9 and April 18, 2002.

Please review these documents and have all three copies signed by the designated Brix official. Once the three originals have been signed, please return them to me. I will have them signed by DEQ's Northwest Region Administrator and a signed original will be returned to Brix. The effective date of the Agreement is the date it is signed by DEQ.

If you have any questions, please do not hesitate to contact me at (503) 229-5562.

Sincerely,

Rodney G. Struck
Project Manager
Portland Harbor and Voluntary Cleanup Section

Enclosures: Voluntary Agreement
Attachment A: Site Maps
Attachment B: Scope of Work

cc: Mike Rosen, NWR/DEQ w/o attachments
Eric Blischke, NWR/DEQ w/o attachments
Bruce Brody-Heine; NWR/DEQ w/o attachments
Lynne Perry, DOJ w/attachments

**********
*** TX REPORT ***
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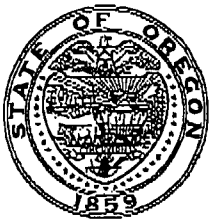

# Oregon

John A. Kitzhaber, M.D., Governor

**Department of Environmental Quality**
**Northwest Region Portland Office**
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
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**Via Facsimile & By Regular Mail**

April 17, 2002

| Post-it® Fax Note 7671 | Date 4-17-02 | # of page 1 |
|---|---|---|
| To Kim Johannessen | From Rod Struck | |
| Co./Dept. Johannessen & Assoc. | Co. DEQ | |
| Phone # 206-632-2000 | Phone # 503-229-5562 | |
| Fax # 206-632-2500 | Fax # 503-229-6899 | |

Ms. Kim Johannessen
Johannessen & Associates
5413 Meridian Ave. N., Suite C
Seattle, Washington 98103-6138

**Re: Brix Maritime Company**
**9030 N.W. St. Helens Road, Portland Oregon**
**ESCI No. 2364**

Dear Ms. Johannessen:

The purpose of this letter is to provide a written response to a your comment on the draft Voluntary Agreement for Remedial Investigation and Source Control Measures, between the Oregon Department of Environmental Quality (DEQ) and Brix Maritime Company, sent to you via electronic mail on March 2, 2002. In your March 9, 2002, redline version of the agreement you proposed adding the following language to Section II.J.2.

> "DEQ shall not include, and Brix shall not be required to reimburse under this Agreement, the costs incurred by DEQ or the Department of Justice (DOJ) associated with preparation of enforcement documents not formally issued to Brix."

This language is not acceptable to DEQ. The costs incurred preparing the Unilateral Order for the Brix Maritime facility are recoverable under Oregon Revised Statute (ORS 465.255 and 465.260). As defined by ORS 465.200(23), "'remedial action costs' means reasonable costs which are attributable to or associated with a removal or remedial action at a facility, including but not limited to the costs of administration, investigation, legal or enforcement activities,

Com

J&A

JOHANNESSEN & ASSOCIATES, P.S.
ENVIRONMENTAL, LAND USE & REGULATORY LAW

RECEIVED
FEB 4 2002
DEPT OF ENVIRONMENTAL QUALITY
NORTHWEST REGION

February 1, 2002

***Via Facsimile & By Regular Mail***

Rodney G. Struck, R.G.
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Brix Maritime Company, 9030 NW St. Helens Road, Portland, Oregon

Dear Rod:

Thank you for your letter dated November 30, 2001 and your January 9, 2002 response to our request for clarification on issues relating to the Voluntary Agreement and Scope of Work for Remedial Investigation and Source Control Measures. You indicated in your response that the terms of the "Voluntary Agreement" and Scope of Work were not negotiable, but clarified that there are no specific statutory or regulatory provisions that would prohibit Brix Maritime Company ("Brix") from gathering and reporting additional soil and groundwater data at the above-referenced property ("the Site").

Brix stands by its Sampling Results Report and the conclusions contained therein, which report was received by DEQ on September 28, 2001. It does not intend to make any revisions to that report at this time. We do not agree that there is clear evidence to support a determination that further investigation or cleanup is required at the Site. Furthermore, the Voluntary Agreement proposed by DEQ encompasses a wide range of activities in addition to remedial investigation work. In light of the findings and conclusions in our report, we do not believe that it would be reasonable for Brix to enter into such an open-ended agreement with DEQ at this time.

Notwithstanding the conclusions in our Sampling Results Report and the numerous reports previously provided to DEQ, we recognize that DEQ believes that there is insufficient evidence for DEQ to endorse the conclusions contained in our report, including our conclusion that the former underground storage tank is not a source of petroleum-related compounds to the river. Your letter of November 30, 2001 proposes several additional investigations and data collection efforts that would help DEQ address its uncertainty. We have reviewed DEQ's comments and have identified the following items as being the most likely to provide the most useful information for resolving DEQ's concerns on a short-term and timely basis:

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Phone: (206) 632-2000 Fax: (206) 632-2500
E-mail: envirolaw@johanassocs.com

1. Develop a preliminary conceptual site hydrogeologic "model".

2. Based on the model, determine if groundwater monitoring is needed to:
   a. characterize the spatial extent of detectable chemicals in groundwater;
   b. determine the direction of groundwater flow.

3. Install groundwater wells as necessary to meet the above monitoring needs.

4. Monitor those wells on a frequency and duration as necessary to meet the above monitoring needs, to determine the spatial extent of detected constituents of concern in groundwater and groundwater flow conditions, and to further support the conclusions contained in our report.

Brix will develop and submit the preliminary conceptual site hydrogeologic model, select appropriate monitoring well locations, and complete installation and sampling of those wells. A work plan will be submitted to DEQ prior to installation of the wells, which will detail the preliminary conceptual site hydrogeologic model, the numbers, locations, and screened depths of proposed monitoring wells, and the frequency and duration of proposed physical and chemical sampling of those wells.

Brix has directed its consultants to begin preparing the preliminary conceptual site hydrogeologic model and work plan, with a goal of submitting the document to DEQ as soon as possible but in any event no later than March 8, 2002. If DEQ is unable or does not wish to review the work plan prior to its implementation, please advise me. If DEQ does wish to review a copy of the work plan, a meeting or conference call can be scheduled to discuss DEQ's comments or concerns after you have completed your review. Brix's goal is to work with DEQ to resolve any issues prior to installation of the wells, with completion of the installation and sampling of the monitoring wells as soon as possible but in any event no later than May 1, 2002.

If you have any questions regarding Brix's plans for moving forward at the Site, please do not hesitate to contact me at (206) 632-2000.

Very truly yours,

Kim Maree Johannessen

Kim Maree Johannessen

KMJ:dmn
cc: Brix Maritime Company
Carl Stivers, Anchor Environmental, L.L.C.
Guy Tanz, Hahn and Associates, Inc.

J&A

JOHANNESSEN & ASSOCIATES, P.S.
ENVIRONMENTAL, LAND USE & REGULATORY LAW

January 8, 2002

***Via Facsimile & By Regular Mail***

Rodney G. Struck, R.G.
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Brix Maritime Company, 9030 NW St. Helens Road, Portland, Oregon

Dear Rod:

In order to fully respond to your letter dated November 30, 2001, we would appreciate receiving written clarification from the Oregon Department of Environmental Quality ("DEQ") regarding the following issues:

1. The extent to which the terms of the Voluntary Agreement for Remedial Investigation and Source Control Measures ("Agreement") and Scope of Work for Remedial Investigation and Source Control Measures ("SOW"), which were enclosed with your November 30, 2001 letter, are or are not negotiable;

2. A list of the companies who have entered into the Voluntary Agreement and SOW as drafted; and

3. The specific statutory and regulatory provisions, if any, that would prohibit Brix Maritime Company ("Brix") from moving forward with the gathering and reporting of additional soil and/or groundwater data at its property in the absence of such an Agreement and SOW.

We continue to believe that working together to confirm Brix's conclusion that its property is not an historical or ongoing source to the river is the best approach for both parties. If you have any questions regarding this request, please do not hesitate to call me at (206) 632-2000.

Very truly yours,

Kim Maree Johannessen

Kim Maree Johannessen

KMJ:dmn
cc: Brix Maritime Company

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Phone: (206) 632-2000 Fax: (206) 632-2500
E-mail: envirolaw@johanassocs.com

COM
2364

Oregon
John A. Kitzhaber, M.D., Governor

**Department of Environmental Quality**
**Northwest Region Portland Office**
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November 30, 2001

Ms. Kim Johannessen
Johannessen & Associates
5413 Meridian Ave. N., Suite C
Seattle, Washington 98103-6138

**Re: Preliminary Assessment**
**Brix Maritime Company**
**9030 N.W. St. Helens Road**
**Portland Oregon**
**ESCI No. 2364**

Dear Ms. Johannessen:

The Oregon Department of Environmental Quality (DEQ) has completed its review of the "*Sampling Results Report in Support of the Preliminary Assessment of the Brix Maritime Company Facility.*" This report was prepared by Anchor Environmental, Inc. and was received by DEQ on September 28, 2001.

**Preliminary Assessment**: This report in conjunction with the "*Supplemental Preliminary Assessment Summary Report*" (Anchor Environmental, October 2000) and the "*Work Plan for Underground Storage Tank Investigation*" (Hahn and Associates, May 2001) are considered Preliminary Assessment (PA) and Expanded Preliminary Assessment (XPA) equivalents. Completion of the PA/XPA satisfies the November 18, 1999 Voluntary Cleanup Letter Agreement between DEQ and Foss Maritime. However, DEQ does not agree with the conclusions or the risk evaluation that are presented in this report. It is our opinion that the conclusions contained in the report are based on an incomplete understanding of the nature and extent of contamination, data of limited quality (i.e., screening level groundwater data) and speculative arguments. Therefore, the risk evaluation presented in this report and conclusion that "no further investigation" is needed are not accepted by DEQ. DEQ's detailed comments on the report are presented in Attachment A.

**Need for Further Investigation**. The "*Supplemental Preliminary Assessment Summary Report*" documents the presence of hazardous substances in site soil and groundwater above risk-based screening levels for human health and ecological receptors. Therefore, DEQ has determined that further investigation is needed to assure protection of present and future public health, safety, welfare or the environment and requests that Brix Maritime perform a remedial investigation (RI) in accordance with the Environmental Cleanup Law, Oregon Revised Statutes (ORS) 465.200 *et seq*. The objective of the RI will be to fully define the nature, and extent of releases of hazardous substances to the upland portion of the site, determine whether source control measures are necessary, and evaluate potential impacts to the Willamette River.

The Brix facility is located within a portion of the Willamette River known as the Portland Harbor. Portland Harbor was designated a National Priorities List (NPL) site (i.e., Superfund) by the U.S. Environmental Protection Agency in December 2000. Regulatory oversight of the Portland Harbor Superfund site is being jointly managed by DEQ and EPA. Under the Memorandum of Understanding (MOU) between DEQ and EPA, DEQ is responsible for the oversight of investigations at upland facilities, such as the Brix facility, and EPA is responsible for oversight of in water (i.e., sediment) activities on a harborwide basis. DEQ is responsible for identifying current and historic sources of sediment contamination and source control measures.

DEQ proposes that your performance of the RI be governed by the Voluntary Agreement (Agreement) developed specially for sites located within the Portland Harbor Superfund site. A draft Agreement and Scope of Work (SOW) are enclosed for your review. It is DEQ's expectation an Agreement can be signed by February 1, 2002. Please notify me no later than December 18, 2001 of Brix's intent to enter into the Agreement. If Brix intends to move forward under this Agreement, DEQ requests that any questions regarding the enclosed Agreement and SOW be resolved no later than 45 calendar days from the date of this letter. Please be advised that DEQ does not intend to negotiate or revise the substantive terms of this standard Agreement or the SOW developed for Portland Harbor sites.

If you indicate that Brix is unwilling to enter into a Voluntary Agreement, DEQ will exercise all remedies available to it under the Environmental Cleanup Law to ensure that necessary investigations are undertaken. Finally, please be advised that DEQ is required by ORS 465.330 to recover remedial action costs incurred by DEQ.

DEQ looks forward to working with you to address the environmental concerns at the Brix facility. You may reach me at (503) 229-5562 to discuss site specific aspects of your project, questions regarding the Agreement or SOW, DEQ oversight costs, or possible DEQ actions as a result of non-compliance.

Sincerely,

Rodney G. Struck, R.G.
Project Manager
Voluntary Cleanup and Portland Harbor Section

Enclosures: Attachment A – DEQ Comments
Draft Voluntary Agreement for Remedial Investigation and Source Control Measures
Scope of Work for Remedial Investigation and Source Control Measures

cc: Eric Blischke, DEQ/NWR w/o enclosure
Lynne Perry, DOJ
Karl Stivers, Anchor w/o enclosure
ECSI File No. 2364
Mike Rosen, DEQ/NWR w/o enclosure
Bruce Brody-Heine, DEQ/NWR w/o enclosure
Guy Tanz, Hahn & Associates w/o enclosure

DEQ-DC1

Oregon
John A. Kitzhaber, M.D., Governor

**Department of Environmental Quality**
**Northwest Region Portland Office**
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
FAX (503) 229-6945
TTY (503) 229-5471

October 3, 2001

Ms. Kim Johannessen
Johannessen & Associates
5413 Meridian Ave. N., Suite C
Seattle, Washington 98103-6138

**Re: Preliminary Assessment**
**Brix Maritime Company**
**9030 N.W. St. Helens Road**
**Portland Oregon**
**ESCI No. 2364**

Dear Ms. Johannessen:

Thank you for your recent submittal to the Department of Environmental Quality's (DEQ) Voluntary Cleanup and Portland Harbor Section. The report titled "*Sampling Results Report in Support of the Preliminary Assessment of the Brix Maritime Company Facility*" was prepared by Anchor Environmental, Inc. and was received by DEQ on September 28, 2001. This letter acknowledges receipt of your submittal. We anticipate that we can complete our review and provide comments by November 16, 2001.

Please do not hesitate to call me at (503) 229-5562, if you have any questions.

Sincerely,

Rodney G. Struck, R.G.
Project Manager
Voluntary Cleanup and Portland Harbor Section

cc: ECSI File No. 2364
Bruce Brody-Heine, DEQ/NWR
Karl Stivers, Anchor Environmental
Guy Tanz, Hahn & Associates

ANCHOR
ENVIRONMENTAL, L.L.C.

1411 4th Avenue, Suite 1210
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Phone 206.287.9130
Fax 206.287.9131
www.anchorenv.com

September 27, 2001
99-056-01

Rodney G. Struck, R.G.
Project Manager
Voluntary Cleanup and Portland Harbor Section
Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

RECEIVED
SEP 28 2001
DEPT OF ENVIRONMENTAL QUALITY
NORTHWEST REGION

**Re:** Sampling Results Report for the Brix Maritime Site.

Dear Rod:

Please find attached one full copy of the Sampling Results Report for the Brix Maritime Site. The report presents the results of the groundwater and soil sampling recently conducted at the site and our evaluation of those results. From this evaluation, our conclusion is that no further remediation or investigation of groundwater or soils for the purposes of determining potential sources to the river is warranted.

Please let me know if you would like additional copies of the report. Thank you for your attention to this matter.

Sincerely,

Carl Stivers

Anchor Environmental, L.L.C.

cc: Kim Johannessen
Guy Tanz
David Templeton
Frank Williamson

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

July 3, 2001

Ms. Kim Johannessen
Johannessen & Associates
5413 Meridian Ave. N., Suite C
Seattle, Washington 98103-6138

**Re: Expanded Preliminary Assessment**
**Brix Maritime Company**
**9030 N.W. St. Helens Road**
**Portland Oregon**
**ESCI No. 2364**

Dear Ms. Johannessen:

The purpose of this letter is to follow-up on our meeting last week. It is our goal to work cooperatively with the Brix team to address the outstanding issues at the facility and to make a determination as to whether the site is currently or has the potential to contribute hazardous substances to the Willamette River.

During our meeting, the preliminary data from the recently completed investigation of the underground storage tanks and lube oil was presented. Based on our cursory review, we identified the following concerns:

- Need for groundwater monitoring wells. DEQ believes wells are needed to assess the groundwater pathway to the river and to satisfy DEQ's leaking underground storage tank rules. Wells would be used define groundwater flow directions, produce groundwater data of acceptable quality; and assess potential impacts to the river.
- Adequacy of constituent analyses. DEQ requested Brix review the available data set to assess if adequate polycyclic aromatic hydrocarbon (PAH) and volatile organic compound (VOC) data has been collected to be representative of observed petroleum contamination concentrations in soil.
- Potential need for additional sampling and chemical constituent analyses. The need for additional sampling will be based on the letter report describing hazardous substance management at the facility. We understand that Brix will submit a response to DEQ's previous comments regarding hazardous substance management and use at the facility in the next couple of weeks.
- Risk Assessment/Screening. Available data needs to be screened against appropriate human health and ecological criteria to determine if the site has the potential to pose an adverse risk to human health or the environment.

During the meeting, the next steps in the project were briefly discussed. To reduce report preparations, DEQ recommended several alternative approaches for data reporting at this point in the project. The Brix team indicated they would submit a letter work plan describing the next phase of site investigation for the petroleum hydrocarbon releases. In order to expedite the completion of the expanded preliminary assessment (XPA) and our understanding of the site, DEQ requests that Brix prepare the following items, in draft form, to facilitate our discussion potential contaminant migration pathways, receptors, and future sampling activities. These items include:

- A geologic cross-section(s) and the conceptual site hydrogeologic model.
- A figure showing the estimated surface topography of the silt/clay unit.
- Conceptual site exposure model prepared following DEQ's Risk-Based Correction Action Guidance for USTs (see Figure 2-1, page 16 of this guidance). The site exposure model should include potential ecological receptors.

DEQ suggests that these items be prepared prior to defining additional field investigations. We believe it would be useful to meet to discuss the draft versions of these items and your response to DEQ's previous comment on potential hazardous substance management/use at the facility. This discussion would allow us to identify potential data gaps and investigation strategies prior to submitting a work plan for additional field activities. Please consider this request and propose a meeting date within the next four weeks to discuss these items.

Thank you for meeting with us last week to present the preliminary data. We believe the meeting was useful and productive. Please do not hesitate to call me at (503) 229-5562, if you have any questions.

Sincerely,

Rodney G. Struck

Rodney G. Struck, R.G.
Project Manager
Voluntary Cleanup and Portland Harbor Section

cc: ECSI File No. 2364
Eric Blischke, DEQ/NWR
Guy Tanz, Hahn & Associates
Bruce Brody-Heine, DEQ/NWR

#2364
Com

**HAHN AND ASSOCIATES, INC.**
ENVIRONMENTAL CONSULTANTS

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

MAY 14 2001

NORTHWEST REGION

May 11, 2001

Via Courier

Mr. Rodney Struck
Oregon Dept. of Env. Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201

HAI Project No. 5074
ODEQ ECSI File No. 2364

Subject: Work Plan for Underground Storage Tank Investigation, Brix Maritime Company Facility, 9030 NW St. Helens Road, Portland, Oregon

Dear Mr. Struck:

On behalf of Brix Maritime Co. ("Brix") enclosed please find a Work Plan for additional field work and sampling at the above-referenced property. It is our desire to begin work the week of June 4, 2001. If we do not hear from you by May 28, 2001, we will assume that the Oregon Department of Environmental Quality (DEQ) has no objection to our beginning work at the property on the date noted above. A copy of the report will be provided to you upon completion.

The Oregon DEQ should be aware that in 1979, Brix, a Delaware corporation, initially developed the property; however in 1993 Brix became a wholly-owned subsidiary of Foss Maritime Company, a Washington corporation. Brix continues to own and operate the facility under a license allowing Brix to use the Foss name. Foss Maritime Company does not own or operate the facility, although the Foss name is displayed at the facility, the use of the Foss name under license to Brix caused confusion in the Expanded Preliminary Assessment (XPA). The facility is operated by Brix and record title to the property comprising the Site remains in Brix's name. Accordingly, Brix should be the listed property owner and not Foss.

We would also like to confirm that Brix has joined the PRP Group for the Portland Harbor Superfund Site (now known as the Lower Willamette Group). As a member of that group, Brix will participate in the funding of sediment sampling in the Willamette River as part of the Remedial Investigation (RI) and Feasibility Study (FS) to be performed pursuant to the Administrative Order on Consent and Statement of Work currently being negotiated with U.S. Environmental Protection Agency (EPA) Region 10.

Any questions regarding the scope of the Work Plan should be directed to Kim Johannessen at (206) 632-2000. You are also welcome to contact the undersigned directly to discuss any specific technical issues at (503) 796-0717.

Sincerely,

Guy H. Tanz

Guy H. Tanz, R.G.
Associate

enclosures (1)

c: Ms. Kim Johannessen, Esq., Johannessen & Associates

bc

434 NW 6th AVENUE, SUITE 203 • PORTLAND, OREGON 97209-3651
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ANCHOR ENVIRONMENTAL, L.L.C.

1411 4th Avenue, Suite 1210
Seattle, WA 98101
Phone 206.287.9130
Fax 206.287.9131

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MAY 10 2000

NORTHWEST REGION

May 8, 2000

Rodney G. Struck, R.G.
Project Manager
Voluntary Cleanup and Portland Harbor Section
Oregon Department of Environmental Quality, Northwest Region
2020 NW Fourth Avenue, Suite 400
Portland, OR 97201-4987

Re: Expanded Preliminary Assessment Summary Report
Foss Maritime Company (Brix) Facility
Request for Meeting

Dear Mr Struck, R.G.,

On behalf Foss Maritime Company (Foss), Anchor Environmental, L.L.C. (Anchor) has reviewed the Oregon Department of Environmental Quality (DEQ) letter dated April 20, 2000. The Expanded Preliminary Assessment (XPA) Summary Report provided to DEQ on February 15, 2000, in response to DEQ's November 19, 2000 request, was designed to specifically assess whether the facility has or does contribute chemicals to the adjacent Willamette River. During preparation of this XPA Summary Report, we used data presented in site documents provided to DEQ per Steve Fortuna's July 1999 request, DEQ's XPA outline for non-waterfront sites, and DEQ's November 1999 Strategy Recommendation for this site.

Based on DEQ's comments and Foss's belief that this facility has not contributed to elevated chemical concentrations in the Willamette River, we request a meeting to discuss the site and Summary Report conclusions in more detail, and evaluate the most practical path forward. Representatives from Foss and Anchor are available to meet with DEQ in Portland the week beginning May 29, 2000.

Please call me at (206) 287-9130 or at dtempleton@anchorenv.com to find a mutually convenient date and time to meet.

Sincerely,

David Templeton

David Templeton
Anchor Environmental, L.L.C.

Cc Frank Williamson, Foss Maritime Company
Larry Johnson, Foss Maritime Company
Eric Blischke, DEQ/NWR

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

April 20, 2000

Mr. Larry Johnson
Manager, Marine Operations
Foss Maritime Company
9030 NW St. Helens Road
Portland, OR 97231

**Re: Comments**
**Expanded Preliminary Assessment**
**Foss Maritime Company**
**Portland Oregon**
**ESCI No. 2364**

Dear Mr. Johnson:

The Oregon Department of Environmental Quality (DEQ) has reviewed the "Expanded Preliminary Summary Report" prepared for the above referenced site in accordance with our Letter Agreement, dated November 18, 1999. This report was prepared by Anchor Environmental, L.L.C. and is dated February 15, 2000.

This report does not satisfy DEQ's requirements for a preliminary assessment (PA) or expanded PA (XPA). The report does not contain sufficient information to assess whether the site is releasing, has released, or could release hazardous substances to the environment and in particular whether the site has contributed to sediment contamination in Portland Harbor. The PA contains minimal information that was not contained in DEQ's November 8, 1999 Strategy Recommendation. The PA should contain detailed information regarding current and past uses of hazardous substances and their potential to have impacted the site. In order for DEQ to approve the document, the PA must be rewritten in accordance with DEQ's PA Guidance Documents (attached). Specifically, the PA must include the following:

- **Ownership and Operation History**. This discussion must include past and current practices, operations, and hazardous substances used.
- **Regulatory History**
- **Past Inspections**
- **Waste Characteristics** including
  - Potential source areas. Potential contaminant source areas should be identified based on a review of historical site information and current site operations. The identification of potential source areas should include

both upland and over or in water operations that may have resulted in a release of hazardous substances to soil, groundwater, surface water, and/or Willamette River sediments.

- Contaminants of Potential Concern (COPC). Hazardous substances used on site (current and past) must be identified and evaluated.

- **Evaluation of Pathways of Exposure**

In addition, the conclusions in this report are not supported by site specific information or findings. Adequate data or documentation is needed to support site conclusions. It is DEQ's expectation that the PA will fully evaluate all upland, in-water, and over-water activities that might have resulted in the release of hazardous substances and that focused sampling will be performed to determine if a release has occurred. Prior to collecting samples, a sampling plan should be prepared in accordance with DEQ's XPA Guidance (attached).

**Specific Comments**

1. Page 1. Site Background. The PA must document the historical property uses. The statement that the property was unused and undeveloped must be supported and documented. For example, copies of historical aerial photographs and maps (e.g., Sanborne, historical tax lot maps) should be included in the report, as well as a review of reverse directories (e.g., Cole or Polk Directories).

   The PA should discuss any dredging that has occurred adjacent to the facility, if any, and present any analytical results associated with historic dredging activities.

2. Page 2. Underground Storage Tanks. The report should include a discussion regarding the closure of the two underground storage tanks (USTs) in 1998 (i.e., Were the tanks closed in accordance with DEQ UST regulations? Was a release reported? Did DEQ's tank program issue a no further action (NFA) finding for these tanks?)

3. Page 2. Underground Storage Tanks. The report should include a discussion of the existing USTs. Why aren't these tanks considered a potential on-site source of contamination?

4. Page 2. Outfalls. Is site storm water discharge regulated? Do the four-inch pipes discharge directly to the Willamette River?

5. Page 3. Adjacent Site Uses. This section does not describe adjacent properties.

6. Page 3. Sediment Quality. The PA should focus on evaluating the potential for a release of hazardous substance at the site and the site's potential contribution to sediment contamination in the Willamette River. The PA should not evaluate risk

using screening tables. Specific sediment quality criteria will be determined for Portland Harbor through the harbor-side remedial investigation/feasibility study. The PA/XPA focus should be evaluating and documenting potential contaminant sources at the Foss facility and determining whether or not these sources have impacted the environment using site specific sampling results.

7. Page 4. Evaluation of Potential Pathways. This section does not adequately assess potential sources of contamination on the site or potential contamination migration or exposure pathways. The identification of potential source areas should include both upland and over or in water operations that may have resulted in a release of hazardous substances to soil, groundwater, surface water, and/or Willamette River sediments. The report identifies several potential contaminant sources uses (e.g., maintenance shop, maintenance barge, USTs,) that may use or have used and/or generated hazardous substances. These areas and the types of contamination that could be present in each should be identified. For example, the general maintenance operations performed at this facility should be described. This information should be used to identify COPCs (e.g., herbicides, petroleum products, fuels, paints, solvents) for the sampling activities.

   The PA should identify and evaluate potential contaminant migration pathways (e.g., groundwater discharge, storm water discharge, direct release, volatilization, dust entrainment) and potentially affected media (e.g., groundwater, soil, Willamette River sediments, surface water) at the subject property. XPA sampling efforts should focus on primary migration pathways.

   The PA should identify and evaluate potential contaminant exposure pathways (e.g., ingestion, direct contact, inhalation) to humans and ecological receptors associated with the potentially affected media (e.g., groundwater, soil, Willamette River sediments, surface water) at the subject property. XPA sampling efforts should focus on primary migration and exposure pathways.

8. The report does not include a proposed sampling plan. DEQ requests that focused sampling be conducted to determine if a release has occurred at the facility. The PA should include a sampling and analyses plan that is based on a conceptual site model that describes the potential sources of contamination, migration pathways, exposure routes, and contaminants of interest. The PA and XPA needs to take a broad approach of what could be present at the facility based on the specific site uses (both current and historical). The PA identifies the following potential contaminant source areas:

   - USTs/fueling area
   - Maintenance Building
   - Maintenance Barge
   - Storm water runoff

- Storage Areas
- Spills (the location, size, and source of the spilled material should be provided)
- City Storm water outfall

The following should be considered/discussed as potential sources:

- PCB containing transformers or capacitors
- Dock Area (spills from refueling, discharges from barges/ships berthed at the Foss dock)

Sufficient sampling should be proposed to determine whether the above potential sources have resulted in a release of hazardous substance(s).

DEQ would be happy to meet with you and your consultant to discuss our comments. DEQ requests that a revised PA report and sampling plan be submitted to DEQ by May 31, 2000. Please do not hesitate to call me at 229-5562 if you have any questions.

Sincerely,

Rodney G. Struck

Rodney G. Struck, R.G.
Project Manager
Voluntary Cleanup and Portland Harbor Section

Enclosure: State Preliminary Assessment (PA) Guidance
Example Report – Preliminary Assessment
Expanded Preliminary Assessment (XPA) Sample Plan Guidance
Expanded Preliminary Assessment (XPA) Report Guidance

cc: ECSI File No. 2364
Mike Rosen, DEQ/NWR
Eric Blischke, DEQ/NWR

2364
QPR

ANCHOR
ENVIRONMENTAL, L.L.C.

6650 SW Redwood Lane, #110
Portland, OR 97224
Phone 503.670.1108
Fax 503.670.1128
www.anchorenv.com

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JAN 14 2003
DEPT OF ENVIRONMENTAL QUALITY
NORTHWEST REGION

January 6, 2003
990056

Rodney G. Struck, R.G.
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Progress Report - Fourth Quarter 2002 - Brix Maritime Company, Portland, Oregon

Dear Mr. Struck:

This Progress Report was prepared in accordance with Section II (H) of the Oregon Department of Environmental Quality (DEQ) Voluntary Agreement for Remedial Investigation and Source Control Measures (ECSI 2464 No. LQDVC-NWR-02-03). This Progress Report addresses the quarter ending December 31, 2002 and is divided into the following subject areas.

- Actions Taken During the Previous Quarter
- Actions Scheduled for the Next Quarter
- Data Generated in the Previous Quarter
- Summaries of Problems and Action Taken To Resolve Problems

## ACTIONS TAKEN DURING THE PREVIOUS QUARTER

- Water levels were measured in monitoring wells MW-3 and MW-4 in October, November, and December.

## ACTIONS SCHEDULED FOR THE NEXT QUARTER

- Water levels will be measured in monitoring wells MW-3 and MW-4 in January, February, and March 2003.
- Monitoring wells MW-1, MW-2, and MW-5 will be installed late January or early February 2003.
- Monitoring wells MW-1, MW-2, and MW-5 will be developed.
- Groundwater samples will be collected from monitoring wells MW-1 through MW-5.

## DATA GENERATED IN THE PREVIOUS QUARTER

**MONTHLY WATER LEVEL MEASUREMENTS.** Water levels were measured in monitoring wells MW-3 and MW-4 on October 30, November 27, and December 30, 2002. Depth–to-water measurements are presented in Table 1. The water table did not show a significant increase in elevation until measured in December 2002, when the elevation increased from the November measurement by 1.3 feet at MW-3 and by 1.6 feet at MW-4. Installation of monitoring wells MW-1, MW-2 and MW-5 will be scheduled for late January/early February 2003.

Free phase petroleum hydrocarbons were detected in monitoring well MW-3 during fourth quarter 2002. The petroleum hydrocarbon thickness was measured with a Solinst model 121 interface meter. In October 2002, the petroleum hydrocarbon thickness was measured at 0.19 feet; in November 2002, the petroleum hydrocarbon thickness was measured at 0.14 feet. No petroleum hydrocarbons were detected by the interface meter when measured in December 2002; however, oil droplets were visible on the probe.

During the October, November, and December 2002 water level measurements, the river bank was inspected for petroleum hydrocarbon seeps or sheens. No seeps or sheens were encountered.

## SUMMARIES OF PROBLEMS AND ACTION TAKEN TO RESOLVE PROBLEMS

No problems were encountered.

If you have any questions regarding this Progress Report, please do not hesitate to contact me at (503) 670-1108 (e-mail: jedwards@anchorenv.com).

Sincerely,

John E. Edwards, R.G., C.E.G.
Anchor Environmental, L.L.C.

John J. Renda, R.G.

Cc: Kim Johannessen, Johannessen & Associates, P.S.
David Templeton, Anchor Environmental

P:\Projects\BRIX\Letters and Reports\Progress Report 3-4Q02.doc

# Table 1
# Depth to Water Measurements
# Brix Maritime
# Portland, Oregon

| Anchor Environmental, L.L.C. | | | | Site: Brix Maritime |
|---|---|---|---|---|
| | | | | Project No. : 990056-01 |
| Well | Date (MM/DD/YY) | Time (2400) | DTW (feet) | Comments |
| **Monitoring Wells** | | | | |
| MW-3 | 07/29/02 | 13:00 | 22.91 | |
| MW-3 | 08/22/02 | 7:15 | 23.50 | Oil detected in well, thickness estimated at 0.02 foot |
| MW-3 | 09/30/02 | 7:00 | 23.37 | Oil detected in well, thickness estimated at 0.02 foot |
| MW-3 | 10/30/02 | 15:50 | 23.68 | DTP = 23.49 (0.19 foot thick) |
| MW-3 | 11/27/02 | 16:30 | 23.30 | DTP = 23.16 (0.14 foot thick) |
| MW-3 | 12/30/02 | 16:30 | 21.99 | Oil noted on probe, product too thin to measure with interface probe |
| | | | | |
| MW-4 | 07/29/02 | 12:55 | 11.62 | |
| MW-4 | 08/22/02 | 7:25 | 11.77 | |
| MW-4 | 09/30/02 | 6:50 | 11.94 | |
| MW-4 | 10/30/02 | 15:55 | 12.06 | |
| MW-4 | 11/27/02 | 16:35 | 11.85 | |
| MW-4 | 12/30/02 | 16:35 | 10.24 | |
| | | | | |
| River | 10/30/02 | 16:00 | 2.75 | Estimated, gauge marked in 1' increments |
| River | 11/27/02 | 16:40 | 3.10 | Estimated, gauge marked in 1' increments |
| River | 12/30/02 | 16:20 | 7.50 | Estimated, gauge marked in 1' increments |

Note: DTW = Depth to Water; DTP = Depth to Product



Confidential Business Information

00034761

State of Oregon

# Department of Environmental Quality Memorandum

**Date:** May 16, 2002

**To:** File No. 26-93-0009
Knappton Corporation/Brix Maritime

**From:** Tina Leppaluoto

**Subject:** Administrative Closure

This project is being picked up by Voluntary Cleanup Program (VCP) an VCP agreement has been signed. VCP has asked that we administratively closeout the LUST project they will handle the tank issues along with their cleanup issues. The project has been closed out in the Underground Storage Tank Program and all information has been transferred to VCP.

Please refer to ECSI #2364 for all Tank information.

This file has been administratively closed.

State of Oregon

# Department of Environmental Quality Memorandum

**Date:** May 16, 2002

**To:** File No. 26-93-0009
Knappton Corporation/Brix Maritime

**From:** Tina Leppaluoto

**Subject:** Administrative Closure

This project is being picked up by Voluntary Cleanup Program (VCP) an VCP agreement has been signed. VCP has asked that we administratively closeout the LUST project they will handle the tank issues along with their cleanup issues. The project has been closed out in the Underground Storage Tank Program and all information has been transferred to VCP.

Please refer to ECSI #2364 for all Tank information.

This file has been administratively closed.

FILE NAME: Knappton Corp/Brix Maritime LOG NO. 26-93-0009

# NWR'S ADMIN. CLOSURE CHECKLIST

| ROUTE TO | ACTIVITY | RESPONSIBLE PERSON | DATE COMPLETED |
|---|---|---|---|
| | Closure memo drafted and placed in the file explaining the reason for file closure. | [illegible] | 5-16-02 |
| | SEQUENT, and the LUST incident form, updated with cleanup start date, cleanup end date, final invoice request date and closed date. | [illegible] | 5-16-02 |
| | OTIS site status – file status and site type fields updated to show administrative closure | [illegible] | 5-16-02 |
| | OTIS project manager screen updated with name of person doing the administrative closure. | [illegible] | 5-16-02 |
| | For CR sites, copy of the memo sent to F&O so that time accounting can be terminated. | [illegible] | 5-16-02 |

## CLOSURE PROCESS COMPLETE

(January 5, 2000)

FILE NAME: Knappton Corp/Brix Maritime LOG NO. 26-93-0009

# NWR'S ADMIN. CLOSURE CHECKLIST

| ROUTE TO | ACTIVITY | RESPONSIBLE PERSON | DATE COMPLETED |
|---|---|---|---|
| | Closure memo drafted and placed in the file explaining the reason for file closure. | [illegible] | 5-16-02 |
| | SEQUENT, and the LUST incident form, updated with cleanup start date, cleanup end date, final invoice request date and closed date. | [illegible] | 5-16-02 |
| | OTIS site status – file status and site type fields updated to show administrative closure | [illegible] | 5-16-02 |
| | OTIS project manager screen updated with name of person doing the administrative closure. | [illegible] | 5-16-02 |
| | For CR sites, copy of the memo sent to F&O so that time accounting can be terminated. | [illegible] | 5-16-02 |

## CLOSURE PROCESS COMPLETE

(January 5, 2000)

# *LUST FORM*

## INCIDENT INFORMATION

LUST Incident Nbr: _____ LUST Log Nbr: 26-93-009 UST Facility ID: 7374

Date Received: 1-13-93 Received By: SAM Emergency Resp Taken: Y N

Tank Identification: File Name : ~~Brooks~~ Brx Maritime

Street: 9030 NW St Helens Road

City: Portland Zip: 97283

County: Mult. Phone: _____

LUST

Incident Comments: _____

## CONTACT & MAIL TYPES

| Reported By: | LUST Contact: | Responsible Party: |
|---|---|---|
| Name: | Name: Raphael Caballero | Name: David Polland |
| Company: | Company: Brooks Maritime | Company: Brooks Maritime |
| Street: | Street: | Street: PO Box 83018 |
| City: Zip: | City: Zip: | City: Portland Zip: 97283 |
| State: Phone: | State: Phone: | State: Phone: 286-0631 |

Blair Loftis Fax 227-2209 (Hahn & Assoc.)

## SITE ASSESSMENT

LUST Incident Nbr: (XXXXXXXXXXXXX)

Date Investigated: _____ Investigated By: _____

Release Exists: (Y) N (Circle) Confirmation Method: A)Staff B)Lab:DEQ C)Lab:RP D)Lab:Other (E)RP) F)Other (Circle)

Cleanup Necessary: (Y) N (Circle) Regulated Tank: Y N ? (Circle) Exposure Assessment: Y N (Circle)

Off-Site Migration: Y N (?) (Circle) Estimated Gallons Released: _____ Priority: _____

Discovery Date: 1-13-93

How Discovered: (Circle) A)Routine Monitoring B)Inventory Control C)Decommissioning D)Site Assessment E)Complaint F)Tank Test (G)Other)

2/2 - Diesel also found - per Hahn & Associates 796-0717

Material Released: (Circle) A)Unleaded Gasoline B)Leaded Gasoline C)Misc. Gasoline (D)Diesel) E)Fuel Oil F)Waste Oil (G)Lubricant) H)Solvent I)Bunker Fuel J)Other Pet. Dist. K)Chemical L)Unknown

Source of Release: (Circle) A)Tank Leak (B)Pipe Leak) C)Overfill D)Surface Spill E)Pump/Valve Leak F)Other G)Unknown

| Impacts: (Circle) | | | | |
|---|---|---|---|---|
| Soil | (Y) | N | % | ? |
| Groundwater | Y | N | % | (?) |
| Surface Water | Y | (N) | % | ? |
| Drinking Water | Y | (N) | % | ? |
| Facility (Vapor) | Y | (N) | % | ? |
| Facility (Free Product) | Y | (N) | % | ? |

Site Assessment Comments: _____

## SITE MANAGEMENT

LUST Incident Nbr: (XXXXXXXXXXXXX)

Date Released Stopped: _____

Cleanup Activity: Start Date: _____ Under Control Date: _____

End Date: _____ Contractor Name: _____

Cleanup Guideline: (Circle) Matrix C.A.P. Cleanup Lead: (Circle) RP SLW/TF SLW/oTF

Free Product Disposal: Soil Disposal:

Est. Gallons: _____ Est. Cu/Yds: _____

Resp. Party: _____ Resp. Party: _____

Disposal Location: _____ Disposal Location: _____

Removal Date: _____ Removal Date: _____

Enforcement Action: (Circle) Y N

Cost Recovery Initiated: (Circle) Y N Source of Cost Recovery: Pct. R.P.: _____ Pct. SLW/TF: _____ Pct. SLW/oTF: _____

Estimations: Cost of Cleanup: _____ Staff Time On Project: _____

Site Management Comments: _____

[Version 1(

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

April 20, 2000

DAVID POLLAND
BRIX MARITIME COMPANY
PO BOX 83018
PORTLAND OR 97283-0018

Re: KNAPPTON CORPORATION/BROOKS MARITIME
File No.: 26-93-0009

The purpose of this letter is to provide an update on your underground storage tank (UST) cleanup project, located at 9030 NW ST HELENS RD in PORTLAND, Oregon, and to inform you of some changes to the DEQ's program. You are receiving this letter because you or your contractor reported a release from the UST system at this property and because the DEQ has not assigned your project to a project manager or closed out your file. File closure occurs when cleanup has met the appropriate requirements and the DEQ has reviewed the reports and issued a "no further action" (nfa) letter.

BACKLOGGED PROJECTS

The DEQ's first priority is to work on projects that pose the highest threat to human health or the environment. Due to staffing limitations, not all projects are assigned to project managers for review and are placed on DEQ's backlog of work needing to be completed.

To accommodate people who do not want to (or cannot) wait years for the DEQ to work down its list of priorities, the DEQ has set up a program by which responsible parties can request oversight. Filling out and signing a "cost recovery agreement" does this. By signing this document, the responsible party agrees to work with the DEQ in resolving the cleanup issues and agrees to pay the oversight costs which DEQ is required by law to collect.

Once a "cost recovery agreement" has been received for a project, DEQ places the project on a waiting list for assignment to the next available project manager. How long this takes depends on a lot of factors including current DEQ staffing and the number of high priority projects that need to be dealt with. In the past, it has taken up to two years for DEQ project managers to be assigned to a project. Currently the wait is about six months for more complicated projects. If there is an immediate need (i.e. a property transaction pending) for DEQ review, projects are usually assigned within two to four weeks.

NEW PROGRAM INFORMATION

In November 1998, revised rules went into effect for UST Cleanups. These rules included housekeeping items as well as rules governing low impact sites (LIP) and for developing generic remedies. These rules are available at the DEQ's website (http://www.deq.state.or.us/wmc/tank/200rules.htm) or can be obtained from the Northwest Region office.

Guidance for LIP sites was prepared in December 1998. Copies of this guidance are available at the DEQ's website (http://www.deq.state.or.us/wmc/tank/lisguid.htm) or from the Northwest Region office.

During 1999, DEQ developed a generic remedy for risk based assessments. The generic remedy and guidance document was finalized on September 29, 1999. Copies of this guidance are available at the DEQ's website (http://www.deq.state.or.us/wmc/tank/rbdm_notice.htm) or from the Northwest Region office. This document replaces the DEQ's "Interim Guidance On Incorporating Risk Based Corrective Action For Petroleum Release Sites" (April 1996).

Another significant change is that the cleanup levels in Oregon Administrative Rules (OAR) 340-122-242 (4) have been replaced by the risk based screening levels in the risk based generic remedy.

The new rules and guidance apply to new releases and to cleanups that were not completed by the adoption date of the rules and guidance. If your cleanup was completed prior to these dates, or if you were operating under a DEQ *approved* corrective action plan, DEQ will apply the rules in place at the time of the cleanup when conducting our review.

If you have any questions or would like copies of the above referenced documents, please call Tina Leppaluoto at (503) 229-5472.

Sincerely,

Andree Pollock

Andree Pollock, Manager
UST Cleanup and Compliance Section

Enclosures: Cost Recovery Agreement

(avp:AVP)

# BRIX MARITIME CO.

26-93-009

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
MAR 29 1994
NORTHWEST REGION

March 26, 1994

DEQ
2020 S.W. 4th
Suite 400
Portland, Oregon 97201

Attn: Laury Mackalick
Reference Log No. 26-93-0009

Ms. Mackalick,

Please find enclosed a copy of the Soil Recycling Certificate that indicates the disposal of the 61.37 tons of petroleum-contaminated soil that was the result of a lube oil leak at our site.

If you have any questions or require additional information, I can be contacted at 503/286-0631 ext. 246.

Sincerely,

BRIX MARITIME COMPANY

Rafael A. Caballero

Rafael A. Caballero
Purchasing Manager

cc: Bob Hindman
Enclosures (1)

9030 N.W. ST. HELENS ROAD · P.O. BOX 83018 · PORTLAND, OREGON 97283-0018 · 503/286-0631

# BRIX MARITIME CO.

February 22, 1994

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
FEB 23 1994
NORTHWEST REGION

DEQ Northwest Region
2020 S.W. 4th Ave.
Suite 400
Portland, Oregon 97201

Attn: Andre Pollack
Re: EPA # 26-93-009

Mr. Pollack,

It has come to my attention that DEQ has not yet received a copy of a Subsurface Investigation of a lube oil release that occurred at our site.

Brix Maritime Company is pleased to present a copy of the Subsurface Investigation dated August 12, 1993 completed by Hahn and Associates.

If you have any questions or required additional information, please contact me at 503/286-0631. Thank you.

Sincerely,

BRIX MARITIME CO.

Rafael A. Caballero

Rafael A. Caballero
Purchasing Manager

enclosures (1)

cc: Bob Hindman

9030 N.W. ST. HELENS ROAD · P.O. BOX 83018 · PORTLAND, OREGON 97283-0018 · 503/286-0631

Confidential Business Information

26-93-009

**HAHN AND ASSOCIATES, INC.**
ENVIRONMENTAL MANAGEMENT

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
FEB 09 1993
NORTHWEST REGION

February 8, 1993

Ms. Laurie McCulloch
Department of Environmental Quality
Underground Storage Tank Compliance Program
811 SW 6th Avenue
Portland, Oregon 97204

HAI Project # 2279

SUBJECT: Initial Report Form, Brix Maritime Co., 9030 NW St. Helens Road, Portland, Oregon, Facility I.D. #7374

Dear Ms. McCulloch:

At the request of the Brix Maritime Company (BMC), Hahn and Associates, Inc. (HAI) has submitted the Oregon Department of Environmental Quality (DEQ) 20-Day Underground Storage Tank (UST) Cleanup Reporting Form to the UST Compliance Program as specified by the Oregon Administrative Rules (OAR 340-122-235). Please include this information with the agency file for facility I.D. #7374.

On January 13, 1992 BMC observed what appeared to be a release of 30-weight lubrication oil coming up through a seam between an asphalt and concrete paved area overlaying a fuel transfer line. The release was reported to the Oregon Emergency Management Division (OEMD) on the same day and was subsequently reported to the DEQ-UST duty officer (Shelia Monroe). BMC immediately ceased all dispensing operations associated with the 30-weigh lubrication UST.

BMC retained Tom New Construction Company to retrofit the damaged fuel transfer line and also retained HAI to evaluate the extent of the soil contamination. The 30-weight lubrication oil line was drained on January 20, 1993, immediately preceding excavation activities. The retrofitting activities took place between January 20, 1993 and February 3, 1993. The retrofitting activities were inspected by the City of Portland Fire Marshal and the transfer line trench was backfilled on February 4, 1993.

A total of four soil samples were obtained from the transfer line trench at approximately 20 foot intervals and approximate depth of three feet below ground surface (bgs) prior to backfilling. The analytical results indicated that three of the soil samples contained total petroleum hydrocarbons (TPH) as diesel and lubrication oil at concentrations above the Soil Matrix Cleanup Standards. The trench could not be over-excavated to remove petroleum-contaminated soils due to its close proximity to a permanent structure.

A test pit excavation was developed in the vicinity of the leaking lube oil transfer line. A soil sample obtained from the test pit at a depth of approximately 12 bgs was reported to contain TPH as diesel and lube oil at a concentration of 39,700 parts per million (ppm). The test pit was backfilled with clean soil so as not to jeopardize the structural integrity of the adjacent building.

434 NW SIXTH AVENUE, SUITE 203 • PORTLAND, OREGON 97209-3600
503/796-0717 OFFICE • 503/227-2209 FAX

recycled paper

The BMC facility maintains two 20,000 gallon diesel USTs, two 6,000-gallon lube oil USTs and one 2,000-gallon unleaded gasoline UST in the vicinity of the observed lubrication oil release. The tanks and lines associated with the diesel USTs were tested in December 1992 and determined to be tight. BMC is pursuing an additional tank test to re-confirm that the diesel tanks and lines are tight. BMC is also evaluating overfill protection on the diesel tanks and other specific over-spill control measures.

BMC intends to conduct a subsurface soil assessment to determine the lateral and vertical extent of petroleum-contamination at the subject property. The assessment would also likely include subsurface sampling to determine the extent of lubrication oil migration beneath the nearby permanent structure at the subject property.

Approximately 50 cubic yards of petroleum-contaminated soil is currently stockpiled at the subject property. The soil is stored on and covered with 9-millimeter (mm) thick plastic sheeting and is diked with hay bales. BMC intends to store the soil on-site until the completion of the proposed drilling activities associated with the subsurface investigation. Subsequently, the soil will likely be transported off-site for thermal treatment.

If there are any comments or questions, please contact the undersigned. Thank you for your attention to this matter.

Sincerely,

Blair T. Loftis
Project Manager

c: Mr. Bob Hindman, Brix Maritime Co.
Mr. Rafael Caballero, Brix Maritime Co.
Mr. David F. Bartz, Jr., Schwabe Williamson and Wyatt

encl. Initial Report Form for Underground Storage Tank Cleanup Projects
Figures (3)
Analytical Reports

# INITIAL REPORT FORM FOR UST CLEANUP PROJECTS

This report is due within twenty (20) days from the date of the release*

## SITE INFORMATION

*DEQ File No.: 7374 *Date of Release: January 13, 1993

Site Name: Brix Maratime Company

Site Address: 9030 NW St. Helens Road
Portland, Oregon 97283-0018

Responsible Party: Brix Maratime Company Phone: 503-286-0631

RP Mail Address: P.O. Box 83018
Portland, Oregon 97283-0018

Service Provider: Hahn and Associates, Inc. Phone: 503-796-0717

SP Mail Address: 434 NW 6TH Ave, Suite 203
Portland, Oregon 97209-3600

* Note: This information is listed on the cover letter received by the Responsible Party.

FEB 09 1993

## INITIAL CLEANUP INFORMATION

Y N Do you believe that this cleanup project can be conducted under the requirements for an UST Cleanup Matrix site?

► Groundwater use in the immediate area of the project (check all that apply) - complete whether or not the release is believed to have impacted groundwater.

___ Drinking water supply
___ Agricultural
X Industrial
___ Groundwater not used

► Facility location (check all that apply)

X <100 ft. from a wetland or surface stream (circle one or both)
___ within a residential area
X within an industrial/commercial area
___ Other (describe): ___

► 25 Current approximate depth to groundwater (in feet).

► UK Seasonal high groundwater level (in feet) if different.

► Describe how depths were determined: Groundwater depth or gradient has not been assessed at this time.

INITIAL REPORT FORM FOR UST CLEANUP PROJECTS - PAGE 2

Y N NA Did you take immediate action to prevent any further release of the regulated substance into the environment? EXPLAIN: Drained leaking lubrication oil transfer line, ceased fueling operations, remove free product.

Y N NA Were steps taken to identify and mitigate fire, explosion, and vapor hazards? EXPLAIN: Free product was removed from excavation and stored in a steel 55-gallon drum.

Y N NA Did you remove as much of the regulated substance from the UST system as necessary to prevent further release to the environment? EXPLAIN: Removed product from damaged transfer line.

Y N NA Did you visually inspect any aboveground releases or exposed below ground releases and prevent further migration of the released substance in surrounding soils and groundwater? EXPLAIN: Removed free product (lube oil) from excavation, lined bottoms and sides of excavation with sorbent.

Y N NA Are/were there any vapors present in buildings or utility corridors? If yes, are you continuing to monitor and mitigate any additional fire and safety hazards posed by vapors and free product? EXPLAIN: No appreciable vapor danger associated with 30-weight oil.

Y N NA Have you remedied any hazards posed by contaminated soils that were excavated or exposed as a result of release confirmation, site investigation, abatement, or cleanup activities? EXPLAIN: Approximately 50 cubic yards of soil stored on and covered with plastic, diked with hay.

Y N NA Have you measured for the presence of a release where contamination is most likely to be present at the UST site? EXPLAIN: Characterization soil samples obtained from pipe trench and vicinity of release area.

Y N NA Did you investigate to determine the possible presence of free product and begin free product removal as soon as practicable? If yes, was the region notified? EXPLAIN: Lubrication oil seeped into excavation after approximately 12 hours, was pumped and bailed into drum.

Y N Was groundwater initially encountered in the excavation? If yes, how was this water handled/disposed? How many gallons involved? EXPLAIN:

Y N Was a sheen or odor observed on any water in the excavation? If yes, DESCRIBE OBSERVATIONS:

Y N Did groundwater recharge 24 hours after pumping the accumulated water in the excavation? If yes, what actions have you taken as a result? Did you resample the recharge water? EXPLAIN: _____

Y/ N Are any SOIL OR WATER SAMPLE RESULTS available at the time of this report? If yes, attach all laboratory analysis reports and chain of custody forms.
(Only preliminary results available at this time)

GENERAL INFORMATION FOR ALL CONTAMINATED SOILS MANAGEMENT

Note: All soils temporarily stockpiled onsite prior to treatment or disposal must be contained within a bermed area, kept covered (and the cover anchored), and the entire area secured to prevent unauthorized access by the public. Non-contaminated soils should be protected and kept separated from contaminated soil.

Y N The level of contamination noted is expected to require removal of contaminated soil for treatment or disposal. If yes, complete the following. If no, go to Page 4, "Report Prepared By".

- Type of petroleum contamination (check all that apply):
  - ___ Gasoline X Diesel ___ Waste Oil ___ Heating Oil
  - X Other contamination (specify): 30-weight lubrication oil
- Estimated volume of soil if known (tons or cubic yards): 50 cubic yards
- Intended Disposition of Soils (check appropriate method):
  - X Treatment
    - X Thermal treatment offsite at an authorized facility
      Facility Name: Oregon Hydrocarbon, Inc. Phone No.: 503-735-9525
      Facility Address: P.O. Box 83685, Portland, OR 97283
    - ___ Thermal treatment onsite with a mobil treatment unit **
      Company Name: _____ Phone No.: _____
    - ___ Offsite soil aeration[1] or bioremediation **
      Treatment Site Address: _____
    - ___ Onsite soil aeration or bioremediation **
  - ___ Disposal
    Landfill Name: _____ Phone No.: _____
    Landfill Address: _____

1 Offsite soil aeration is banned within the Portland METRO area - see enclosed fact sheet.

** Permit from DEQ required, see page 5 if you would like forms mailed.

▶ Who will be conducting the soil treatment or disposal work?

Company Name: Oregon Hydrocarbon, Inc. Phone: 503-735-9525

Contact Name: Blair Loftis at Hahn and Associates, Inc. 503-796-0717

▶ What date(s) is the treatment or disposal intended to be started?

Yet to be determined. Will dispose of drill cuttings with excavation soil.

Note: You have approximately 30 days to stockpile contaminated soils onsite while making arrangements for proper disposal or treatment. After that time, you may be required to obtain a permit from DEQ for onsite management of the contaminated soil if you fail to take active measures to manage the soil in an appropriate manner.

THIS REPORT WAS PREPARED BY: Date: February 3, 1993

Individual: Blair T. Loftis Phone: 503-796-0717

Company: Hahn and Associates, Inc.

Address: 434 NW 6th Ave, Suite 203 Portland, Oregon 97209-3600

If this report was NOT prepared by the Responsible Party:

Y N NA Are you the licensed Matrix Service Provider for the project and authorized by the Responsible Party to submit reports on their behalf?

Matrix Service Provider License No.: 12606

NOTE: This initial report is intended to provide the Department with the basic initial information about activities associated with the release. It is anticipated that future reports will be much more detailed and will provide a more complete picture of the entire cleanup project. If appropriate, you may reference this initial report in subsequent reports if the information does not need to be repeated for clarity.

▶ Please attach additional information as necessary to explain any unusual circumstances associated with the project or if you need more space to respond to any of the questions in this report form.

Return this form to: DEQ-Northwest Region
UST Section
1500 SW First, Suite 750
Portland, OR 97201

If you have questions, call 503-229-5263 and ask for the underground storage tank (UST) Duty Officer.

▶▶▶▶▶▶▶ KEEP A COPY OF THIS REPORT FOR YOUR FACILITY RECORDS ◀◀◀◀◀◀◀

## TABLE I

## SUMMARY OF ANALYTICAL DATA

Brix Maritime Co.
9030 NW St. Helens Road
Portland, Oregon

(February 2, 1993)

| Sample Identification No. | Sample Location | Soil Type | Sample Depth feet (bgs) | TPH-HCID (ppm) | TPH-418.1M (ppm) |
|---|---|---|---|---|---|
| 2279-01 | Excavation (east wall) | Silty Clay | 6.0 | D, L | 451 |
| 2279-02 | Excavation (bottom) | Sand | 12.0 | D, L | 39,700 |
| 2279-03 | Excavation (north wall) | Silty Clay | 6.0 | NA | 10,800 |
| 2279-04 | Excavation (west wall) | Silty | 6.0 | NA | 161 |
| 2279-05 | Excavation (south wall) | Silty Clay | 6.0 | NA | 58 |
| 2279-06 | Trench (0 ft. from pump) | Gravel | 3.0 | D, L | 6,290 |
| 2279-07 | Trench (20 ft. from pump) | Gravel | 3.0 | D, L | 26,100 |
| 2279-08 | Trench (40 ft. from pump) | Gravel | 3.0 | D, L | 53,400 |
| 2279-09 | Trench (60 ft. from pump) | Gravel | 3.0 | L | 49 |
| 2279-10 | Stockpile | Sand | -- | L | 53,100 |
| Regulatory Soil Cleanup Standard | | | | | 100 |

Notes:

TPH-HCID = Total Petroleum Hydrocarbons - Hydrocarbon Identification Scan
TPH-418.1M = Total Petroleum Hydrocarbons as Lube Oil or Bunker Related Fuel
ppm = parts per million
bgs = below ground surface
D = Diesel fuel
L = Lube oil or bunker-related fuel
NA = Not Analyzed
-- = Not applicable
Regulatory standard represents most stringent regulatory cleanup level, Oregon Administrative Rules (OAR 340-122-355(2)

Table generated from preliminary analytical results.

HUGHES
ANALYTICAL LABORATORY

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
FEB 09 1993
INVESTIGATION DIVISION

February 3, 1993

Mr. Blair Loftis
Hahn & Associates, Inc.
434 NW 6th Ave.
Suite 203
Portland, OR 97209-3600

Dear Mr. Loftis:

Enclosed is the lab report for your samples which were received on January 27, 1993. The Hughes Report # is 93-0031 and the Client Project is 2279 BRXUST.

Ten soil samples were received under a chain of custody. The samples were received in containers consistent with U.S. EPA (United States Environmental Protection Agency) protocol.

Standard Quality Assurance/Quality Control (QA/QC) procedures were performed as stated in "EPA Test Methods for Evaluating Solid Waste (SW-846)", 3rd Edition and "Standard Methods for the Examination of Water and Wastewater", 17th Edition. The EPA laboratory protocols followed include sample holding times, laboratory method blanks, laboratory matrix spikes, replicate samples and calibration standards. There were no significant variations from these protocols that would invalidate the analytical data.

Test methods may include minor modifications of detection limits or lists of parameters for the published methods. Solid samples are reported on a wet weight basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Kim Hughes

Kim Hughes
Lab Director

21920 N.E. Glisan ■ Gresham, Oregon 97030 ■ (503) 669-3745 ■ FAX (503) 669-4165

Confidential Business Information

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 93-0031 CLIENT JOB:2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: Six Soil Samples

**METHOD:** TPH-HCID by GC/FID
Per Oregon DEQ

Extraction: 01/27/93
Analysis: 01/27/93

| SAMPLE I.D. | RESULT | SURROGATE RECOVERY, % |
|---|---|---|
| 2279-01 | $C_{16}$-$C_{40}$* | 96.2 |
| 2279-02 | $C_{9}$-$C_{40}$* | *** |
| 2279-06 | $C_{21}$-$C_{40}$* | 92.9 |
| 2279-07 | $C_{16}$-$C_{40}$* | 96.5 |
| 2279-08 | $C_{16}$-$C_{40}$* | *** |
| 2279-09 | $C_{22}$-$C_{40}$** | 102 |
| Lab Blank | ND | 94.9 |

* Carbon range corresponds to a mixture of diesel and heavy oil.

** Carbon range corresponds to heavy oil.

***No surrogate recovery for this sample due to matrix interference.

Detection Limits:
Gasoline - 10 mg/kg
Diesel - 20 mg/kg
Heavy Oil - 50 mg/kg

ND = Not Detected

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 93-0031 CLIENT JOB:2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: Ten Soil Samples

**METHOD:** TPH-418.1 Modified per Oregon DEQ Results in mg/Kg(ppm)

Extraction: 01/28/93, 01/30/93
Analysis: 01/29/93, 01/30/93

| SAMPLE I.D. | RESULT | DETECTION LIMIT |
|---|---|---|
| 2279-01 | 451 | 100 |
| 2279-02 | 39700 | 5000 |
| 2279-03 | 10800 | 1250 |
| 2279-04 | 161 | 50 |
| 2279-05 | 58 | 25 |
| 2279-06 | 6290 | 1250 |
| 2279-07 | 26100 | 5000 |
| 2279-07 (replicate) | 23700 | 5000 |
| 2279-08 | 53400 | 10000 |
| 2279-09 | 49 | 25 |
| 2279-10 | 53100 | 10000 |
| Lab Blank | ND | 25 |

ND = Not Detected

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 92-0031 CLIENT #: 2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: One Soil Sample

**METHOD:** TPH-G by GC/FID per Oregon DEQ Results in mg/Kg (ppm)

Extraction: 01/28/93
Analysis: 01/28/93

| Sample I.D. | Result | Surrogate Recovery, % |
|---|---|---|
| 2279-02 | ND | 107 |
| Lab Blank | ND | 95.6 |
| Detection Limit | 10 | |

ND = Not Detected

Oregon

Mailed: 2-3-93

DEQ FILE NO.: 26-93-009

SITE NAME: BRIX MARITIME
SITE ADDRESS: 9030 NW St. Helens Road
Portland Oregon 97283
RESPONSIBLE PARTY NAME: DAVID POLLAND
RP COMPANY NAME: BRIX MARITIME
MAILING ADDRESS: P.O. Box 83018
Portland, Oregon 97283

DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHWEST REGION

DATE RELEASE REPORTED TO DEQ: 1-13-93

A release has been reported from an underground storage tank (UST) system at your facility located at the address listed above. As the responsible party for the facility, you are required to clean up the release according to OAR 340-122-201 through 340-122-360.

An Initial Report Form for UST Cleanup Projects is enclosed, which needs to be completed and returned to this office within twenty (20) days from the date the release was reported. An outline of additional reporting requirements and due dates is also enclosed.

Please read the rules carefully. As the responsible party, you should be aware of the regulations and requirements, even if you have hired a qualified consultant or service provider to do the actual work.

**Please reference the DEQ File Number listed in the top left corner of this letter in all future correspondence and reports.**

The Department is required to recover oversight costs on projects that we review and provide a final notice of compliance or "closure letter". As provided in the law, all petroleum contamination sites are eligible for recovery of costs by the Department. In order to receive oversight and more effectively schedule your project you will be asked to sign, and return within 30 days, an agreement to pay oversight costs with the Department. Not entering into the agreement does not release you from responsibility for investigation and/or cleanup of the contamination. Please read the attached information on the cost recovery process; contact Darby Bacon at 503-229-6635 if you have questions on cost recovery.

Thank you for your cooperation and continued efforts to comply with the regulations. If you have any questions, please contact the UST Section of Northwest Region at 503-229-5263.

A copy of the UST Cleanup Manual
X is enclosed
___ will be provided upon request

cc to Hahn & Assoc (Blair Loftis)

1500 SW First Avenue
Suite 750
Portland, OR 97201-5884
(503) 229-5263
DEQ-1

Oregon

Mailed: 1-19-93

DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHWEST REGION

**DEQ FILE NO.:** 26-93-009

SITE NAME: Brooks Maritime

SITE ADDRESS: 9030 NW St. Helens Road
Portland, Oregon 97203

RESPONSIBLE PARTY NAME: David Polland

RP COMPANY NAME: Brooks Maritime

MAILING ADDRESS: P.O. Box 83018
Portland Oregon 97283

**DATE RELEASE REPORTED TO DEQ:** 1-13-93

A release has been reported from an underground storage tank (UST) system at your facility located at the address listed above. As the responsible party for the facility, you are required to clean up the release according to OAR 340-122-201 through 340-122-360.

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Thank you for your cooperation and continued efforts to comply with the regulations. If you have any questions, please contact the UST Section of Northwest Region at 503-229-5263.

A copy of the UST Cleanup Manual
X is enclosed
___ will be provided upon request

1500 SW First Avenue
Suite 750
Portland, OR 97201-5884
(503) 229-5263

DEQ-1

26-93-009

# BRIX MARITIME CO.

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
FEB 22 1994
NORTHWEST REGION

February 17, 1994

Ms. Laurie McCulloch
Department of Environmental Quality
Underground Storage Tank Compliance Program
811 S.W. 6th Avenue
Portland, Oregon 97204

Subject: Underground Storage Tank System Investigation, Brix Maritime Co., 9030 NW St. Helens Road, Portland, Oregon, Facility I.D. #7374

Dear Ms. McCulloch:

Enclosed please find one copy of document entitled *Underground Storage Tank System Investigation, Brix Maritime Company, 9030 NW St. Helens Road, Portland, Oregon* prepared by Hahn and Associates, Inc. (HAI) and dated February 26, 1993. This report has been prepared for the purposes of an initial site characterization that was performed in accordance with Oregon Administrative Rules (OAR 340-122-230).

This report details the information required by the Oregon Department of Environmental Quality (ODEQ) 20-Day Underground Storage Tank (UST) Cleanup Reporting Form which was submitted to your attention on February 8, 1993. Please include this information with the agency file for facility I.D. #7374.

If there are any comments or questions, please contact the undersigned. Thank you for your attention to this matter.

Sincerely,

Robert A. Hindman
Manager, Finance, Administration
& Risk Management

RAH/paf
hindman:undrtank

9030 N.W. ST. HELENS ROAD · P.O. BOX 83018 · PORTLAND, OREGON 97283-0018 · 503/286-0631

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26-93-009

DEPT OF ENVIRONMENTAL QUALITY
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NORTHWEST REGION

# UNDERGROUND STORAGE TANK SYSTEM INVESTIGATION

Brix Maritime Company
9030 NW St. Helens Road
Portland, Oregon

February 26, 1993

**HAHN AND ASSOCIATES, INC.**
**Environmental Management**

434 NW 6th Avenue, Suite 203
Portland, Oregon 97209-3600
503/796-0717 • 503/227-2209 FAX

# UNDERGROUND STORAGE TANK SYSTEM INVESTIGATION

Brix Maritime Company
9030 NW St. Helens Road
Portland, Oregon

February 26, 1993

Prepared for:

Brix Maritime Company
Portland, Oregon

Prepared by:

Hahn and Associates, Inc.
Portland, Oregon

Project #2279

## TABLE OF CONTENTS


| Topic | Page |
|---|---|
| EXECUTIVE SUMMARY | 1 |
| 1.0 INTRODUCTION | 2 |
| 2.0 SCOPE OF WORK | 2 |
| 3.0 BACKGROUND | 3 |
| 4.0 FIELD ACTIVITIES | 4 |
| 5.0 QUALITY ASSURANCE AND QUALITY CONTROL | 7 |
| 6.0 ANALYTICAL TESTS | 8 |
| 7.0 CONCLUSIONS | 9 |
| 8.0 RECOMMENDATIONS | 10 |
| 9.0 LIMITATIONS | 11 |
| GLOSSARY OF ABBREVIATIONS | |





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## TABLE OF CONTENTS
(continued)

### TABLES

1 Summary of Analytical Results for Soils

### FIGURES

1 Site Location Map
2 Facility Map
3 Facility Detail Map
4 Sample Location Map

Site Photographs

### APPENDICES

A Certificate of Underground Storage Tank System Testing Certificate, Dated December 22, 1992
B Laboratory Results and Chain-of-Custody Documentation for Soil Samples



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## EXECUTIVE SUMMARY

The Brix Maritime Company has retained the environmental management firm of Hahn and Associates, Inc. to perform investigative activities associated with a release of 30-weight lubricating oil from a product transfer line to the subsurface soils near a permanent storage and office building located at the corporate headquarters of the company. The investigation was designed to assess extent of the petroleum release to the soils in the area.

The transfer line, from which the release apparently originated, and another transfer line were replaced with fiberglass pipe during January and February 1993. Four soil samples were obtained at a depth of approximately 3 feet below ground surface and at 20-foot intervals from the trench which had contained the transfer lines. The soil samples obtained from the trench were determined to contain petroleum hydrocarbons as diesel fuel and lube oil at concentrations ranging from 49 to 53,400 parts per million.

A test pit was in the vicinity of the observed area of the product release in order to determine the depth of soil affected by the release. Petroleum hydrocarbons were detected in a soil sample obtained from a depth of approximately 12 feet below ground surface at a concentration of 39,700 parts per million. Groundwater was not encountered in the excavation. The Oregon Department of Environmental Quality regulations require that the soil be cleaned up to the Level 2 Numeric Soil Cleanup Standards of 500 parts per million based on the conditions and location of the subject property.

Approximately 50 cubic yards of petroleum-contaminated soil is temporarily stored on site, pending the selection of a disposal option. The excavated areas have been backfilled with clean soil to minimize physical and safety hazards that they would present if left open. Recommendations for further investigation are presented in this report.



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## 1.0 INTRODUCTION

The Brix Maritime Company (BMC) has retained the environmental management firm of Hahn and Associates, Inc. (HAI) to perform environmental management activities relating to a release of 30-weight lubricating oil from a product transfer line at the BMC site, located at 9030 NW St. Helens Road, Portland, Multnomah County, Oregon (Figure 1). The release of lubricating oil to the surrounding soils was reported to the Oregon Department of Environmental Quality (DEQ) on January 13, 1993 by the Oregon Emergency Management Division (OEMD) for BMC. The release had been observed during a routine fueling operation as oil coming up through a seam between an asphalt and concrete-paved area overlaying the product transfer line. BMC immediately ceased all dispensing operations associated with the 30-weight lubricating oil underground storage tank (UST).

Soil samples were obtained by HAI from an excavated trench where the product transfer lines were located and also from a test pit developed in the vicinity of leaking transfer line during January 26 and 27, 1993. Selected soil samples were analyzed for the presence of total petroleum hydrocarbons (TPH) and for gasoline, diesel and/or lube oil.

## 2.0 SCOPE OF WORK

The scope of work for the subsurface investigative activities included the following tasks:

1) Excavation of obviously impacted soils

2) Analysis of selected soil samples for the presence of petroleum hydrocarbons

3) Data synthesis and report preparation

## 3.0 BACKGROUND

The subject property is the location of the BMC corporate office facility. The facility includes two permanent structures (office and storage), one trailer building, a maintenance and fueling barge and boat moorages (Figure 2). The site is situated on a narrow man-made terrace located between the Willamette River to the north and east and NW St. Helens Road to the south and west. Topographically, the site is relatively flat, but drops abruptly to the Willamette River at its northern perimeter. The facility lies at an elevation of approximately 38 feet above mean sea level (MSL) and is located approximately 18 feet above the Willamette River. The area of concern is approximately 25 feet from the Willamette River. The subject property is covered with either buildings or asphalt. All investigative sampling took place near the western end of the storage building.

The BMC facility maintains two 20,000 gallon diesel USTs, two 6,000-gallon lube oil USTs and one 2,000-gallon unleaded gasoline UST in the vicinity of the observed lubrication oil release. Each of the tanks were tested by NDE Environmental Corporation (NDE) on December 22, 1992 using the DEQ-approved volume, pressure, level and temperature (VPLT) test, and they were subsequently determined to be tight. The transfer lines associated with the diesel and gasoline USTs were also determined to be tight at that time. However, according to NDE, the pumps associated with the lube oil USTs could not be located and as such, were not tested. The *Certificates of Underground Storage Tank System Testing* results are included in Appendix A.

BMC indicated that a Spill Prevention Control and Countermeasure (SPCC) plan had been prepared for the facility. An SPCC is required for the BMC facility since greater than 42,000 gallons of petroleum fuel is stored below ground.

## 4.0 FIELD ACTIVITIES

BMC retained Tom New Construction Company (TNC) to retrofit the damaged product 30-weight lube oil transfer line. TNC initiated excavation activities in the vicinity of the observed area of product release on January 20, 1993. The 30-weight and 40-weight lubrication oil lines were drained immediately preceding the excavation activities by TNC. The damaged product line was encountered at approximately 3.0 feet below ground surface (bgs) (Photograph #1). An approximately 1/8-inch diameter hole was observed in the 30-weight transfer line, located beneath the observed area of the release (Photograph #2).

It was also noted upon the initial excavation activities that the 30-weight and 40-weight lube oil transfer lines had been installed adjacent to one another and that they were separated by approximately 3 inches. Each of the lines were noted to be constructed of 3.5 inch inside diameter (ID) uncoated steel-piping which appeared to be corroded. As such, BMC elected to remove an approximately 60-foot section of each of the product lines and replace them with fiberglass piping.

The retrofitting activities performed by TNC took place between January 20 and February 3, 1993. The sections of product transfer line which were replaced extended between the dual 30-weight and 40-weight suction pumps located near the southwest corner of the storage building and an earthen embankment at the northern perimeter of the terrace (Photograph #3). The transfer lines continued and ran exposed down the slope of the embankment to a fueling barge located on the shore of the Willamette River (Photograph #4). The exposed sections of transfer lines had also been tested by Northwest Field Services (NFS) in December 1992 and appeared to be in good condition.

The excavation activities which took place to expose the transfer lines was complicated by the presence of a 4-inch ID diesel transfer line and numerous utility lines which included telecommunication lines, sanitary sewer, water, an unused electrical conduit line and a 750-volt electrical conduit line (Figure 3) all of which were in or crossed the area of concern. The final dimensions of the transfer line excavation was approximately 60 feet

long by 3 feet wide and 3 feet deep. The southern wall of the excavation was at a lateral distance of approximately 1.5 feet from the northern footing of the adjacent storage building foundation (Photograph #5).

The soil in the product transfer line trench was composed of crushed gravel and other fill material that appeared to be underlain by a layer of clay. A silt and clay layer appeared to extend to a depth of approximately 6 feet bgs in the test pit excavation. The soils from 6 feet bgs to the maximum extent of the test pit excavation (12 feet bgs) appeared to be characteristic of sands or dredge fill material. Groundwater was not encountered during the excavation activities. However, based on the topography, it is estimated that flow direction for the local shallow groundwater beneath the site is to the south towards the Willamette River.

Once the transfer lines were exposed, they were each purged with compressed air to remove any free product that was present. During the purging activities, additional holes were not noted in either the 30-weight or 40-weight transfer lines.

On January 21, 1993, approximately 25 gallons of lubrication oil as free product was removed from the transfer line excavation and was placed in a 55-gallon drum (Photograph #6). It appeared that the lube oil was entering the exposed area from the northern and eastern side walls of the excavation. Sorbent pads were placed in a portion of the excavation to minimize free product migration. Subsequently, an additional 30 gallons of free product was removed from the excavation on January 22 and January 25, 1993 and placed in the 55-gallon drum.

Once the 30-weight and 40-weight transfer lines were removed, the trench could not be over-excavated without jeopardizing the structural integrity of the adjacent building foundation and potentially damaging the utility lines. Due to the number of utility lines which occupied the trench, it was determined to be impractical to divert the utility lines in order to remove additional contaminated soils. As such, visual indications of petroleum-contaminated soils were left in-place in the bottom and the side walls of the excavation. It



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appeared that the lube oil had also migrated beneath the foundation of the adjacent building at the observed area of product release.

On January 26, 1993 a test pit was excavated using a rubber-tired backhoe in the vicinity of the observed area of product release. The final dimensions of the test pit excavation was approximately 15 feet long by 14 feet wide and 12 feet deep. The soils in the test pit appeared to consist of silts and clays to a depth of approximately 6 feet bgs and sand or dredge fill material from approximately 6 to 12 bgs. There were visual and olfactory indications of petroleum contamination in the soil removed from the test pit. What appeared to be lubrication oil was also observed to be seeping from the northern and eastern walls of the excavation (Photograph #7).

A total of approximately 50 cubic yards of petroleum-contaminated soil which was removed from the product line trench and the test pit is currently stockpiled at the subject property. The soil is stored on and covered with 9-millimeter (mm) thick plastic sheeting and is diked with hay bales (Photograph #8). Disposal options were under consideration by BMC at the time of this report.

A total of 10 soil samples were obtained from the test pit and transfer line trench on January 26 and 27, 1993. Sample identification numbers (2270-01 through 2279-04) were obtained from the side walls of the test pit excavation at depths of approximately 6 feet bgs. The sample locations were chosen from obviously contaminated areas of soil. Sample 2270-05 was obtained from the bottom of the test pit excavation at a depth of approximately 12 feet bgs. Samples 2279-06 through 2279-09 were obtained from 20 foot intervals along the transfer line trench bottom at depths of approximately 3 feet bgs. Sample 2279-10 was obtained from the stockpile of petroleum-contaminated soil. The samples locations are depicted in Figure 4.

TNC removed the 30-weight and 40-weight product transfer lines on January 27, 1993 and completed the retrofitting of the new fiberglass product lines on January 29, 1993 (Photograph #9). The new transfer lines were inspected and approved by the City of Portland Fire Marshal and the trench was backfilled on February 4, 1993. The excavated

areas have since been paved with asphalt to facilitate vehicle traffic and to minimize physical and safety hazards that they would prevent if left open (Photograph #10).

## 5.0 QUALITY ASSURANCE AND QUALITY CONTROL

All samples were obtained in keeping with the sampling protocols described in the U.S. Environmental Protection Agency (EPA) publication, *Test Methods for Evaluating Solid Wastes-Physical/Chemical Methods* (SW-846). Sampling took place as rapidly as possible to minimize the loss of volatiles. Samples were placed into precleaned, chilled glass sample containers. The completely filled (zero headspace) containers were capped with Teflon-lined caps, sealed, and labeled with independent sample identification numbers. The samples were shipped under chain-of-custody in a chilled cooler (4$^{o}$C) to Hughes Analytical Laboratory (HAL) located in Gresham, Oregon.

All sampling equipment was cleaned prior to use to prevent cross-contamination between sampling events by the following process:

- Trisodium phosphate (TSP) solution wash
- Clean water rinse
- Distilled water rinse

## 6.0 ANALYTICAL TESTS

The soil samples obtained from the southern wall of the test pit excavation, from the bottom of the test pit excavation and from the transfer line trench were analyzed for the presence of petroleum hydrocarbons by the Oregon Department of Environmental Quality (DEQ) hydrocarbon identification (HCID) test method (TPH-HCID). Subsequently, the presence of petroleum hydrocarbons were quantified using DEQ test method TPH-418.1 (Modified). The soil sample obtained from the bottom of the test pit excavation was additionally analyzed for the presence of gasoline using DEQ test method TPH-G, as indicated by the TPH-HCID test.

The results of the analytical testing for soils is summarized on Table 1. The laboratory reports and chain-of-custody documentation for the soil sampling and analyses are included in Appendix B.



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## 7.0 CONCLUSIONS

According to the analytical results, petroleum hydrocarbons as diesel fuel and lube oil were detected at concentrations as high as 10,800 parts per million (ppm) in soil obtained from the side walls of the test pit excavation. Diesel fuel and lube oil were also detected in the soil sample obtained from the bottom of the test pit excavation at a concentration of 39,700 ppm.

Petroleum hydrocarbons as diesel fuel and lube oil were detected in soil samples obtained from the bottom of the transfer line trench at concentrations ranging from 6,290 ppm at the south end of the trench, near the suction pumps, to 53,400 ppm at the approximate location of observed product release. As such, a portion of the trench measuring approximately 50 feet long appeared to have been impacted by the lubrication oil release.

However, with the exception of the immediate area of release, it appeared that the lateral extent of the contaminant migration appeared to have been due to surface water which may have entered the trench and facilitated the movement of the lube oil to the southern portion of the trench. Moreover, when the exposed portion of the transfer lines were purged with compressed air, additional leaks were not observed. As such, the vertical extent of petroleum-contamination in the southern portion of the trench is likely shallow.

The soil sample obtained at the maximum depth bgs (12 feet) was also analyzed for the presence of gasoline for verification purposes. According to the analytical results TPH as gasoline was not detected in the soil sample. A soil sample was also obtained from the stockpile of contaminated soil for disposal considerations. According to the analytical results, the soil contained petroleum hydrocarbons as lube oil at a concentration of 53,100 ppm.



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## 8.0 RECOMMENDATIONS

1) Due to the presence of TPH as diesel fuel which was detected in the site soils, it is recommended that diesel tanks and transfer lines be tested to re-confirm the results of the December 1992 UST integrity results.

2) If the diesel tanks are found to be tight, then it is recommended that BMC install overfill protection or implement other specific over fill control measures.

3) It is recommended that the Brix Maritime Company should submit a copy of this report to the DEQ for its review and in order to comply with the regulations.

Any questions regarding the information presented in this report are welcome and should be referred to the undersigned. Thank you for the opportunity to be of service to the Brix Maritime Company in this manner.

**Hahn and Associates, Inc.**

Prepared by:

Blair T. Loftis
Project Manager

Reviewed by:

Gary W. Hahn
President

Date February 26, 1993

## 9.0 LIMITATIONS

Analytical results presented in this report document only the concentrations of the target analytes in the particular sample and not the property as a whole. We have taken samples from those areas we have identified as having the greatest risk of contamination. Unless a comprehensive statistical sampling program is conducted, however, one cannot conclude with confidence that contaminants may not be found in significantly higher or lower concentrations in other parts of the property. The scope of this investigation was dictated by the client's determination of an appropriate balance between cost and the increased certainty that flows from comprehensive investigation.

(HAI 10/90)



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## GLOSSARY OF ABBREVIATIONS

| | |
|---|---|
| BMC | Brix Maritime Company |
| bgs | below existing ground surface |
| DEQ | Oregon Department of Environmental Quality |
| EPA | US Environmental Protection Agency |
| HAI | Hahn and Associates, Inc. |
| HAL | Hughes Analytical Laboratory |
| HCID | Hydrocarbon Identification Scan |
| ID | inside diameter |
| NDE | NDE Environmental Corporation |
| NFS | Northwest Field Services |
| MSL | mean sea level |
| OAR | Oregon Administrative Rules |
| OEMD | Oregon Emergency Management Division |
| ppm | parts per million |
| SW-846 | Test Methods for Evaluating Solid Waste |
| TNC | Tom New Construction |
| TPH | total petroleum hydrocarbons |
| TSP | Trisodium Phosphate |
| VPLT | Volume, Pressure, Liquid and Temperature Test |



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TABLES

# TABLES

**TABLE I**

**Summary of Analytical Results for Soils**

Brix Maritime Co.
9030 NW St. Helens Road
Portland, Oregon

| Sample Identification No. | Sample Date | Sample Location | Soil Type | Sample Depth feet (bgs) | TPH-HCID (ppm) | TPH-418.1M (ppm) |
|---|---|---|---|---|---|---|
| 2279-01 | 1/26/93 | Excavation (east wall) | Silty Clay | 6.0 | Diesel fuel Lube oil | 451 |
| 2279-02 | 1/26/93 | Excavation (bottom) | Sand | 12.0 | Diesel fuel Lube oil | 39,700 |
| 2279-03 | 1/27/93 | Excavation (north wall) | Silty Clay | 6.0 | NA | 10,800 |
| 2279-04 | 1/27/93 | Excavation (west wall) | Silty Clay | 6.0 | NA | 161 |
| 2279-05 | 1/27/93 | Excavation (south wall) | Silty Clay | 6.0 | NA | 58 |
| 2279-06 | 1/27/93 | Trench (0 ft. from pump) | Gravel | 3.0 | Diesel fuel Lube oil | 6,290 |
| 2279-07 | 1/27/93 | Trench (20 ft. from pump) | Gravel | 3.0 | Diesel fuel Lube oil | 26,100 |
| 2279-08 | 1/27/93 | Trench (40 ft. from pump) | Gravel | 3.0 | Disel fuel Lube oil | 53,400 |
| 2279-09 | 1/27/93 | Trench (60 ft. from pump) | Gravel | 3.0 | Lube oil | 49 |
| 2279-10 | 1/27/93 | Stockpile | Sand | -- | Lube oil | 53,100 |
| Regulatory Soil Cleanup Standard | | | | | | 100 |

**Table 1 (Continued)**

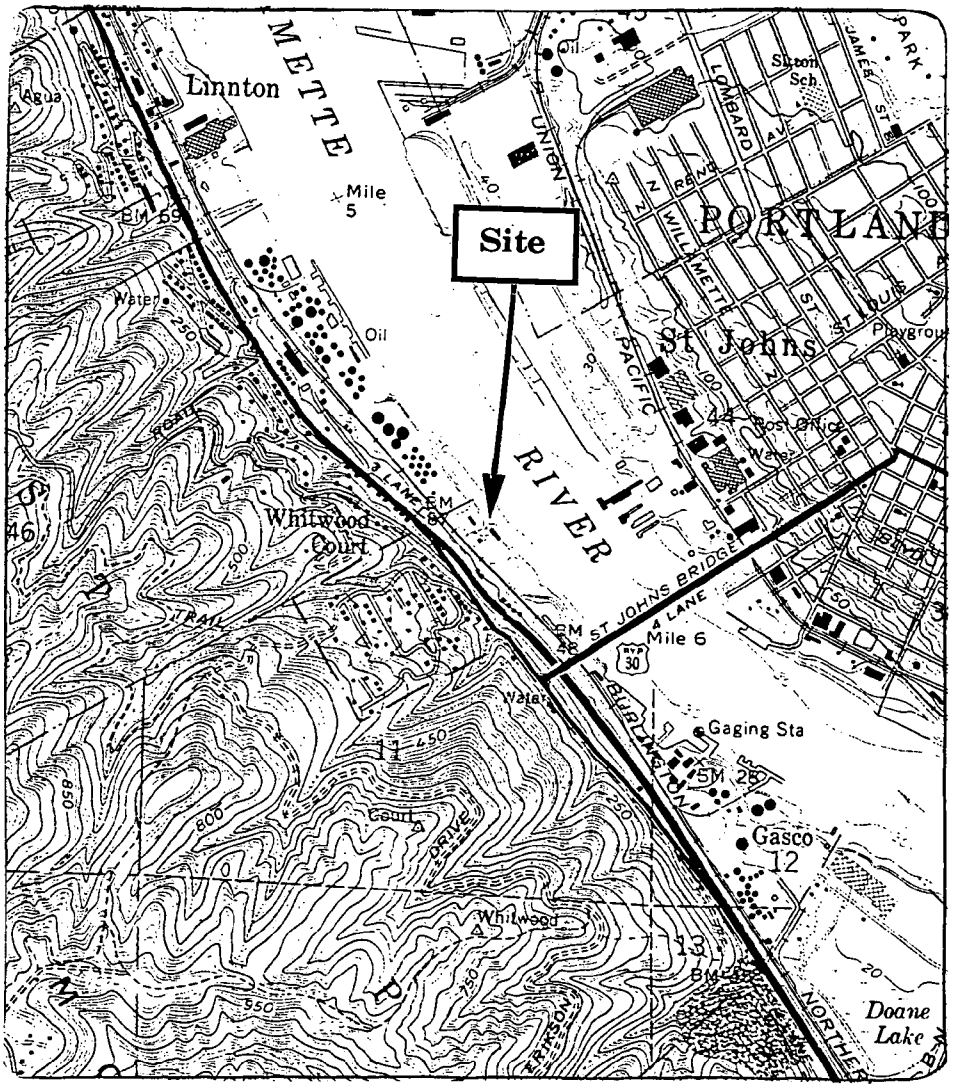
Notes:

| | | |
|---|---|---|
| TPH-HCID | = | Total Petroleum Hydrocarbons - Hydrocarbon Identification Scan |
| TPH-418.1M | = | Total Petroleum Hydrocarbons as Lube Oil or Bunker Related Fuel |
| ppm | = | parts per million |
| bgs | = | below ground surface |
| NA | = | Not Analyzed |
| -- | = | Not applicable |

Regulatory standard represents most stringent regulatory cleanup level, Oregon Administrative Rules (OAR 340-122-355(2)

# FIGURES

**FIGURES**



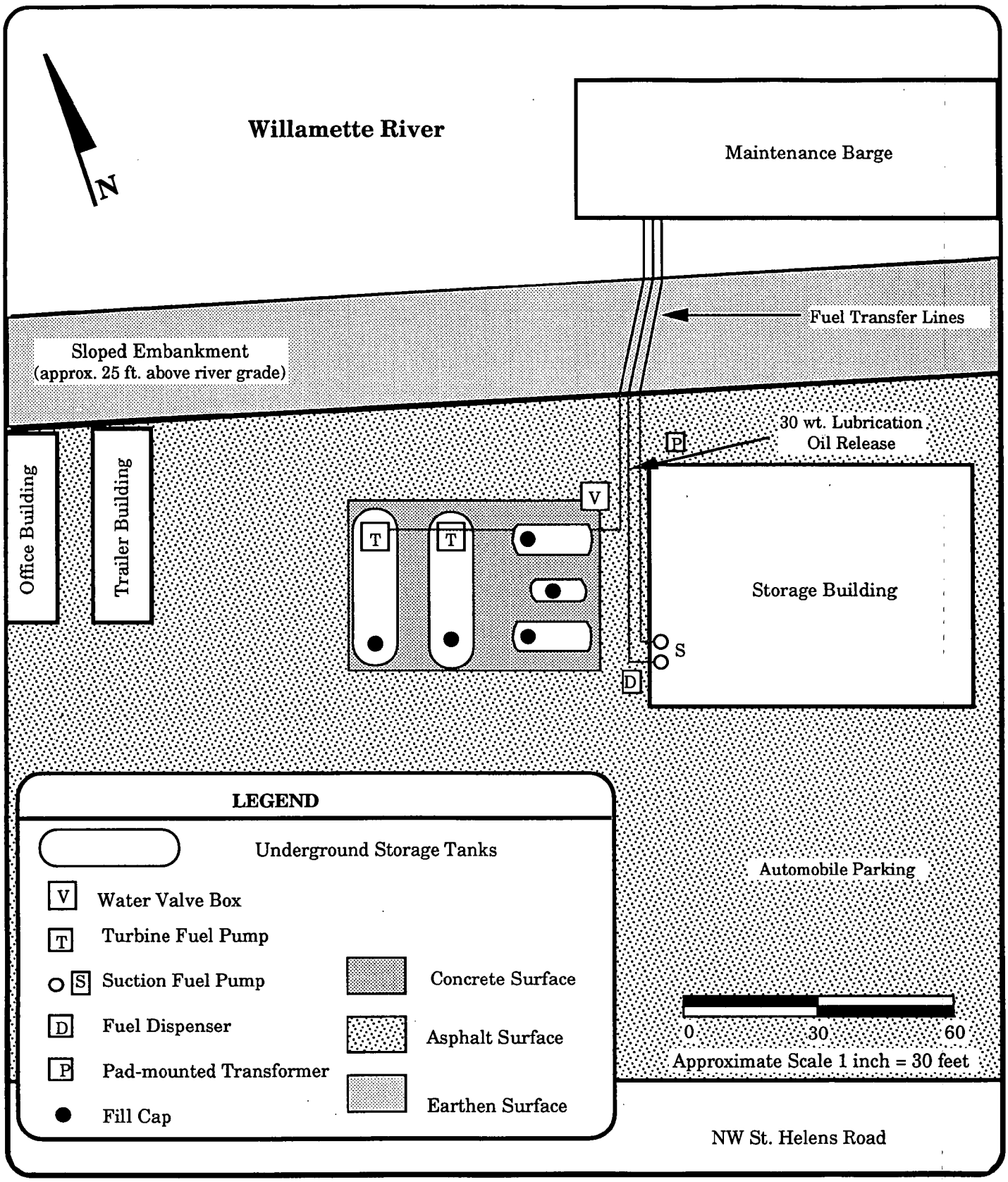

0 2000 4000

**Scale in Feet**

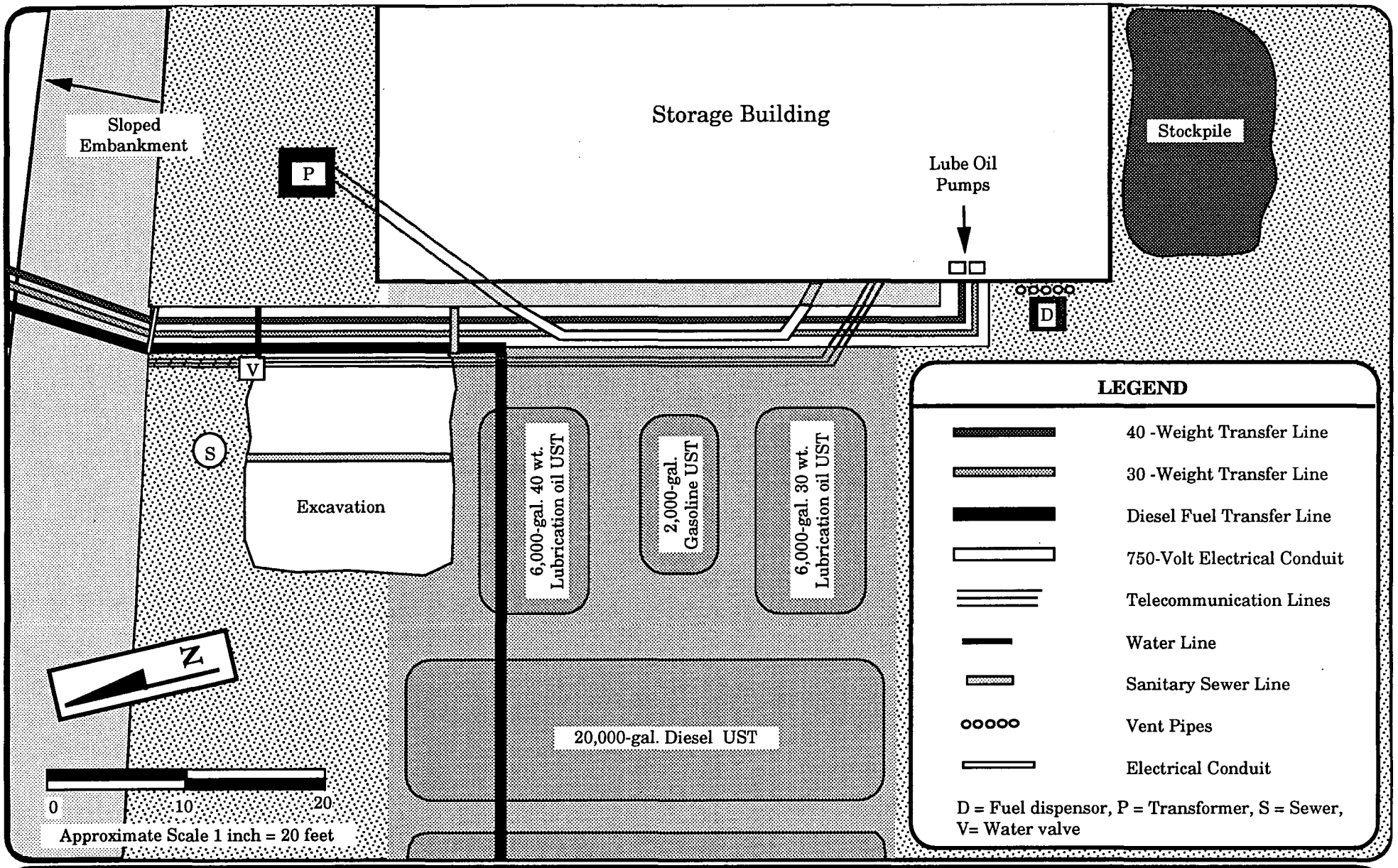
N

U.S.G.S 7.5 Minute Topographical Map, Linnton, Oregon, Photorevised 1984

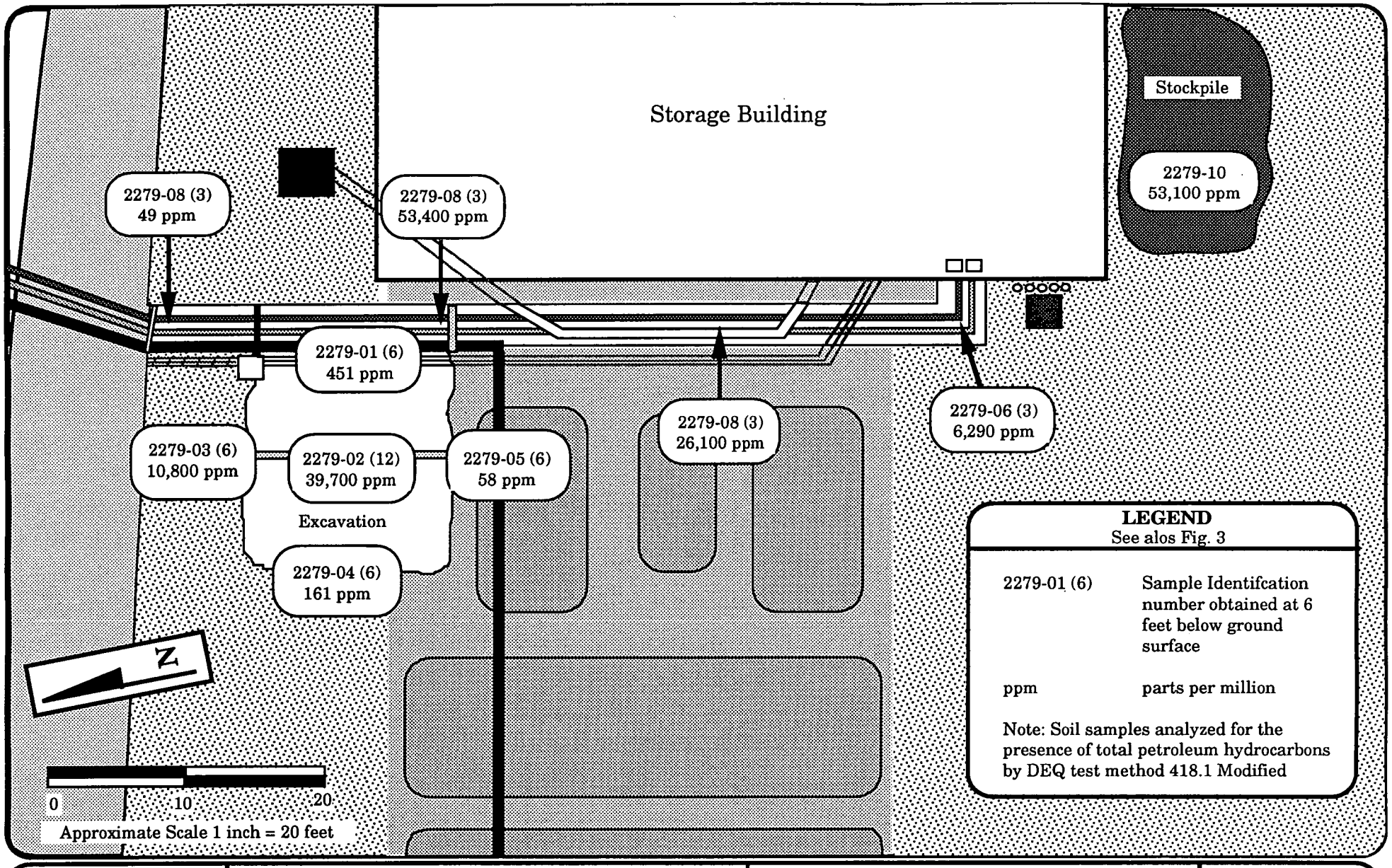
| | | | |
|---|---|---|---|
| HAI Project #2279<br>February 1993 | **HAHN & ASSOCIATES**<br>**INCORPORATED**<br>ENVIRONMENTAL MANAGEMENT<br>434 NW SIXTH AVENUE, SUITE 203<br>PORTLAND, OREGON 97209<br>503/796-0717 | **LOCATION MAP**<br>Brix Maritime Company<br>9030 NW St. Helens Road<br>Portland, Oregon | FIGURE<br>1 |




| | | | |
|---|---|---|---|
| HAI Project #2279<br>February 1993 | **HAHN & ASSOCIATES**<br>**INCORPORATED**<br>ENVIRONMENTAL MANAGEMENT<br>434 NW SIXTH AVENUE, SUITE 203<br>PORTLAND, OREGON 97209<br>503/796-0717 | **FACILITY MAP**<br>Brix Maritime Co.<br>9030 NW St. Helens Road<br>Portland, Oregon | FIGURE<br>**2** |




| | | | |
|---|---|---|---|
| HAI Project #2279 | **HAHN & ASSOCIATES** INCORPORATED | **Site Detail and Sampling Map** | FIGURE 3 |
| February 1993 BTL | ENVIRONMENTAL MANAGEMENT 434 NW SIXTH AVENUE, SUITE 203 PORTLAND, OREGON 97209 503/796-0717 | Brix Maritime Company 9030 NW St. Helens Road Portland, Oregon | |



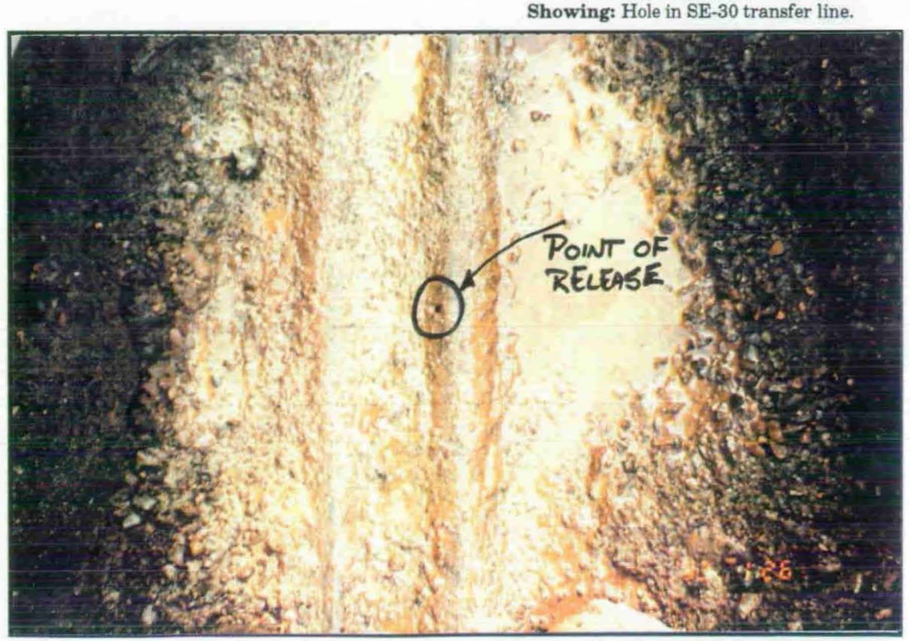

| | | | |
|---|---|---|---|
| HAI Project #2279 | **HAHN & ASSOCIATES** INCORPORATED | **SAMPLE LOCATION MAP** | FIGURE 4 |
| February 1993 BTL | ENVIRONMENTAL MANAGEMENT 434 NW SIXTH AVENUE, SUITE 203 PORTLAND, OREGON 97209 503/796-0717 | Brix Maritime Company 9030 NW St. Helens Road Portland, Oregon | |

**SITE PHOTOGRAPHS**

**Photograph #1** (Above)
**Date:** January 20, 1993
**Location: Northwest corner of storage building**
**Direction Faced:** North
**Showing:** Trench exposing SE-30 and SE-40 product lines at the observed area of release.

**Photograph #3** (Above)
**Date:** January 26, 1993
**Location:** Western side of storage building
**Direction Faced:** South
**Showing:** Transfer lines and test pit from earthen embankm to lube oil pumps.

**Photograph #2** (Below)
**Date:** January 26, 1993
**Location:** Northwest corner of storage building
**Direction Faced:** Photographed from above
**Showing:** Hole in SE-30 transfer line.




**Photograph #4** (Below)
**Date:** January 28, 1993
**Location:** Earthen embankment of terrace
**Direction Faced:** North
**Showing:** Exposed transfer lines to the fueling barge

# PLATE 1

**Photographs**

Underground Storage Tank System Investigation
Brix Maritime Company
9030 NW St. Helens Road
Portland, Oregon

**HAHN & ASSOCIATES**
INCORPORATED
ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
PORTLAND, OREGON 97209
503/796-0717

**February 1993**

**Project #2279**

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**Photograph #5** (Above)
**Date:** January 26, 1993
**Location:** Western side of storage building
**Direction Faced:** North
**Showing:** Exposed utility trench from the lube oil suction pumps to the earthen embankment. Also showing telecommunication lines, electrical conduits, and water lines.

**Photograph #6** (Above)
**Date:** January 21, 1993
**Location:** Nothwest corner of storage building
**Direction Faced:** South
**Showing:** Pooling of free product at observed area of release.

**Photograph #7** (Below)
**Date:** January 22, 1993
**Location:** Nothwest corner of storage building
**Direction Faced:** North
**Showing:** Seeping lube oil in test pit and utility trench.

# PLATE 2

**Photographs**

Underground Storage Tank System Investigation
Brix Maritime Company
9030 NW St. Helens Road
Portland, Oregon


**HAHN & ASSOCIATES**
INCORPORATED
ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
PORTLAND, OREGON 97209
503/796-0717


**February 1993**

**Project #2279**


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**Photograph #8** (Above)
**Date:** January 28, 1993
**Location: Southern side of storage building**
**Direction Faced:** North
**Showing:** Stockpile of petroleum-contaminated soil.

**Photograph #10** (Below)
**Date:** February 4, 1993
**Location:** Western side of storage building
**Direction Faced:** North
**Showing:** Backfilled area of test pit and utility trench.

**Photograph #9** (Above)
**Date:** January 28, 1993
**Location:** Western side of the storage building
**Direction Faced:** South
**Showing:** Replaced lube oil transfer lines and Poly Fely liner.

# PLATE 3

**Photographs**

Underground Storage Tank System Investigation
Brix Maritime Company
9030 NW St. Helens Road
Portland, Oregon

**HAHN & ASSOCIATES**
INCORPORATED
ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
PORTLAND, OREGON 97209
503/796-0717

**February 1993**

**Project #2279**

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00034876

# APPENDICES

## APPENDIX A

**Certificates of Underground Storage Tank Testing**
**Dated December 22, 1992**

# CERTIFICATE OF UNDERGROUND STORAGE TANK SYSTEM TESTING

**NDE ENVIRONMENTAL CORPORATION**
**20000 Mariner Avenue, Suite 500**
**Torrance, California 90503**
**(310) 542-4342**

**Test Date:** 22 Dec 1992 **Work Order#:** 940606

Client: BRIX MARINE
PO BOX 83018
PORTLAND , OR 97283
Attn: RAFAEL CABALLERO

Site: BRIX MARITIME
9030 ST HELENS
PORTLAND , OR 97283

The following tests were conducted at the site described above in accordance with all applicable portions of Federal, NFPA, and Local regulations.

## TANK SYSTEM INFORMATION

| Tank No. | Tank Capacity Gallons | Tank Diameter Inches | Product | Product Level Inches | Tank Material | Vapor Recovery | |
|---|---|---|---|---|---|---|---|
| | | | | | | Stage I | Stage II |
| 1 | 20,029 | 120 | DIESEL | 99.25 | STEEL | NO | NO |
| 2 | 20,029 | 120 | DIESEL | 103.75 | STEEL | NO | NO |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## TESTING RESULTS

| Tank No. | VPLT Volume Change (gph) | Wetted Portion of Tank Pass/fail | Ullage Test Pass/Fail | Vent & Vapor Lines Pass/Fail | Product Lines Pass/Fail | Leak Detector Present? Yes/no | Leak Detector Results Pass/Fail |
|---|---|---|---|---|---|---|---|
| 1 | 0.001 | PASS | PASS | PASS | PASS | NO | |
| 2 | 0.031 | PASS | PASS | PASS | PASS | NO | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

NDE appreciates the opportunity to serve you, and looks forward to working with you in the future. Please call any time, day or night, when you need us.

**NDE Customer Service Representative**

T. CORNO

**Reviewed by:** Benjamin Alicea

**Benjamin Alicea**

**Testing conducted by**

S. WATERFIELD

**Technician certification no.:**

11808

Test Date: 22 Dec 1992 Work Order#: 940606

## TANK TESTING DATA

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Product: | DIESEL | DIESEL | | | | |
| True Capacity-gal: | 20,029 | 20,029 | | | | |
| Manifolded tanks: | NO | NO | | | | |
| Manifolded Vents: | NO | NO | | | | |
| Tank Bottom to top of fill-in: | 154 | 159 | | | | |
| Fill pipe length-in: | 35 | 40 | | | | |
| Tank diameter-in: | 120 | 120 | | | | |
| Tank Bottom to top of grade-in: | 159 | 165 | | | | |
| Fill pipe diameter-in | 4 | 4 | | | | |
| Fluid Level-in: | 99.25 | 103.75 | | | | |
| Fluid Volume-gal: | 17,808 | 18,566 | | | | |
| Water in tank-in: | 0 | 0 | | | | |
| Specific Gravity: | 0.845 | 0.845 | | | | |
| Tank Construction: | STEEL | STEEL | | | | |
| OFT/UFT: | UFT | UFT | | | | |
| No. thermistor: | 10 | 10 | | | | |
| Ground Water level-in | | | | | | |
| How determined: | NO WELL | NO WELL | | | | |
| Test start time:<br>Test finish time: | 08:00<br>12:00 | 08:05<br>12:05 | :<br>: | :<br>: | :<br>: | :<br>: |
| Total temperature change (degrees F): | -0.032 | 0.022 | | | | |
| Total fluid level change (inches): | -0.001 | -0.000 | | | | |
| Leak Rate (GPH): | 0.001 | 0.031 | | | | |
| Pass/Fail: | PASS | PASS | | | | |



Confidential Business Information 00034881

Test Date: 22 Dec 1992 Work Order#: 940606

## ULLAGE TESTING DATA

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Product: | DIESEL | DIESEL | | | | |
| True Capacity-gal: | 20,029 | 20,029 | | | | |
| Ullage volume-gal: | 2,221 | 1,463 | | | | |
| Fluid pressure on tank bottom(psi): | 3.00 | 3.12 | | | | |
| Ullage test pressure: | 0.8 | 0.8 | | | | |
| Stabilization time: | 20 | 20 | | | | |
| Fill start time: | 12:15 | 12:20 | : | : | : | : |
| Time to 1 PSI: | 4 | 4 | | | | |
| Time to test pressure: | 7 | 5 | | | | |
| Start time - test 1: | 12:45 | 12:50 | : | : | : | : |
| Nitrogen flow (cfh): | 0.80 | 0.80 | | | | |
| Ullage temperature-F: | 51.2 | 51.1 | | | | |
| Finish time - test 1: | 12:55 | 13:00 | : | : | : | : |
| Nitrogen flow (cfh): | 0.40 | 0.30 | | | | |
| Start time - test 2: | 12:55 | 13:00 | : | : | : | : |
| Nitrogen flow (cfh): | 0.20 | 0.20 | | | | |
| Ullage temperature: | 51.2 | 51.1 | | | | |
| Finish time - test 2: | 13:05 | 13:10 | : | : | : | : |
| Nitrogen flow (cfh): | 0.00 | 0.00 | | | | |
| Start time - test 3: | : | : | : | : | : | : |
| Nitrogen flow (cfh): | | | | | | |
| Ullage temperature-F: | | | | | | |
| Finish time - test 3: | : | : | : | : | : | : |
| Nitrogen Flow (cfh): | | | | | | |
| Pass/Fail: | PASS | PASS | | | | |

ULLAGE TEST COMMENTS:

NOTE: [ 2 consecutive test @ < 0.275 constitute a PASS ] [ 3 consecutive test @ > 0.275 constitute a FAIL ]



Confidential Business Information 00034882

Test Date: 22 Dec 1992 Work Order#: 940606

## LINE TEST DATA

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Product: | DIESEL | DIESEL | | | | |
| Pump type: | TURBINE | TURBINE | | | | |
| Pump Make: | REDJACKET | REDJACKET | | | | |
| Isolator: | ELEMENT | ELEMENT | | | | |
| Line Material: | STEEL | STEEL | | | | |
| Line Length (ft): | 150 | 150 | | | | |
| Line Diameter(in): | 2 | 2 | | | | |
| Test pressure(psi) | 50 | 50 | | | | |
| Bleed Back (cc): | | | | | | |
| Test start time: | 09:00 | 09:10 | : | : | : | : |
| Time (1): | 09:10 | 09:20 | : | : | : | : |
| Finish PSI: | 47 | 46 | | | | |
| Vol Change (cc): | 4 | 5 | | | | |
| Time (2): | 09:20 | 09:30 | : | : | : | : |
| Finish PSI: | 46 | 44 | | | | |
| Vol Change (cc): | 4 | 6 | | | | |
| Time (3): | 09:30 | 09:40 | : | : | : | : |
| Finish PSI: | 45 | 44 | | | | |
| Vol Change (cc): | 5 | 6 | | | | |
| Volume change-GPH: | 0.007 | 0.009 | | | | |
| Pass/Fail: | PASS | PASS | | | | |

LINE TEST COMMENTS:



Confidential Business Information 00034883

Test Date: 22 Dec 1992 Work Order#: 940606

## LEAK DETECTOR DATA

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Serial number: | 1 | 2 | | | | |
| Product: | DIESEL | DIESEL | | | | |
| Leak Detector manufacturer: | | | | | | |
| Leak detector model: | | | | | | |
| Leak detector serial number: | | | | | | |
| Open time - sec: | | | | | | |
| Element holding-psi: | | | | | | |
| Resiliency - cc: | | | | | | |
| Leak calibration-cc: | | | | | | |
| Leak Rate - GPH: | | | | | | |
| Metering PSI: | | | | | | |
| Detected Leak (Y/N): | | | | | | |
| Pass/Fail: | | | | | | |

## FAILED LEAK DETECTORS

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Leak Detector manufacturer: | | | | | | |
| Leak detector model: | | | | | | |
| Leak detector serial number: | | | | | | |
| Leak Rate - GPH: | | | | | | |
| Pass/Fail: | | | | | | |

LEAK DETECTOR TEST COMMENTS:



Confidential Business Information 00034884

Test Date: 22 Dec 1992 Work Order#: 940606

## COMMENTS

| SITE CONDITIONS, NECESSARY REPAIRS: |
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| ADDITIONAL WORK PERFORMED: |
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| PARTS/EQUIPMENT PROVIDED: |
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| Was lock-out/tag-out procedure used?: **YES** |
| Was location fully operational upon leaving site?: **YES** |
| Was a visual inspection of all submersible pumps, leak detectors, dispensers, etc. conducted while on-site?: **YES** |
| Was station manager or attendant present during final inspection?: **YES** |



Confidential Business Information 00034885

# CERTIFICATE OF UNDERGROUND STORAGE TANK SYSTEM TESTING

NDE ENVIRONMENTAL CORPORATION
20000 Mariner Avenue, Suite 500
Torrance, California 90503
(310) 542-4342

**Test Date:** 23 Dec 1992 **Work Order#:** 940607

Client: BRIX MARITIME CO.
PO BOX 83018
PORTLAND , OR 97283
Attn: RAFAEL CABALLERO

Site: BRIX MARITIME CO.
9330 ST HELENS ROAD
PORTLAND , OR 97283

The following tests were conducted at the site described above in accordance with all applicable portions of Federal, NFPA, and Local regulations.

## TANK SYSTEM INFORMATION

| Tank No. | Tank Capacity Gallons | Tank Diameter Inches | Product | Product Level Inches | Tank Material | Vapor Recovery | |
|---|---|---|---|---|---|---|---|
| | | | | | | Stage I | Stage II |
| 1 | 2,000 | 75 | UNLEAD | 44.50 | STEEL | NONE | NONE |
| 2 | 6,000 | 95 | 30 WT OIL | 13.00 | STEEL | NONE | NONE |
| 3 | 6,000 | 95 | 40 WT OIL | 1.00 | STEEL | NONE | NONE |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## TESTING RESULTS

| Tank No. | VPLT Volume Change (gph) | Wetted Portion of Tank Pass/fail | Ullage Test Pass/Fail | Vent & Vapor Lines Pass/Fail | Product Lines Pass/Fail | Leak Detector Present? Yes/no | Leak Detector Results Pass/Fail |
|---|---|---|---|---|---|---|---|
| 1 | 0.008 | PASS | PASS | PASS | PASS | NO | |
| 2 | -0.033 | PASS | PASS | PASS | | NO | |
| 3 | | | PASS | PASS | | NO | |
| | | | | | | | |
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| | | | | | | | |

NDE appreciates the opportunity to serve you, and looks forward to working with you in the future. Please call any time, day or night, when you need us.

**NDE Customer Service Representative**

T. CORNO

**Reviewed by:** Benjamin Alicea

**Testing conducted by**

J. FEUKER

**Technician certification no.:**

11809

Test Date: 23 Dec 1992 Work Order#: 940607

## TANK TESTING DATA

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Product: | UNLEAD | 30 WT OI | 40 WT OI | | | |
| True Capacity-gal: | 2,000 | 6,000 | 6,000 | | | |
| Manifolded tanks: | NO | NO | NO | | | |
| Manifolded Vents: | NO | NO | NO | | | |
| Tank Bottom to top of fill-in: | 110 | 128 | 128 | | | |
| Fill pipe length-in: | 35 | 33 | 33 | | | |
| Tank diameter-in: | 75 | 95 | 95 | | | |
| Tank Bottom to top of grade-in: | 119 | 134 | 134 | | | |
| Fill pipe diameter-in | 3 | 4 | 4 | | | |
| Fluid Level-in: | 44.50 | 13.00 | 1.00 | | | |
| Fluid Volume-gal: | 1,236 | 1,029 | 0 | | | |
| Water in tank-in: | 0 | 0 | 0 | | | |
| Specific Gravity: | 0.732 | 0.875 | | | | |
| Tank Construction: | STEEL | STEEL | STEEL | | | |
| OFT/UFT: | UFT | UFT | N/A | | | |
| No. thermistor: | 5 | 4 | | | | |
| Ground Water level-in | | | | | | |
| How determined: | NO WELL | NO WELL | | | | |
| Test start time:<br>Test finish time: | 10:25<br>12:26 | 10:29<br>12:32 | :<br>: | :<br>: | :<br>: | :<br>: |
| Total temperature change (degrees F): | -0.061 | 0.099 | | | | |
| Total fluid level change (inches): | 0.001 | 0.006 | | | | |
| Leak Rate (GPH): | 0.008 | -0.033 | | | | |
| Pass/Fail: | PASS | PASS | | | | |



Confidential Business Information 00034887

Test Date: 23 Dec 1992 Work Order#: 940607

ULLAGE TESTING DATA

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Product: | UNLEAD | 30 WT OI | 40 WT OI | | | |
| True Capacity-gal: | 2,000 | 6,000 | 6,000 | | | |
| Ullage volume-gal: | 746 | 4,971 | 6,000 | | | |
| Fluid pressure on tank bottom(psi): | 1.20 | 0.40 | 0.00 | | | |
| Ullage test pressure: | 2.8 | 3.6 | 4.0 | | | |
| Stabilization time: | 12 | 35 | 40 | | | |
| Fill start time: | 12:40 | 12:40 | 10:40 | : | : | : |
| Time to 1 PSI: | 1 | 6 | 9 | | | |
| Time to test pressure: | 2 | 18 | 23 | | | |
| Start time - test 1: | 12:54 | 13:33 | 11:45 | : | : | : |
| Nitrogen flow (cfh): | 0.20 | 0.20 | 0.20 | | | |
| Ullage temperature-F: | 54.3 | 58.9 | 52.0 | | | |
| Finish time - test 1: | 13:04 | 13:43 | 11:55 | : | : | : |
| Nitrogen flow (cfh): | 0.20 | 0.20 | 0.25 | | | |
| Start time - test 2: | 13:04 | 13:43 | 11:55 | : | : | : |
| Nitrogen flow (cfh): | 0.20 | 0.20 | 0.20 | | | |
| Ullage temperature: | 54.3 | 58.7 | 52.1 | | | |
| Finish time - test 2: | 13:14 | 13:53 | 12:05 | : | : | : |
| Nitrogen flow (cfh): | 0.20 | 0.20 | 0.20 | | | |
| Start time - test 3: | : | : | : | : | : | : |
| Nitrogen flow (cfh): | | | | | | |
| Ullage temperature-F: | | | | | | |
| Finish time - test 3: | : | : | : | : | : | : |
| Nitrogen Flow (cfh): | | | | | | |
| Pass/Fail: | PASS | PASS | PASS | | | |

ULLAGE TEST COMMENTS:

NOTE: [ 2 consecutive test @ < 0.275 constitute a PASS ] [ 3 consecutive test @ > 0.275 constitute a FAIL ]

Test Date: 23 Dec 1992 Work Order#: 940607

## LINE TEST DATA

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Product: | UNLEAD | 30 WT OIL | 40 WT OIL | | | |
| Pump type: | SUCTION | GRAVITY | GRAVITY | | | |
| Pump Make: | AO SMITH | | | | | |
| Isolator: | FT VLV | | | | | |
| Line Material: | STEEL | | | | | |
| Line Length (ft): | 25 | | | | | |
| Line Diameter(in): | 2 | | | | | |
| Test pressure(psi) | 15 | | | | | |
| Bleed Back (cc): | 120 | | | | | |
| Test start time: | 12:45 | : | : | : | : | : |
| Time (1): | 12:55 | : | : | : | : | : |
| Finish PSI: | 14 | | | | | |
| Vol Change (cc): | 6 | | | | | |
| Time (2): | 13:05 | : | : | : | : | : |
| Finish PSI: | 14 | | | | | |
| Vol Change (cc): | 3 | | | | | |
| Time (3): | 13:15 | : | : | : | : | : |
| Finish PSI: | 14 | | | | | |
| Vol Change (cc): | 2 | | | | | |
| Volume change-GPH: | 0.006 | | | | | |
| Pass/Fail: | PASS | | | | | |

LINE TEST COMMENTS:



Confidential Business Information 00034889

Test Date: 23 Dec 1992 Work Order#: 940607

## LEAK DETECTOR DATA

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Serial number: | 1 | 2 | 3 | | | |
| Product: | UNLEAD | 30 WT OIL | 40 WT OIL | | | |
| Leak Detector manufacturer: | | | | | | |
| Leak detector model: | | | | | | |
| Leak detector serial number: | | | | | | |
| Open time - sec: | | | | | | |
| Element holding-psi: | | | | | | |
| Resiliency - cc: | | | | | | |
| Leak calibration-cc: | | | | | | |
| Leak Rate - GPH: | | | | | | |
| Metering PSI: | | | | | | |
| Detected Leak (Y/N): | | | | | | |
| Pass/Fail: | | | | | | |

## FAILED LEAK DETECTORS

| | Tank 1 | Tank 2 | Tank 3 | Tank 4 | Tank 5 | Tank 6 |
|---|---|---|---|---|---|---|
| Leak Detector manufacturer: | | | | | | |
| Leak detector model: | | | | | | |
| Leak detector serial number: | | | | | | |
| Leak Rate - GPH: | | | | | | |
| Pass/Fail: | | | | | | |

LEAK DETECTOR TEST COMMENTS:



Confidential Business Information 00034890

Test Date: 23 Dec 1992 Work Order#: 940607

## COMMENTS

| SITE CONDITIONS, NECESSARY REPAIRS: |
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| ADDITIONAL WORK PERFORMED: |
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| PARTS/EQUIPMENT PROVIDED: |
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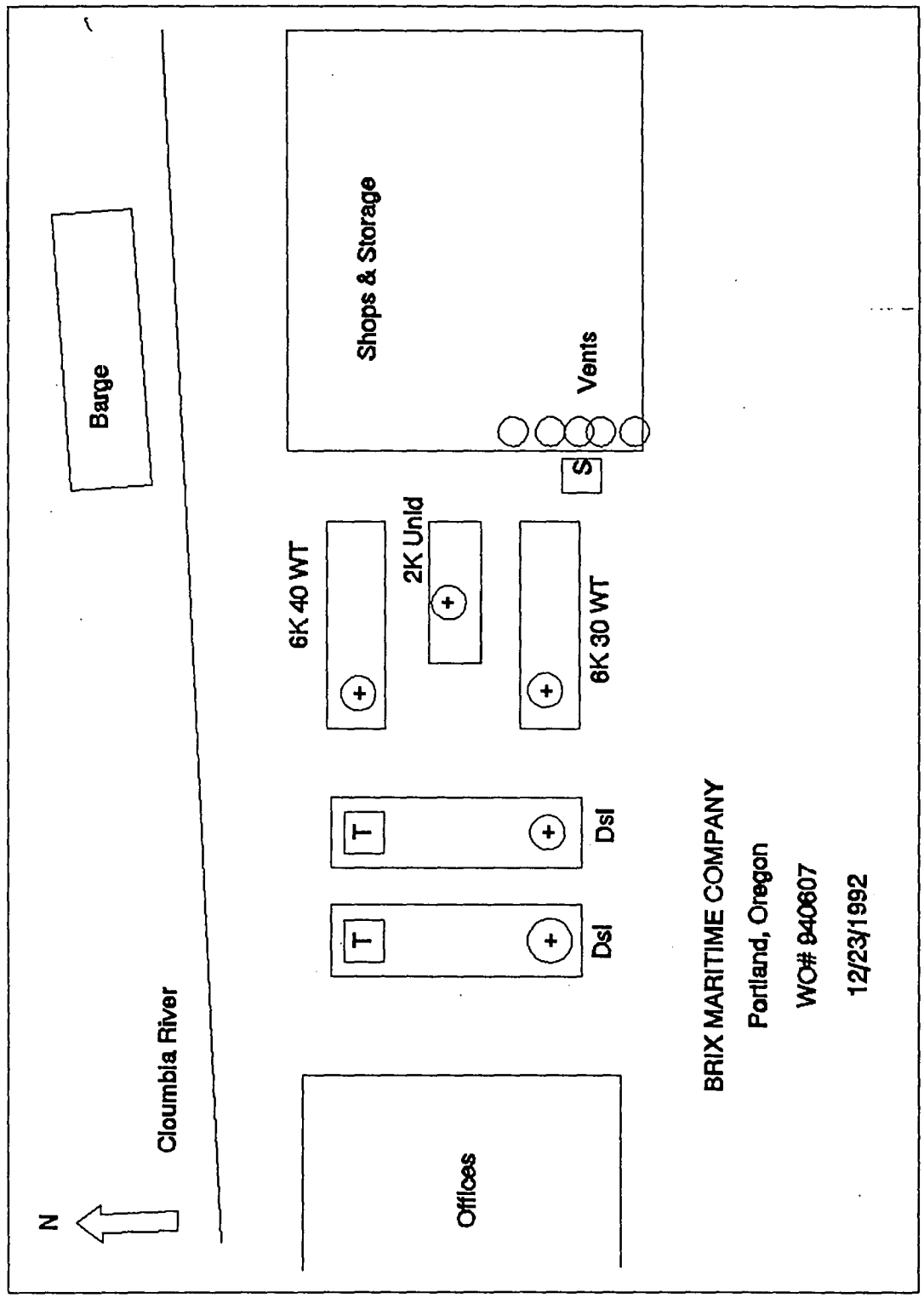
| Was lock-out/tag-out procedure used?: **YES** |
| Was location fully operational upon leaving site?: **YES** |
| Was a visual inspection of all submersible pumps, leak detectors, dispensers, etc. conducted while on-site?: **YES** |
| Was station manager or attendant present during final inspection?: **YES** |



Confidential Business Information 00034891

## SITE DIAGRAM






Confidential Business Information

# APPENDIX B

## Laboratory Results and Chain-of-Custody Information for Soil Samples

HUGHES
ANALYTICAL LABORATORY

February 3, 1993

Mr. Blair Loftis
Hahn & Associates, Inc.
434 NW 6th Ave.
Suite 203
Portland, OR 97209-3600

Dear Mr. Loftis:

Enclosed is the lab report for your samples which were received on January 27, 1993. The Hughes Report # is 93-0031 and the Client Project is 2279 BRXUST.

Ten soil samples were received under a chain of custody. The samples were received in containers consistent with U.S. EPA (United States Environmental Protection Agency) protocol.

Standard Quality Assurance/Quality Control (QA/QC) procedures were performed as stated in "EPA Test Methods for Evaluating Solid Waste (SW-846)", 3rd Edition and "Standard Methods for the Examination of Water and Wastewater", 17th Edition. The EPA laboratory protocols followed include sample holding times, laboratory method blanks, laboratory matrix spikes, replicate samples and calibration standards. There were no significant variations from these protocols that would invalidate the analytical data.

Test methods may include minor modifications of detection limits or lists of parameters for the published methods. Solid samples are reported on a wet weight basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Kim Hughes

Kim Hughes
Lab Director

21920 N.E. Glisan ■ Gresham, Oregon 97030 ■ (503) 669-3745 ■ FAX (503) 669-4165

Confidential Business Information

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 93-0031 CLIENT JOB:2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: Six Soil Samples

**METHOD:** TPH-HCID by GC/FID Per Oregon DEQ

Extraction: 01/27/93
Analysis: 01/27/93

| SAMPLE I.D. | RESULT | SURROGATE RECOVERY, % |
|---|---|---|
| 2279-01 | $C_{16}$-$C_{40}$* | 96.2 |
| 2279-02 | $C_{9}$-$C_{40}$* | *** |
| 2279-06 | $C_{21}$-$C_{40}$* | 92.9 |
| 2279-07 | $C_{16}$-$C_{40}$* | 96.5 |
| 2279-08 | $C_{16}$-$C_{40}$* | *** |
| 2279-09 | $C_{22}$-$C_{40}$** | 102 |
| Lab Blank | ND | 94.9 |

* Carbon range corresponds to a mixture of diesel and heavy oil.

** Carbon range corresponds to heavy oil.

***No surrogate recovery for this sample due to matrix interference.

Detection Limits:
Gasoline - 10 mg/kg
Diesel - 20 mg/kg
Heavy Oil - 50 mg/kg

ND = Not Detected

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 93-0031 CLIENT JOB:2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: Ten Soil Samples

**METHOD:** TPH-418.1 Modified per Oregon DEQ Results in mg/Kg(ppm)

Extraction: 01/28/93, 01/30/93
Analysis: 01/29/93, 01/30/93

| SAMPLE I.D. | RESULT | DETECTION LIMIT |
|---|---|---|
| 2279-01 | 451 | 100 |
| 2279-02 | 39700 | 5000 |
| 2279-03 | 10800 | 1250 |
| 2279-04 | 161 | 50 |
| 2279-05 | 58 | 25 |
| 2279-06 | 6290 | 1250 |
| 2279-07 | 26100 | 5000 |
| 2279-07 (replicate) | 23700 | 5000 |
| 2279-08 | 53400 | 10000 |
| 2279-09 | 49 | 25 |
| 2279-10 | 53100 | 10000 |
| Lab Blank | ND | 25 |

ND = Not Detected

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 92-0031 CLIENT #: 2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: One Soil Sample

**METHOD:** TPH-G by GC/FID per Oregon DEQ Results in mg/Kg (ppm)

Extraction: 01/28/93
Analysis: 01/28/93

| Sample I.D. | Result | Surrogate Recovery, % |
|---|---|---|
| 2279-02 | ND | 107 |
| Lab Blank | ND | 95.6 |
| Detection Limit | 10 | |

ND = Not Detected

HUGHES
ANALYTICAL LABORATORY

February 3, 1993

Mr. Blair Loftis
Hahn & Associates, Inc.
434 NW 6th Ave.
Suite 203
Portland, OR 97209-3600

Dear Mr. Loftis:

Enclosed is the lab report for your samples which were received on January 27, 1993. The Hughes Report # is 93-0031 and the Client Project is 2279 BRXUST.

Ten soil samples were received under a chain of custody. The samples were received in containers consistent with U.S. EPA (United States Environmental Protection Agency) protocol.

Standard Quality Assurance/Quality Control (QA/QC) procedures were performed as stated in "EPA Test Methods for Evaluating Solid Waste (SW-846)", 3rd Edition and "Standard Methods for the Examination of Water and Wastewater", 17th Edition. The EPA laboratory protocols followed include sample holding times, laboratory method blanks, laboratory matrix spikes, replicate samples and calibration standards. There were no significant variations from these protocols that would invalidate the analytical data.

Test methods may include minor modifications of detection limits or lists of parameters for the published methods. Solid samples are reported on a wet weight basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Kim Hughes

Kim Hughes
Lab Director

21920 N.E. Glisan ▪ Gresham, Oregon 97030 ▪ (503) 669-3745 ▪ FAX (503) 669-4165

Confidential Business Information

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 93-0031 CLIENT JOB:2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: Six Soil Samples

**METHOD:** TPH-HCID by GC/FID
Per Oregon DEQ

Extraction: 01/27/93
Analysis: 01/27/93

| SAMPLE I.D. | RESULT | SURROGATE RECOVERY, % |
|---|---|---|
| 2279-01 | $C_{16}$-$C_{40}$* | 96.2 |
| 2279-02 | $C_{9}$-$C_{40}$* | *** |
| 2279-06 | $C_{21}$-$C_{40}$* | 92.9 |
| 2279-07 | $C_{16}$-$C_{40}$* | 96.5 |
| 2279-08 | $C_{16}$-$C_{40}$* | *** |
| 2279-09 | $C_{22}$-$C_{40}$** | 102 |
| Lab Blank | ND | 94.9 |

* Carbon range corresponds to a mixture of diesel and heavy oil.

** Carbon range corresponds to heavy oil.

***No surrogate recovery for this sample due to matrix interference.

Detection Limits:
Gasoline - 10 mg/kg
Diesel - 20 mg/kg
Heavy Oil - 50 mg/kg

ND = Not Detected

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 93-0031 CLIENT JOB:2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: Ten Soil Samples

**METHOD:** TPH-418.1 Modified per Oregon DEQ Results in mg/Kg(ppm)

Extraction: 01/28/93, 01/30/93
Analysis: 01/29/93, 01/30/93

| SAMPLE I.D. | RESULT | DETECTION LIMIT |
|---|---|---|
| 2279-01 | 451 | 100 |
| 2279-02 | 39700 | 5000 |
| 2279-03 | 10800 | 1250 |
| 2279-04 | 161 | 50 |
| 2279-05 | 58 | 25 |
| 2279-06 | 6290 | 1250 |
| 2279-07 | 26100 | 5000 |
| 2279-07 (replicate) | 23700 | 5000 |
| 2279-08 | 53400 | 10000 |
| 2279-09 | 49 | 25 |
| 2279-10 | 53100 | 10000 |
| Lab Blank | ND | 25 |

ND = Not Detected

HUGHES ANALYTICAL LABORATORY



HUGHES REPORT #: 92-0031 CLIENT #: 2279 BRXUST
CLIENT: Hahn & Associates, Inc.
DATE: February 3, 1993
ITEMS: One Soil Sample

**METHOD:** TPH-G by GC/FID per Oregon DEQ Results in mg/Kg (ppm)

Extraction: 01/28/93
Analysis: 01/28/93

| Sample I.D. | Result | Surrogate Recovery, % |
|---|---|---|
| 2279-02 | ND | 107 |
| Lab Blank | ND | 95.6 |
| Detection Limit | 10 | |

ND = Not Detected

# HAHN AND ASSOCIATES, INC.
## ENVIRONMENTAL MANAGEMENT

434 NW 6th Ave., Suite 203 • Portland, Oregon 97209-3600
503/796-0717 Office • 503/227-2209 FAX

LABORATORY Hughes Analytical Laboratory

Lab Project No.

# CHAIN OF CUSTODY

☐ Please bill the Port of Portland
☑ Please bill Hahn and Associates, Inc.

Project Manager: Blair T. Loftis
Project No.: 2279
Project Name: BRXUST
Collected by: BTL

LIQUID WITH SEDIMENT SAMPLE
___ Test Filtrate ___ Test Sediment ___ Test Both
MULTI-PHASE SAMPLE ( )
___ Test one (which) ___ Test Separately ___ Shake

Samples Received at 4°C ☐ YES ☐ NO
Appropriate Containers Used ☑ YES ☐ NO
Provide Verbal Results ☑ YES ☐ NO
Provide Preliminary FAX Results ☑ YES ☐ NO

COMMENTS
• VERBAL RESULTS FOR 2279-02 by 1/29/93 IF POSIBLE
• HOLD 2279-03 through -05 AND -10 PENDING SAMPLE RESULTS.

STANDARD TURN AROUND TIME

| LAB I.D. | SAMPLE I.D. | DATE | TIME | SAMPLE DESCRIPTION | MATRIX: Soil | Water | Other | Number of Containers | TPH-HCID (OAR/DEQ) | Quantify HCID (if detected) | TPH-G (OAR/DEQ) | TPH-D (OAR/DEQ) | TPH-418.1 Mod. (OAR/DEQ) | TPH (EPA 418.1) | BTEX (EPA 8020) | PAHs (EPA 8310-OAR/DEQ) | PAHs (GC/MS SIM Mode) | Halo.-Volatiles (EPA 8010) | Volatiles (EPA 8240) | Semivolatiles (EPA 8270) | TCLP (8) Metals | TCLP (8) Metals | Pesticides (EPA 8080) | PCBs (EPA 8080) | | | | RUSH | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2279-01 | 1/26/93 | 1530 | SILTY CLAY (8.0' BGS) | X | | | 1 | X | X | | | X | | | | | | | | | | | | | | | | EXCAVATION (EAST WALL) |
| | 2279-02 | 1/26/93 | 1545 | DREDGE FILL (12.0' BGS) | X | | | 1 | X | X | X | | X | | | | | | | | | | | | | | | | EXCAVATION (BOTTOM) |
| | 2279-03 | 1/27/93 | 1040 | SAND + GRAVEL (8.0' BGS) | X | | | 1 | | | | | X | | | | | | | | | | | | | | | | EXCAVATION (NORTH WALL) |
| | 2279-04 | 1/27/93 | 1050 | SILTY CLAY (8.0' BGS) | X | | | 1 | | | | | X | | | | | | | | | | | | | | | | EXCAVATION (WEST WALL) |
| | 2279-05 | 1/27/93 | 1105 | DREDGE FILL (8.0' BGS) | X | | | 1 | | | | | X | | | | | | | | | | | | | | | | EXCAVATION (SOUTH WALL) |
| | 2279-06 | 1/27/93 | 1320 | SAND + GRAVEL (3.0' BGS) | X | | | 1 | X | | | | X | | | | | | | | | | | | | | | | TRENCH @ 0.0' |
| | 2279-07 | 1/27/93 | 1300 | SAND + GRAVEL (3.0' BGS) | X | | | 1 | X | | | | X | | | | | | | | | | | | | | | | TRENCH @ 20.0' |
| | 2279-08 | 1/27/93 | 1230 | SAND + GRAVEL (3.0' BGS) | X | | | 1 | X | | | | X | | | | | | | | | | | | | | | | TRENCH @ 40' |
| | 2279-09 | 1/27/93 | 1200 | SAND + GRAVEL (3.0' BGS) | X | | | 1 | X | | | | X | | | | | | | | | | | | | | | | TRENCH @ 60' |
| | 2279-10 | 1/27/93 | 1330 | SAND + GRAVEL | X | | | 1 | | | | | X | | | | | | | | | | | | | | | | STOCK PILE |

| Relinquished by | Company | Date | Time | Received by | Company |
|---|---|---|---|---|---|
| Blair T. Loftis | Hahn and Assocs. Inc. | 1/27/93 | 1505 | Jenni Hughes 3:45 1-27-93 | Hughes Analytical |
| | | | | | |
| | | | | | |

Confidential Business Information

000349023

File

# Oregon

Theodore R. Kulongoski, Governor

**Department of Environmental Quality**
**Northwest Region Portland Office**
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
FAX (503) 229-6945
TTY (503) 229-5471

April 23, 2008

Arya Behbehani-Divers
Portland General Electric
Mailstop 3WTCBR05
121 SW Salmon Street
Portland, OR 97204

Re: Participation in Downtown Portland Sediment Characterization Project
ECSI #4956

Dear Ms Behbehani-Divers:

Thank you for your ongoing participation in project planning efforts for the upcoming Downtown Reach sediment sampling event taking place in the Willamette River. As we discussed, these investigation activities are being conducted under the oversight of the Oregon Department of Environmental Quality (DEQ) Cleanup Program.

The purpose of this investigation is to refine our understanding of potential sources of inwater contamination, and determine the impact, if any, that those sources may have to downstream areas. This will be accomplished by sampling shoreline areas to assess potential impacts, if any, and to determine sources as appropriate. Additional samples will be taken in several mid channel and other locations to evaluate ambient conditions in this stretch of the river.

Sampling will take place as described in the draft *Sampling and Analysis Plan*, being finalized by GSI, Inc for the City of Portland and DEQ. Locations for sampling will be identified in Tables 2-2 and 2-3 of that document. Samples collected will be a mix of core and surface grabs, and will be analyzed for a wide variety of chemicals, including PCBs, pesticides, Tributyltin (TBT) and metals.

Sample locations are designed for three criteria:

- Outfalls - assess the potential historic and ongoing impact to river sediments from stormwater originated from a variety of land uses and from basins containing DEQ-listed (ECSI) sites.
- Riverfront Industries - assess the potential impact to river sediments from past and current riverfront industries.

- Ambient Stations - assess ambient levels of hazardous substances within the Downtown Reach.

As we have discussed, Portland General Electric's (PGE's) former operations in the vicinity of Station L are within the geographic scope of this investigation. DEQ requests that PGE participate in the study. This group effort (currently including the City of Portland and 3 other parties) is the most efficient and cost-effective way to meet DEQ's objectives for this investigation. PGE proposes that its participation consist of analyzing a total of 21 samples. These samples will be located in the direct vicinity of its former operations, in locations targeted to assist in characterizing areawide contaminant concentrations in the study area, and include a prorated share of laboratory QA/QC blanks necessary for data validation.

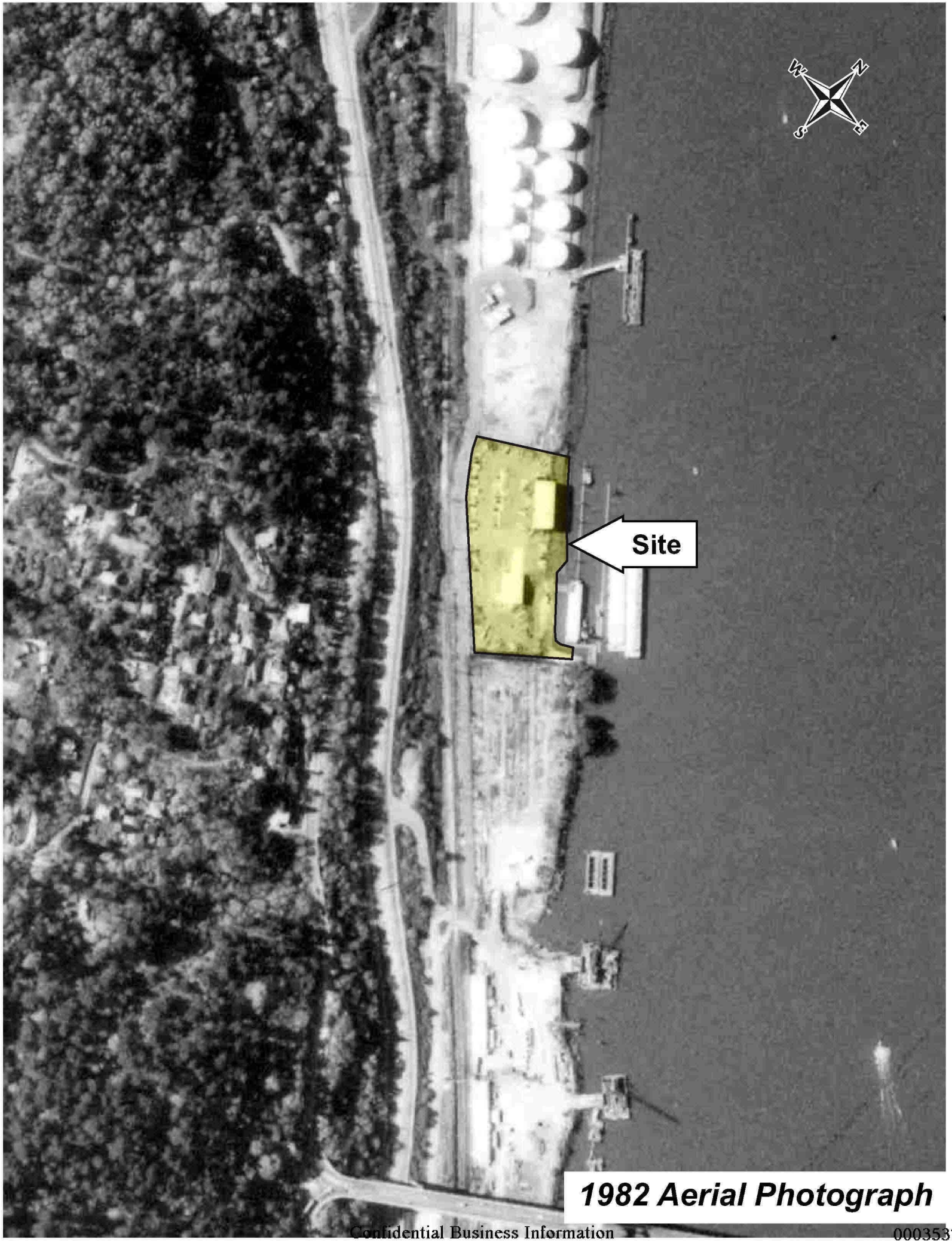
As a result of participating, PGE will directly receive analytical on its samples, as well as input into the data summary report that will be produced by the participants, estimated for August 2008. DEQ also encourages PGE's comments on our subsequent follow up analysis of the findings, which will follow the August 2008 report. For specifics on reporting, please reference Section 7 of the Field Sampling Plan.

Further inquiries can be made to Keith Johnson at 503-229-6431, or johnsonkeith@deq.state.or.us.

Sincerely,

Keith Johnson
Northwest Region Cleanup Program Manager

cc: Jim Anderson, ODEQ
ECSI File 4956

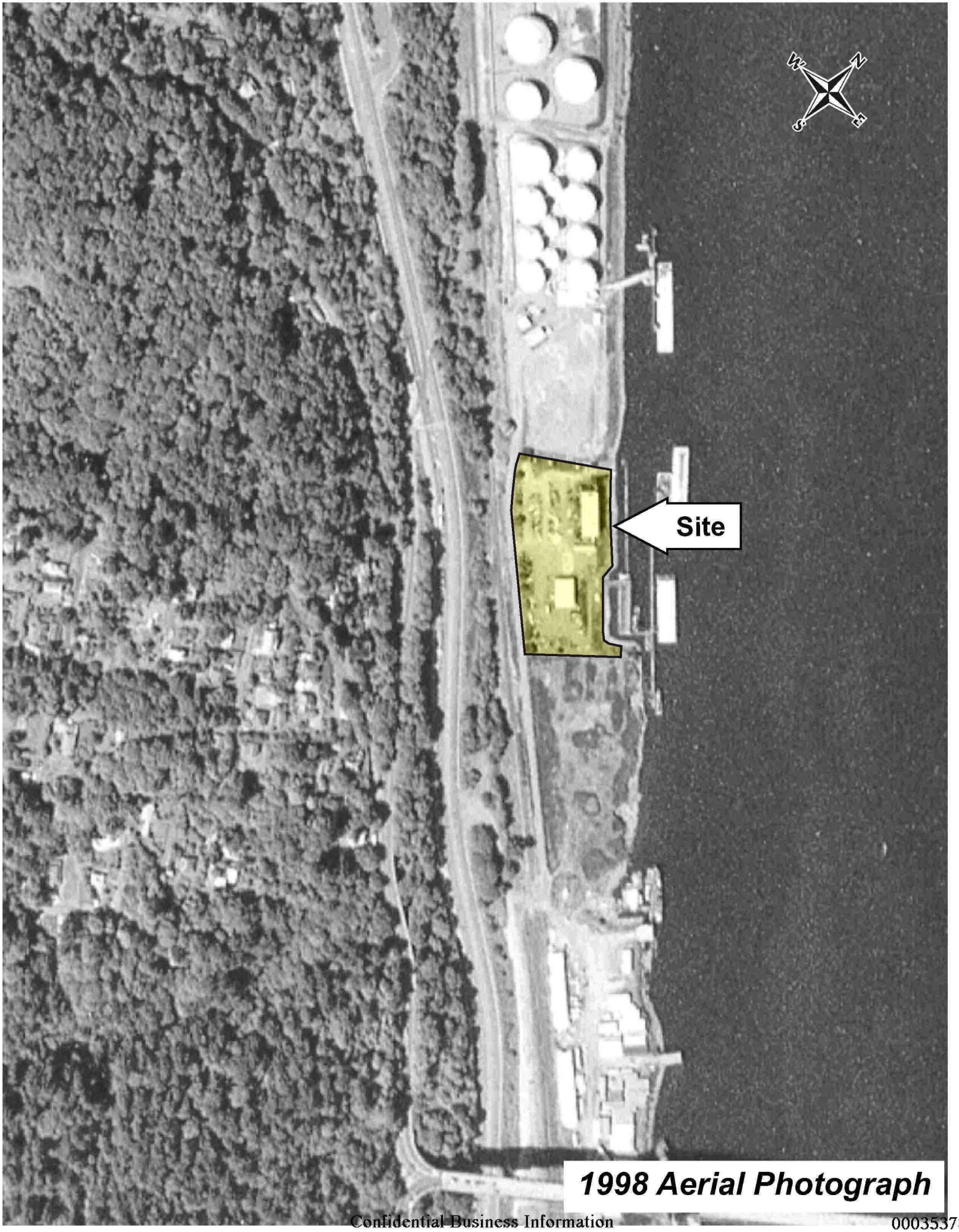



1982 Aerial Photograph

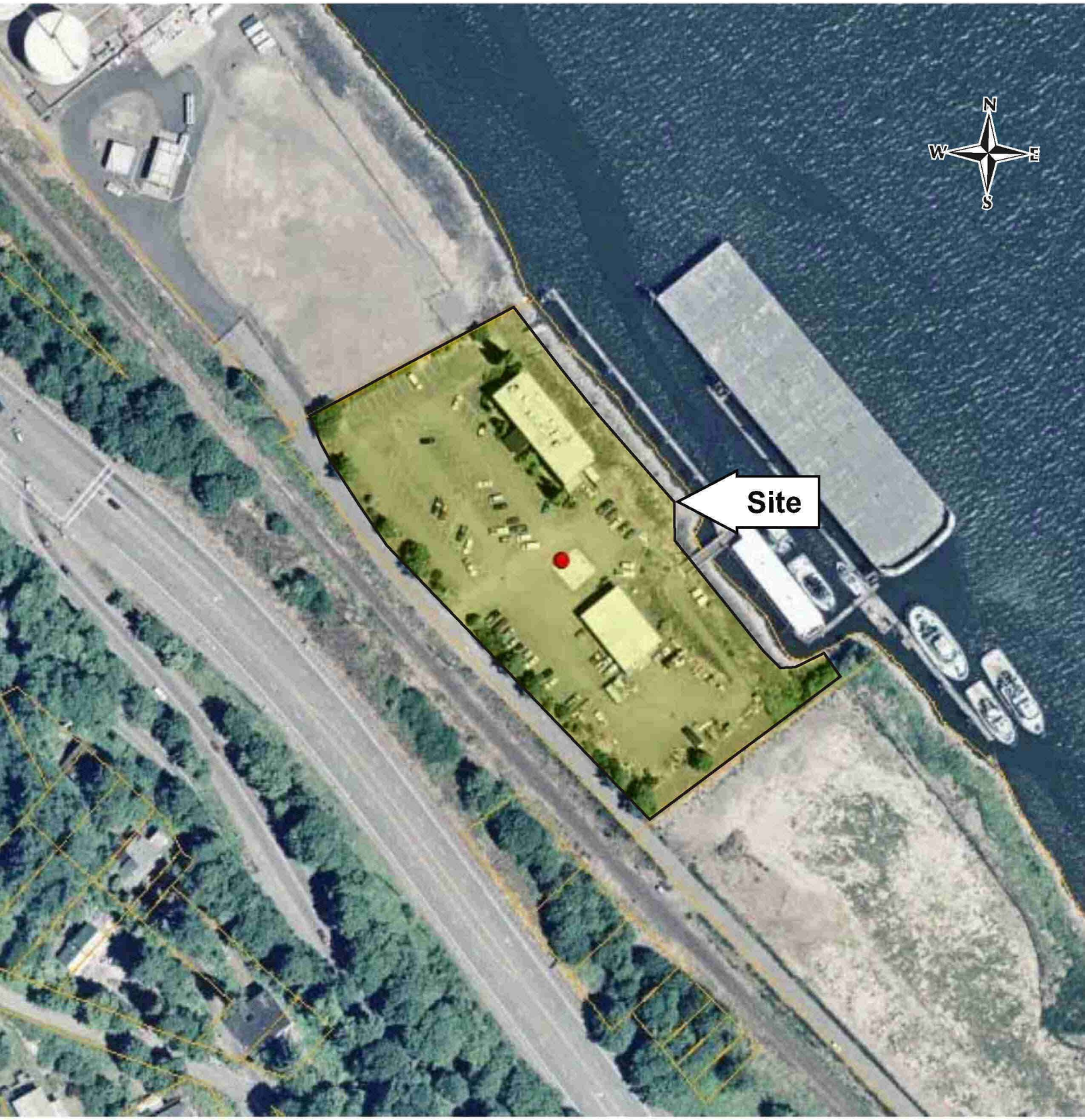
**1988 Aerial Photograph**

**1990 Aerial Photograph**

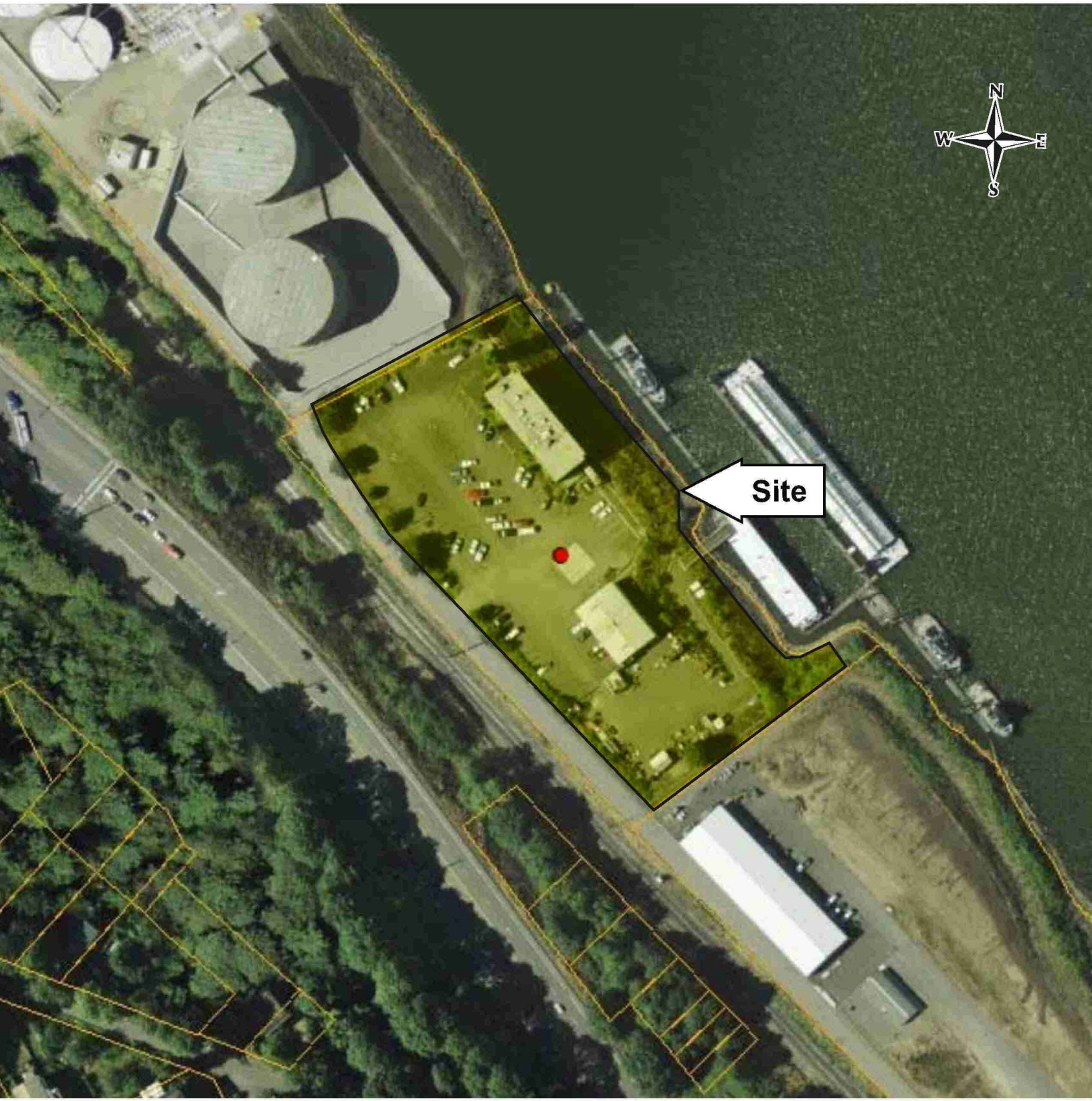
**1994 Aerial Photograph**




**1998 Aerial Photograph**




## 2002 Aerial Photograph




## 2007 Aerial Photograph

# Generation and Management Answer Sheet

**GM**

Please enter your RCRA Site ID number and your site name in the box at the right, before making as many two-sided copies of this answer sheet as you will need to report each of your waste streams. Complete one answer sheet for each waste stream that was generated.

Reference the instructions as you complete this form. Please type or print legibly in blue or black ink.

**Please Enter:**

**Your RCRA Site ID Number:** ORD103014866 Year: 1994

**Site Name:** Foss Maritime Co

**For DEQ Use Only:**

**Date Received:** _____

## A. Description of Hazardous Waste Stream

**Sequence Number:** 2

A-1. What is your waste stream identification?

A-2. Briefly describe the hazardous waste stream:
Paint, xylene, toulene, MEK (less than 2%)

A-3. Which EPA hazardous waste codes are associated with this waste stream?
D001 F003 F005

A-4. Which Oregon state-only hazardous waste code is associated with this waste stream?

A-5. Which source code best describes the type of process or activity from which this waste stream was generated? A21

A-5.a. If you specified source code G25 in question A-5, please enter the management method code from the on-site hazardous waste management system:

A-5.b. If you specified source code G62 in question A-5, please enter the country of origin from which this waste was received:

A-6. Which form code best corresponds to the physical form or chemical composition of this waste stream? B209

A-7. If there were toxic substances in this waste stream that your facility reported on its 2002 Toxic Chemical Release Inventory (TRI) Reporting Form (Form R), please provide the CAS numbers reported:

A-8. Did this waste stream contain mercury? ☐ Yes ☒ No

A-8.a. If you answered yes to question A-8, please provide a reasonable estimate of the percentage of mercury in this waste stream: 0.00

## B. Hazardous Waste Management Activities

B-1. What is the total quantity of this waste stream generated in the reporting year and what is the unit of measure?
Quantity: 717.24 ☒ Pounds ☐ Gallons ☐ Tons ☐ Cubic Yards ☐ Kilograms

B-1.a. If the waste stream is measured in gallons or cubic yards, what is its density?
Density: ☐ Pounds/gallon ☐ Specific gravity ☐ Pounds/cubic yard

B-2. Was the waste stream managed on-site, off-site, or both?
☐ On-site ☒ Off-site ☐ Both

B-3. If all or part of this waste stream was managed on-site, how much was managed on-site and how was it managed?
Quantity: Management Method Code:

B-4. Indicate the quantity of this waste stream that was remaining on-site at the end of the calendar year you are reporting:

B-5. Indicate the quantity of this waste stream that was carried forward from the previous reporting year:



Confidential Business Information

00035386

# Generation and Management Answer Sheet

**GM**

ORD103014866 Year: 1994

**B-6.** Please provide the following information for each off-site shipment of waste:

| Shipment_DT | Manifest_NR | Reported_QT | Transporter_ID_NR | Mgmt_System_CD | RCRA_Site_ID_NR |
|---|---|---|---|---|---|
| 11/11/1994 | 51919 | 717.24 | | M061 | WAD000812909 |

## C. Comments

Use the Comments section to provide any additional comments, information or explanations as necessary. In your comments always provide the reference to the specific question number:



Confidential Business Information

00035387

# Generation and Management Answer Sheet

**GM**

Please enter your RCRA Site ID number and your site name in the box at the right, before making as many two-sided copies of this answer sheet as you will need to report each of your waste streams. Complete one answer sheet for each waste stream that was generated.

Reference the instructions as you complete this form. Please type or print legibly in blue or black ink.

**Please Enter:**

**Your RCRA Site ID Number:** ORD103014866 Year: 1994

**Site Name:** Foss Maritime Co

**For DEQ Use Only:**

**Date Received:** _____

## A. Description of Hazardous Waste Stream

**Sequence Number:** 1

A-1. What is your waste stream identification?

A-2. Briefly describe the hazardous waste stream:
Ignitable paint: Methonol, aliphatic hydrocarbons, silicon alkyd resin, ca

A-3. Which EPA hazardous waste codes are associated with this waste stream?
D001

A-4. Which Oregon state-only hazardous waste code is associated with this waste stream?

A-5. Which source code best describes the type of process or activity from which this waste stream was generated? A21

A-5.a. If you specified source code G25 in question A-5, please enter the management method code from the on-site hazardous waste management system:

A-5.b. If you specified source code G62 in question A-5, please enter the country of origin from which this waste was received:

A-6. Which form code best corresponds to the physical form or chemical composition of this waste stream? B209

A-7. If there were toxic substances in this waste stream that your facility reported on its 2002 Toxic Chemical Release Inventory (TRI) Reporting Form (Form R), please provide the CAS numbers reported:

A-8. Did this waste stream contain mercury? ☐ Yes ☒ No

A-8.a. If you answered yes to question A-8, please provide a reasonable estimate of the percentage of mercury in this waste stream: 0.00

## B. Hazardous Waste Management Activities

B-1. What is the total quantity of this waste stream generated in the reporting year and what is the unit of measure?
Quantity: 480.38 ☒ Pounds ☐ Gallons ☐ Tons ☐ Cubic Yards ☐ Kilograms

B-1.a. If the waste stream is measured in gallons or cubic yards, what is its density?
Density: ☐ Pounds/gallon ☐ Specific gravity ☐ Pounds/cubic yard

B-2. Was the waste stream managed on-site, off-site, or both?
☐ On-site ☒ Off-site ☐ Both

B-3. If all or part of this waste stream was managed on-site, how much was managed on-site and how was it managed?
Quantity: Management Method Code:

B-4. Indicate the quantity of this waste stream that was remaining on-site at the end of the calendar year you are reporting:

B-5. Indicate the quantity of this waste stream that was carried forward from the previous reporting year:



Confidential Business Information

00035388

# Generation and Management Answer Sheet

**GM**

ORD103014866 Year: 1994

**B-6.** Please provide the following information for each off-site shipment of waste:

| Shipment_DT | Manifest_NR | Reported_QT | Transporter_ID_NR | Mgmt_System_CD | RCRA_Site_ID_NR |
|---|---|---|---|---|---|
| 11/11/1994 | 51919 | 480.38 | | M061 | WAD000812909 |

## C. Comments

Use the Comments section to provide any additional comments, information or explanations as necessary. In your comments always provide the reference to the specific question number:



Confidential Business Information

00035389

# RCRA Waste Site Identification Form

**Site ID**

State of Oregon
**Department of Environmental Quality**

**State of Oregon Department of Environmental Quality**
Accounting Section
811 SW Sixth Avenue, Portland, OR 97204-1390
Questions: (503)229-6511 in Portland, OR or toll free in Oregon: (800)452-4011 Ext. 6511
Fax: (503)229-6977
TTY: (50)229-6993
Email: hazwaste@deq.state.or.us
Web site: www.DeqHazWaste.net

**1. Reason for Submittal**

☐ To provide **New** Notification of Regulated Waste Activity (complete entire form)

- ☐ Initial Notification ($200 non-refundable fee required)
- ☐ Change in business ownership (represent the new owner) (No fee required)
- ☐ Reactivation of RCRA Site ID Number ($200 non-refundable fee required)

☐ To provide **Revised** Site Identification Information

☐ To **Withdraw** Site Identification Number  Effective Date: 03/03/1995

- ☐ Completion of RCRA waste activity
- ☐ Change in business ownership (represent the old owner)

☒ To provide as a component of the **Annual Hazardous Waste Report** (skip section 11, 12, and 13)

Reporting Year: 1994  If ownership changed: ☒ Filing for entire year  ☐ Filing for partial year

**2. RCRA Site ID Number:** **ORD103014866**

**3a. Site Location Information**

Company Name: Foss Maritime Co
Site Location: 9030 NW ST HELENS RD
PORTLAND, OR 97231
County: MULTNOMAH
Corp. Div. Reg. Nbr.:
NAICS Code:
Employee Count: 45

**4a. Site Contact**

Person Name:
Mailing Address:
,
Country:
Phone Number (Ext):
Email Address:

**5a. Land Owner**

Name:
Mailing Address:
,
Country:
Phone Number (Ext):
Owner Type: ☐ Private ☐ Federal ☐ State ☐ County ☐ District ☐ Municipal ☐ Tribal ☐ Other



Confidential Business

00035390

# RCRA Waste Site Identification Form

**Site ID**

**RCRA Site ID Number:** ORD103014866

## 6a. Legal Owner

Name: Brix Maritime Co Dba Foss Maritime Co
Mailing Address: 9030 NW St. Helens Rd.
Portland, OR 97231
Country: United States
Phone Number (Ext): (503) 286-0631
Owner Since: 05/21/1986
Owner Type: ☒ Private ☐ Federal ☐ State ☐ County ☐ District ☐ Municipal ☐ Tribal ☐ Other

## 7a. Site Operator

Name:
Mailing Address:
,
Country:
Phone Number (Ext):
Operator Since:
Operator Type: ☐ Private ☐ Federal ☐ State ☐ County ☐ District ☐ Municipal ☐ Tribal ☐ Other

## 8a. Hazardous Waste Forms Contact

Person Name: Rafael Caballero
Organization: Foss Maritime Co
Mailing Address: 9030 NW Saint Helens Rd
Portland, OR 97231
Country: United States
Phone Number (Ext): (503) 286-0631
Email Address: rafael@foss.com

## 9a. Hazardous Waste Fee Contact

Person Name: Rafael Caballero
Organization: Foss Maritime Co
Mailing Address: 9030 NW Saint Helens Rd
Portland, OR 97231
Country: United States
Phone Number (Ext): (503) 286-0631
Email Address: rafael@foss.com



Confidential Business Information

# RCRA Waste Site Identification Form

**Site ID**

**RCRA Site ID Number:** ORD103014866

## 10. Hazardous Waste Activities ( Mark the appropriate boxes for activities that apply to your site)

**1. Generator of Hazardous Waste**

☐ a. LQG: Large Quantity Generator (Generates greater than 2,200 lbs/mo or more than 2.2 lbs of acute hazardous waste)

☒ b. SQG: Small Quantity Generator: (Generates between 220-2,200 lbs/mo or more than 2.200 lbs accumulated on-site)

☐ c. CEG: Conditionally Exempt Generator: (Generates between 0-220 lbs/mo, less than 2.2 lbs of acute hazardous waste and less than 2,200 lbs accumulated on-site)

**2. Are you a hazardous waste generator due to remediation of environmental contamination or a business closure?**

☐ Yes ☒ No

If yes, find out about expedited annual reporting at: www.deq.state.or.us/wmc/hw/factsheets/HWFeesForCleanups.p

☐ **3. Importer of Hazardous Waste**

☐ **4. Generator of Mixed Waste (hazardous and radioactive)**

**5. Transporter of Hazardous Waste**

☐ a. Transports hazardous waste generated at this facility

☐ b. Transports for commercial purposes

☐ c. Hazardous Waste Transfer Facility

☐ **6. Treatment, Storage, Disposal (TSD) Facility**

(Note: A RCRA Permit is required for this activity)

**7. Recycler of Hazardous Waste**

☐ a. Recycles HW generated at this facility

☐ b. Recycles HW generated by other facilities

**8. Hazardous waste management in RCRA permit exempt units (e.g. elementary neutralization units, waste water treatment units, or accumulation tanks or containers)**

☐ a. Manages HW generated at this facility

☐ b. Manages HW generated by other facilities

**9. Exempt Boiler and/or Industrial Furnace**

☐ a. Small Quantity On-Site Burner Exemption

☐ b. Smelting, Melting, Refining Furnace Exemption

☐ **10. Underground Injection Control**

If yes, there may be addition reporting requirements at: www.deq.state.or.us/wq/groundwa/uichome.htm

## 11. Description of Hazardous Wastes

**1. Waste Codes for Federally Regulated Hazardous Wastes:** Identify the federal hazardous waste codes that best describe your waste (e.g., D001 - Ignitable, D002 - Corrosive, D003 - Reactive, etc.) List additional federal codes in the comments section.

**2. Waste Codes for State Regulated(i.e., non-federal) Hazardous Wastes:** Identify the Oregon state-only hazardous waste codes that best describe your waste (e.g., ORX001, ORX007, ORP003, ORU001, etc.)

## 12. Universal Waste Activities ( Mark the appropriate boxes for activities that apply to your site)

☐ **1. Large Quantity Handler of Universal Waste**

(Accumulates a total of 11,000 lbs. or more of universal waste at any time, at the location at which it was generated)

☐ **2. Off-site Universal Waste Collection Site**

(Accumulates a total of 2,000 lbs. or more of universal waste received from off-site). If yes, there are additional notification requirements at: www.deq.state.or.us/wmc/documents/uwnotification.pdf

☐ **3. Pesticide Collection Program**

(Collects and accumulates waste pesticides from off-site). If yes, there are additional notification requirements at: www.deq.state.or.us/wmc/documents/uwnotification.pdf

☐ **4. Destination Facility for Universal Waste**

(A facility that treats, disposes of, or recycles universal wastes on-site)

**5. Mark all boxes that apply**

| | Generate | Accumulate |
|---|---|---|
| a. Batteries | ☐ | ☐ |
| b. Mercury containing thermostats | ☐ | ☐ |
| c. Lamps | ☐ | ☐ |
| d. Pesticides | ☐ | ☐ |

## 13. Used Oil Activities ( Mark the appropriate boxes for activities that apply to your site)

☐ **1. Used Oil Collection Center**

☐ **2. Used Oil Transporter**

☐ **3. Used Oil Transfer Facility**

**4. Used Oil Processor/Re-refiner**

Indicate type(s) of activity(s)

☐ a. Processor

☐ b. Re-refiner

☐ **5. Off-Specification Used Oil Burner (not used oil space heaters operating according to CFR 279.23)**

**6. Used Oil Fuel Marketer**

Indicate type(s) of activity(s)

☐ a. Marketer who directs shipments of off-specification used oil to off-specification used oil burner

☐ b. Marketer who first claims the used oil to meet the specifications



Confidential Business Information

00035392

# RCRA Waste Site Identification Form

**Site ID**

**RCRA Site ID Number:** ORD103014866

**14. Comments**

**15. Certification** — **This form cannot be processed without a signature**

*I certify that under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration and all attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.*

**Signature** _____ **Date** _____

**Name (print or type)** _____ **Title** _____

*If you have special accommodation needs or require this documentin an alternative format, please contact the Hazardous Waste Section in Portland at 503-229-6938 or toll-free within the State of Oregon at 1-800-452-4011, extension 6938*

**16. Electronic Submittals**

DEQ will issue a PIN number and electronic filing instructions in a letter addressed to the Forms Contact in Section 8 on this form. The electronic reporting system may be used for your company's annual reporting and site identification updates.

DOD Hazardous Materials Information System
DoD 6050.5-L
AS OF July 1998

FSC: 7930
NIIN: 00F002782
Manufacturer's CAGE: 13091
Part No. Indicator: A
Part Number/Trade Name: AC 500

==========

General Information

==========

Item Name: ACID METAL CLEANER
Company's Name: ROCHESTER MIDLAND
Company's Street: 333 HOLLENBECK ST
Company's P. O. Box: 1515
Company's City: ROCHESTER
Company's State: NY
Company's Country: US
Company's Zip Code: 14603-1515
Company's Emerg Ph #: 716-266-2250
Company's Info Ph #: 716-266-2250
Distributor/Vendor # 1:
Distributor/Vendor # 1 Cage:
Distributor/Vendor # 2:
Distributor/Vendor # 2 Cage:
Distributor/Vendor # 3:
Distributor/Vendor # 3 Cage:
Distributor/Vendor # 4:
Distributor/Vendor # 4 Cage:
Safety Data Action Code:
Safety Focal Point: F
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 15DEC88
Safety Data Review Date: 28MAY93
Supply Item Manager:
MSDS Preparer's Name:
Preparer's Company: ROCHESTER MIDLAND
Preparer's St Or P. O. Box: 333 HOLLENBECK ST
Preparer's City: ROCHESTER
Preparer's State: NY
Preparer's Zip Code: 14603-1515
Other MSDS Number:
MSDS Serial Number: BBLSC
Specification Number:
Spec Type, Grade, Class:
Hazard Characteristic Code:
Unit Of Issue:
Unit Of Issue Container Qty:
Type Of Container:
Net Unit Weight:

Report for NIIN: 00F002782

NRC/State License Number:
Net Explosive Weight:
Net Propellant Weight-Ammo:
Coast Guard Ammunition Code:

==========

Ingredients/Identity Information



Confidential Business Information

==========
Proprietary: NO
Ingredient: PHOSPHORIC ACID
Ingredient Sequence Number: 01
Percent: 56
Ingredient Action Code:
Ingredient Focal Point: F
NIOSH (RTECS) Number: TB6300000
CAS Number: 7664-38-2
OSHA PEL: 1 MG/CUM
ACGIH TLV: 1 MG/CUM
Other Recommended Limit: 1 MG/CUM
==========

## Physical/Chemical Characteristics

==========
Appearance And Odor: VISCOUS LIGHT AMBER LIQUID W/MILD ODOR.
Boiling Point: 245F
Melting Point: N/K
Vapor Pressure (MM Hg/70 F): AS WATER
Vapor Density (Air=1): AS WATER
Specific Gravity: 1.37
Decomposition Temperature: N/K
Evaporation Rate And Ref: LESS THAN WATER
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 30-35%
Viscosity:
pH: <1
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:
==========

## Fire and Explosion Hazard Data

==========
Flash Point: NONE
Flash Point Method: N/P
Lower Explosive Limit: N/K
Upper Explosive Limit: N/K
Extinguishing Media: AS FOR SURROUNDING FIRE. PRODUCT WILL NOT BURN.
Special Fire Fighting Proc: USE SCBA. COOL EXPOSED CONTAINERS W/WATER SPRAY.
Unusual Fire And Expl Hazrds: CAN REACT W/METALS TO GENERATE HYDROGEN. THIS GAS IS FLAMMABLE &/OR EXPLOSIVE IN THE PRESENCE OF AN IGNITION SOURCE.

Report for NIIN: 00F002782

==========

## Reactivity Data

==========
Stability: YES
Cond To Avoid (Stability): N/K
Materials To Avoid: DON'T MIX W/ALKALINE OR CHLORINE CONTAINING CLEANERS. METALS SUCH AS ALUMINUM OR ZINC.
Hazardous Decomp Products: HYDROGEN
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): N/K
==========

## Health Hazard Data

==========
LD50-LC50 Mixture: N/K



Confidential Business Information

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYES: CORROSIVE & ALSO TO THE MUCOUS MEMBRANES. SKIN: SEVERE IRRITATION, BURNING. INGESTION: HARMFUL, IRRITATION, SWELLING & TISSUE DAMAGE TO MOUTH, THROAT & ESOPHAGUS. INHALATION: IRRITATING TO NOSE & THROAT.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: N/K
Med Cond Aggravated By Exp: RESPIRATORY
Emergency/First Aid Proc: EYES/SKIN: FLUSH W/PLENTY OF WATER FOR AT LEAST 15 MINS. INGESTION: DON'T INDUCE VOMITING. DILUTE BY DRINKING SEVERAL GLASSES OF MILK OR WATER. INHALATION: REMOVE TO FRESH AIR. OBTAIN MEDICAL ATTENTION IN ALL CASES.

## Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SMALL SPILLS: FLUSH W/PLENTY OF WATER. LARGE SPILLS: DIKE TO PREVENT RUNOFF, RECLAIM ALL POSSIBLE. NEUTRALIZE RESIDUES W/SODA ASH OR LIME W/ADEQUATE VENTILATION & FLUSH W/WATER.
Neutralizing Agent: SODA ASH OR LIME
Waste Disposal Method: TRAINED & PROPERLY EQUIPPED PERSONNEL MAY DILUTE & NEUTRALIZE WASTE VERY CAREFULLY W/DILUTE ALKALI IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: DON'T MIX W/CHLORINE SANITIZERS. STORE AS ACID MATERIAL IN A COOL, DRY AREA AWAY FROM OXIDIZERS. DON'T REUSE EMPTY CONTAINERS.
Other Precautions: READ & FOLLOW LABEL DIRECTIONS. AVOID BREATHING SPRAY MISTS. KEEP OUT OF REACH OF CHILDREN.

## Control Measures

Respiratory Protection: NONE NORMALLY REQUIRED. USE NIOSH APPROVED ACID RESPIRATOR IF SPRAY MIST IN AIR.
Ventilation: NOT NORMALLY REQUIRED. LOCAL EXHAUST W/CORROSION RESISTANT & EXPLOSION PROOF EQUIPMENT.

Report for NIIN: 00F002782

Protective Gloves: RUBBER OR PLASTIC
Eye Protection: GOGGLES
Other Protective Equipment: RUBBER OR PLASTIC TO PREVENT PROLONGED SKIN CONTACT.
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Suppl. Safety & Health Data: N/K

## Transportation Data

Transportation Action Code:
Transportation Focal Point:
Trans Data Review Date:
DOT PSN Code:
DOT Symbol:
DOT Proper Shipping Name:
DOT Class:
DOT ID Number:
DOT Pack Group:



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DOT Label:
DOT/DoD Exemption Number:
IMO PSN Code:
IMO Proper Shipping Name:
IMO Regulations Page Number:
IMO UN Number:
IMO UN Class:
IMO Subsidiary Risk Label:
IATA PSN Code:
IATA UN ID Number:
IATA Proper Shipping Name:
IATA UN Class:
IATA Subsidiary Risk Class:
IATA Label:
AFI PSN Code:
AFI Symbols:
AFI Prop. Shipping Name:
AFI Class:
AFI ID Number:
AFI Pack Group:
AFI Label:
AFI Special Prov:
AFI Basic Pac Ref:
MMAC Code:
N.O.S. Shipping Name:
Additional Trans Data:

==========

Disposal Data

==========

Disposal Data Action Code:
Disposal Data Focal Point:
Disposal Data Review Date:
Rec # For This Disp Entry:
Tot Disp Entries Per NSN:

Report for NIIN: 00F002782

Landfill Ban Item:
Disposal Supplemental Data:
1st EPA Haz Wst Code New:
1st EPA Haz Wst Name New:
1st EPA Haz Wst Char New:
1st EPA Acute Hazard New:
2nd EPA Haz Wst Code New:
2nd EPA Haz Wst Name New:
2nd EPA Haz Wst Char New:
2nd EPA Acute Hazard New:
3rd EPA Haz Wst Code New:
3rd EPA Haz Wst Name New:
3rd EPA Haz Wst Char New:
3rd EPA Acute Hazard New:

==========

Label Data

==========

Label Required: YES
Technical Review Date: 28MAY93
Label Date: 20MAY93
MFR Label Number: N/K
Label Status: F
Common Name: AC 500
Chronic Hazard: NO



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Signal Word: WARNING!
Acute Health Hazard-None:
Acute Health Hazard-Slight:
Acute Health Hazard-Moderate: X
Acute Health Hazard-Severe:
Contact Hazard-None:
Contact Hazard-Slight:
Contact Hazard-Moderate: X
Contact Hazard-Severe:
Fire Hazard-None: X
Fire Hazard-Slight:
Fire Hazard-Moderate:
Fire Hazard-Severe:
Reactivity Hazard-None: X
Reactivity Hazard-Slight:
Reactivity Hazard-Moderate:
Reactivity Hazard-Severe:
Special Hazard Precautions: EYES: CORROSIVE & ALSO TO THE MUCOUS MEMBRANES. SKIN: SEVERE IRRITATION, BURNING. INGESTION: HARMFUL, IRRITATION, SWELLING & TISSUE DAMAGE TO MOUTH, THROAT & ESOPHAGUS. INHALATION: IRRITATING TO NOSE & THROAT. TARGET ORGANS: EYES, SKIN, DIGESTIVE TRACT.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ROCHESTER MIDLAND
Label Street: 333 HOLLENBECK ST
Label P.O. Box: 1515
Label City: ROCHESTER

Report for NIIN: 00F002782

Label State: NY
Label Zip Code: 14603-1515
Label Country: US
Label Emergency Number: 716-266-2250
Year Procured: UNK



Confidential Business Information

VICTOR ATIYEH
GOVERNOR

# Division of State Lands

1445 STATE STREET, SALEM, OREGON 97310 PHONE 378-3805

December 22, 1981

OREGON STATE
LAND BOARD

VICTOR ATIYEH
Governor

NORMA PAULUS
Secretary of State

CLAY MYERS
State Treasurer

Mr. Bradley R. Wall
Wall & Wall, P.C.
Lloyd Five Hundred Building
500 N. E. Multnomah
Portland, OR 97232

Dear Mr. Wall:

The Division of State Lands, by this letter, consents to the sub-lease of the leased premises of The Siegfried Company to Knappton Corporation, with all other provisions of the lease remaining in full force and effect.

Please have one copy signed and return this letter as the Knappton Corporation's acceptance of the terms and conditions of ML-613.

Sincerely,

Boston L. White, Supervisor
Waterway Revenue Unit

Knappton Corporation

BLW:kl

WALL & WALL, P. C.
ATTORNEYS AT LAW
SUITE 686
LLOYD FIVE HUNDRED BUILDING
500 N. E. MULTNOMAH
PORTLAND, OREGON 97232

ROBERT C. WALL
MITCHELL C. WALL
MARILYN M. WALL

TELEPHONE
(503) 238-0333

September 1, 1981

Ms. Wendy Anderson
Knappton Corporation
9030 N.W. St. Helens Rd.
P. O. Box 03018
Portland, Oregon 97203

Mr. Joseph R. McGuinn
Riedel International, Inc.
4555 N. Channel Avenue
P. O. Box 3320
Portland, Oregon 97208

Re: Submersible Land Lease

Dear Wendy and Joe:

Enclosed is a copy of the Submerged and Submersible Land Lease retrieved from the State. We are now obtaining a State form of assignment which will be used to have Art assign his interest in this Lease to Siegfried, who in turn will then sublet the submersible lands to Knappton. It is our intent to obtain the consent of the State to both transactions at the same time. We are presently awaiting delivery of the assignment form. I will keep you informed.

Very truly yours,

WALL & WALL, P.C.

Robert C. Wall

RCW:skt

SUBMERGED AND SUBMERSIBLE LAND LEASE

ML-613-S

The parties to this lease are the STATE OF OREGON, acting by and through the Division of State Lands, hereinafter referred to as STATE, (Lessor) and Arthur Riedel, dba The Celtic Investment Company hereinafter referred to as LESSEE.

STATE leases to LESSEE, on the terms and conditions stated below, the following described lands:

A parcel of submerged land in the Willamette River between the Mean Low Tide line of the left bank and a line parallel to and 80 feet distant riverward from the Mean Low Tide line of said left bank. Beginning at the point of intersection of the South line of the George J. Watts Donation Land Claim and the Mean Low Tide line; thence running upstream a distance of 510 feet, encompassing .93 acres, more or less, all in the Northeast Quarter of Section 11, Township 1 North, Range 1 West, Willamette Meridian, Multnomah County, Oregon.

I
TERM

This lease shall commence May 1, 1980 and continue through April 30, 1990.

II
RENTAL

LESSEE shall pay to STATE as rental the sum of $150.00 per year, subject to an initial redetermination after five (5) years. Rent shall be payable not later than the 10th day of May of each year in advance at the office of the Division of State Lands, Salem, Oregon, except that rent for the first year has been paid upon the execution of this lease, and STATE acknowledges receipt of this sum.

LESSEE fully acknowledges the character of the leased lands and assumes any risk of using the same.

## III
## REDETERMINATION

STATE may redetermine the yearly rental sum at any time after the period specified in paragraph II of this lease. Subsequent redeterminations may be made at any time, but the period between redeterminations must be at least the period of time specified in paragraph II for the initial redetermination. The LESSEE shall be notified of the redetermined value at least 30 days prior to the due date of the yearly rental sum. The redetermined yearly rent shall commence with the year immediately following the redetermination.

In the event LESSEE does not agree on any redetermined yearly rent by STATE, including a redetermination pursuant to a partial termination of the lease, LESSEE may apply to any court of record for the appointment of an arbitrator and thereafter the arbitration proceedings shall be in accordance with ORS 33.210 to 33.340.

## IV
## PURPOSE

The leased lands shall be used for a workboat and barge moorage _____ and for no other purposes without the written consent of STATE. This lease does not authorize any injury to private property or invasion of private rights or any infringement of federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining other federal, state, or local government's assent required by law for the structure or work proposed. LESSEE shall conform to all applicable laws and regulations of any public authority respecting the lands and use. [Federal law prohibits any construction or work riverward of the normal high water line unless a valid permit for said work is obtained from the U. S. Army Corps of Engineers. See Section 10 of the Act of 3 March 1899 (30 Stat. 1151; 33 USC 403).]

## V
## ASSIGNMENT

Except as otherwise provided herein, the leased lands or any part thereof shall not be assigned, mortgaged or subleased, nor shall any right of use of said lands be conferred on any third person by any other means without the prior consent of STATE.

STATE may consent to an assignment of lease (novation) provided:

a. A fee of $50 is prepaid to cover administrative costs, and
b. LESSEE has satisfied all conditions of the lease precedent to assignment and
c. The STATE standard form application for Assignment is completed by both LESSEE and assignee.

Subject to approval of STATE and upon request, LESSEE will obtain release fro liability after assignment.

## VI
## RIGHT OF WAY

The interest of LESSEE under this lease shall at all times be subject to STATE granting rights-of-way in and over the said lands, or any part thereof, for railroad, telegraph and telephone poles, electric poles, oil pipelines,



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water pipes, irrigation or other water canals and ditches, and to lease all or part thereof for discovery, development and production of petroleum, mineral oil or minerals of any nature whatsoever, provided such right-of-way or lease does not unreasonably interfere with the purpose of this lease.

## VII
## DEFAULT

The following shall be events of default:

a. Delinquency in the payment of rent in excess of 60 days beyond the rental due date unless specifically extended in writing by STATE. Within 40 days after the rental due date, the STATE shall notify the LESSEE by registered or certified mail of the pending default. Failure of LESSEE to receive or to acknowledge receipt of notice shall not invalidate the default.

b. Failure of LESSEE to comply with any term or condition or fulfill any obligation of the lease (other than the payment of rent or other charges) within 10 days after written notice by STATE specifying the nature of the default with reasonable particularity. If the default is of such a nature that it cannot be completely remedied within the 10-day period, this provision shall be complied with if LESSEE begins correction of the default within the 10-day period and thereafter proceeds with reasonable diligence and in good faith to effect the remedy as soon as practicable.

c. Failure of LESSEE to use the leased lands for the purposes authorized under the terms of this lease.

d. LESSEE maintaining a nuisance on the leased lands.

e. Failure to remove any lien or encumbrance placed upon the leased lands.

## VIII
## TERMINATION

In the event of default by LESSEE, the lease may be unilaterally terminated at the option of the STATE by notice in writing to the LESSEE. The notice may be included in a notice of failure of compliance given under paragraph VIII.

STATE will consent to termination of all or part of the lease:

a. If intended operations under lease are halted by another governmental agency and such action is not due to action or failure to act by LESSEE, or

b. Upon application of LESSEE providing LESSEE has satisfied all conditions of the lease precedent to date of termination and, in addition, upon payment of one-quarter, or the equivalent thereof, the total sum of future rentals as consideration for said termination, or

c. Upon mutual consent and such termination would be in the best interest of both the people and natural resources of the state.



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00035409

of the lands rem ing subject to lease, and red mine the rent therefore accordingly.

IX
REMEDIES

In the event of unilateral termination, STATE may elect to pursue whatever legal, equitable, or other remedies are available to it. In case of termination, or at the expiration of the term of this lease, the STATE may re-enter, take possession of the state lands and remove any persons or property by legal action.

In the event STATE brings suit to compel performance of any term or condition of this lease, or to recover for breach of such term or condition, the prevailing party shall recover in addition to costs and disbursements, such sums as the court may adjudge reasonable as attorney fees, including any appeals therefrom.

X
MAILING ADDRESS

Any notice required or permitted under this lease shall be given when actually delivered or when deposited in the United States mail as registered or certified mail addressed as follows:

TO STATE: Division of State Lands
1445 State Street
Salem, Oregon 97310

TO LESSEE: Mr. Arthur A. Riedel, dba The Celtic Investment Company
P. O. Box 3320
Portland, OR 97208

or to such other address as may be specified from time to time by either the STATE or LESSEE in writing.

XI
TAXES, LIENS

LESSEE shall pay all taxes or assessments levied upon the leased land during the term of the lease. LESSEE shall not cause any liens or encumbrances to be imposed upon the lease land and if any lien or encumbrance is imposed upon such land, LESSEE shall proceed immediately to remove said lien or encumbrance.

XII
INDEMNIFICATION

LESSEE shall be responsible and liable for all injuries to persons, or prop resulting from any negligence or otherwise tortious acts or omissions of LESSEE, its servants or agents. LESSEE shall indemnify the STATE and hold it harmless against any and all claims, demands, lawsuits, injuries, damages, and costs, including litigation costs, which STATE may sustain by reason of any such acts o omissions.



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## XIII
## EXPIRATION

Upon expiration of the lease term or earlier termination on account of default, or mutual consent, LESSEE shall surrender the leased lands in substantially their original condition. STATE may require LESSEE, within a reasonable time after expiration or termination, to restore the leased lands to substantially their original condition.

## XIV
## HOLDOVER

If LESSEE does not vacate the lease premises at the time required, STATE shall have the option to treat LESSEE as a lessee from month to month, subject to all the provisions of this lease except the provision for TERM. In the event of a holdover and STATE exercises its option to treat the holdover as a month-to-month tenancy, the monthly rental fee shall be one-twelfth of the yearly rental fee.

IN WITNESS WHEREOF, the said parties have on this 21st day of May, 1990, in pursuance of due authority given, caused this instrument to be executed in duplicate.

STATE OF OREGON (Lessor):
Division of State Lands

William S. Cox, Director

LESSEE:



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ASSIGNMENT OF LEASE

For good and valuable consideration received, I hereby assign to The Siegfried Company an Oregon partnership consisting of Arthur A. Riedel & Peter J. Brix all my right, title, and interest in the attached Lease No. ML-613-S dated May 21, 1980, by and between the State of Oregon acting by the Division of State Lands (Lessor) and Arthur A. Riedel dba The Celtic Investment Company (Lessee), covering the use of the real property and improvements described therein situated in Multnomah County, Oregon. This assignment is not valid until the Division of State Lands issues its written consent.

Dated this 21 day of October, 19 81.

Assignor: Arthur A. Riedel dba The Celtic Investment Company

I, The Siegfried Company/an Oregon Partnership consisting of Arthur A. Riedel & Peter J. Brix, hereby acknowledge the within assignment and agree to be bound by all the terms, conditions, obligations, and liabilities therein mentioned and in any way connected with the said lease and to faithfully perform all provisions therein contained.

Dated this 21 day of October, 1981.

4555 N. Channel Avenue
(Address)

Portland, Oregon 97208
(City) (State) (Zip)

Assignee: Arthur A. Riedel "Partner"

X

Assignee: Peter J. Brix "Partner"

STATE OF Oregon )
) ss.
COUNTY OF Multnomah)

Submitted and sworn to before me this 21 day of October, 1981, by the above-named Arthur A. Riedel/dba The Celtic Investment Company (Assignor) who acknowledged to me that he executed the foregoing assignment of his free will and choice.

Notary Public, in and for the said County and State
My Commission expires: 8-10-1984

(Seal)

The State of Oregon, acting by the Division of State Lands in the above-mentioned lease, hereby acknowledges and consents to this assignment.

Dated at Salem, Oregon, this _____ day of _____, 19____.

DIVISION OF STATE LANDS

Director

# MATERIAL SAFETY DATA SHEET

## Cable Lube

## 1. PRODUCT AND COMPANY IDENTIFICATION

| | |
|---|---|
| **Product Name:** | Cable Lube |
| **Product Code:** | 1044381 |
| **Intended Use:** | Multipurpose wire rope and cable lubricant. Also lubricates open or semi-enclosed gears, pinions, guides, and sliding surfaces. |
| **Chemical Family:** | Petroleum Hydrocarbon |
| **Responsible Party:** | ConocoPhillips<br>600 N. Dairy Ashford<br>Houston, Texas<br>77079-1175 |
| **Customer Service:** | 800-822-6457 |
| **Technical Information:** | 800-766-0050 |

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

### EMERGENCY OVERVIEW

**24 Hour Emergency Telephone Numbers:**
Spill, Leak, Fire or Accident Call CHEMTREC:
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: (800) 356-3219

**NOT CLASSIFIED AS HAZARDOUS ACCORDING TO CRITERIA OF NOHSC**

**Health Hazards/Precautionary Measures:** Causes eye and skin irritation. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Wear appropriate eye protection. Wear appropriate personal protective equipment.

**Physical Hazards/Precautionary Measures:** Keep away from all sources of ignition. Combustible liquid and vapor.

| | |
|---|---|
| **Appearance:** | Black |
| **Physical Form:** | Semi-solid |
| **Odor:** | Aromatic |

**NFPA 704 Hazard Class:**

| | |
|---|---|
| **Health:** | 1 (Slight) |
| **Flammability:** | 2 (Moderate) |
| **Instability:** | 0 (Least) |

**HMIS Hazard Class:**

| | |
|---|---|
| **Health:** | 1 (Slight) |
| **Flammability:** | 2 (Moderate) |
| **Physical Hazards:** | 0 (Least) |

## 2. COMPOSITION / INFORMATION ON INGREDIENTS

| HAZARDOUS COMPONENTS | | | | | |
|---|---|---|---|---|---|
| **Component / CAS No:** | **Percent (%)** | **ACGIH:** | **OSHA:** | **NIOSH:** | **Other:** |
| Calcium Dinonylnaphthalene Sulfonate<br>57855-77-3 | 0.5-2 | NE | NE | NE | NE |

| NON-HAZARDOUS COMPONENTS | | | | | |
|---|---|---|---|---|---|
| **Component / CAS No:** | **Percent (%)** | **ACGIH:** | **OSHA:** | **NIOSH:** | **Other:** |
| Lubricant Base Oil (Petroleum)<br>VARIOUS | 98-100 | 5mg/m$^3$ TWA<br>10 mg/m$^3$ STEL | 5 mg/m$^3$ TWA | 2500 mg/m$^3$ IDLH | as Oil Mist, if Generated<br><br>5 mg/m$^3$ NOHSC TWA |

The base oil for this product can be a mixture of any of the following highly refined petroleum streams: CAS 64741-88-4; CAS 64741-89-5; CAS 64741-96-4; CAS 64741-97-5; CAS 64742-01-4; CAS 64742-52-5; CAS 64742-53-6; CAS 64742-54-7; CAS 64742-55-8; CAS 64742-56-9; CAS 64742-57-0; CAS 64742-62-7; CAS 64742-63-8; CAS 64742-65-0; CAS 72623-83-7; CAS 72623-85-9; CAS 72623-86-0; CAS 72623-87-1

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

1%=10,000 PPM.
NE=Not Established

## 3. HAZARDS IDENTIFICATION

**Potential Health Effects:**

**Eye:** Eye irritant. Contact may cause stinging, watering, redness, and swelling.

**Skin:** Skin irritant. Contact may cause redness, itching, burning, and skin damage. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin, leading to dermatitis (inflammation). No harmful effects from skin absorption are expected.

**Inhalation (Breathing):** No data available. However, inhalation is not an expected route of exposure.

**Ingestion (Swallowing):** No harmful effects expected from ingestion.

**Signs and Symptoms:** Effects of overexposure may include irritation of the respiratory tract, irritation of the digestive tract, nausea, diarrhea.

**Cancer:** Inadequate evidence available to evaluate the cancer hazard of this material. See Section 11 for carcinogenicity information of individual components, if any.

**Target Organs:** No data available for this material.

**Developmental:** No data available for this material.

**Pre-Existing Medical Conditions:** Conditions aggravated by exposure may include skin disorders.

## 4. FIRST AID MEASURES

**Eye:** Move victim away from exposure and into fresh air. If irritation or redness develops, flush eyes with clean water and seek medical attention. For direct contact, hold eyelids apart and flush the affected eye(s) with clean water for at least 15 minutes. Seek medical attention.

**Skin:** Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek medical attention.

**Inhalation (Breathing):** If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

**Ingestion (Swallowing):** First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

**Notes to Physician:** High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. Often these injuries require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury.

Acute aspirations of large amounts of oil-laden material may produce a serious aspiration pneumonia. Patients who aspirate these oils should be followed for the development of long-term sequelae. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities.

## 5. FIRE-FIGHTING MEASURES

**Flammable Properties:**

| | |
|---|---|
| **Flash Point:** | 160°F / 71°C (COC, ASTM D92) |
| **OSHA Flammability Class:** | Combustible liquid |
| **NFPA Flammability Class:** | No data |
| **LEL%:** | No data |
| **UEL%:** | No data |
| **Autoignition Temperature:** | No data |

**Unusual Fire & Explosion Hazards:** This material is combustible and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment). May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

**Extinguishing Media:** Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

**Fire Fighting Instructions:** For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

## 6. ACCIDENTAL RELEASE MEASURES

Combustible. Keep all sources of ignition away from spill/release. The use of explosion-proof electrial equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

# 7. HANDLING AND STORAGE

**Handling:** Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

**Storage:** Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

# 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering controls:** If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional engineering controls may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

**Personal Protective Equipment (PPE):**

**Respiratory:** A NIOSH certified air purifying respirator with a Type 95 (R or P) particulate filter may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a NIOSH approved self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode if there is potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

**Skin:** The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation, and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

**Eye/Face:** Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

**Other Protective Equipment:** A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

Suggestions for the use of specific protective materials are based on readily available published data. Users should check with specific manufacturers to confirm the performance of their products.

# 9. PHYSICAL AND CHEMICAL PROPERTIES

**Note:** Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

| | |
|---|---|
| **Appearance:** | Black |
| **Physical Form:** | Semi-solid |
| **Odor:** | Aromatic |
| **Odor Threshold:** | No data |
| **pH:** | Not applicable |
| **Vapor Pressure (mm Hg):** | >1 |
| **Vapor Density (air=1):** | >1 |
| **Boiling Point:** | > 351°F / 177°C |
| **Solubility in Water:** | Insoluble |
| **Partition Coefficient (n-octanol/water):** | No data |
| **Specific Gravity:** | 0.89 |
| **Bulk Density:** | 7.7 |
| **Bulk Density Units** | lbs/gal |
| **Percent Volatile:** | Negligible |
| **Evaporation Rate (nBuAc=1):** | < 0.01 |
| **Flash Point:** | 160°F / 71°C |
| **Test Method:** | (COC, ASTM D92) |
| **LEL%:** | No data |
| **UEL%:** | No data |
| **Autoignition Temperature:** | No data |

# 10. STABILITY AND REACTIVITY

**Stability:** Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

**Conditions to Avoid:** Extended exposure to high temperatures can cause decomposition.

**Materials to Avoid (Incompatible Materials):** Avoid contact with acids, oxidizing agents.

**Hazardous Decomposition Products:** Combustion can yield carbon oxides.

**Hazardous Polymerization:** Will not occur.

# 11. TOXICOLOGICAL INFORMATION

**Chronic Data:**

**Lubricant Base Oil (Petroleum) - CAS: VARIOUS**
*Carcinogenicity:* The petroleum base oils contained in this product have been highly refined by a variety of processes including solvent extraction, hydrotreating, and dewaxing to remove aromatics and improve performance characteristics. All of the oils meet the IP-346 criteria of less than 3 percent PAH's and therefore none are listed as a carcinogen by NTP, IARC, or OSHA.

**Acute Data:**

**Lubricant Base Oil (Petroleum) - CAS: VARIOUS**
*Dermal LD50* = >2 g/kg
*LC50* = No information available
*Oral LD50* = >5 g/kg

**Calcium Dinonylnaphthalene Sulfonate - CAS: 57855-77-3**
*Dermal LD50* = No information available
*LC50* = No information available
*Oral LD50* = No information available

## 12. ECOLOGICAL INFORMATION

Not evaluated at this time.

## 13. DISPOSAL CONSIDERATIONS

This material under most intended uses would become used oil due to contamination by physical or chemical impurities. RECYCLE ALL USED OIL. While being recycled, used oil is regulated by 40 CFR 279. Use resulting in chemical or physical change or contamination may also subject it to regulation as hazardous waste. Under federal regulations, used oil is a solid waste managed under 40 CFR 279. However, in California, used oil is managed as hazardous waste until tested to show it is not hazardous. Consult state and local regulations regarding the proper handling of used oil. In the case of used oil, the intent to discard it may cause the used oil to be regulated as hazardous waste.

Contents should be completely used and containers emptied prior to discard. Rinsate may be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations. Large empty containers, such as drums, should be returned to the distributor or a drum reconditioner. To assure proper disposal of small empty containers, consult with state and local regulations and disposal authorities.

## 14. TRANSPORTATION INFORMATION

**DOT Proper Shipping Name:** Not classified as hazardous

**Note:** Material is unregulated unless in container of 3500 gallons or more, then provisions of 49 CFR Part 130 apply for land shipment.

**IMDG Shipping Description:** Not regulated

**ICAO/IATA Shipping Description:** Not regulated

## 15. REGULATORY INFORMATION

**U.S. Regulations:**

**EPA SARA 311/312 (Title III Hazard Categories)**

| | |
|---|---|
| **Acute Health:** | Yes |
| **Chronic Health:** | No |
| **Fire Hazard:** | No |
| **Pressure Hazard:** | No |
| **Reactive Hazard:** | No |

**SARA - Section 313 and 40 CFR 372:**
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:
--None Known--

**EPA (CERCLA) Reportable Quantity (in pounds):**
--None Known--

**CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):**
This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:
-- None Known --

**California Proposition 65:**
Warning: This material contains the following chemicals which are known to the State of Calfornia to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):
-- None Known --

**Carcinogen Identification:**
This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any.

**TSCA:**
All components are listed on the TSCA inventory.

**International Regulations:**

**Canadian Regulations:**
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**Domestic Substances List:** Listed
**WHMIS Classification:** B3-Combustible Liquid
**WHMIS Classification:** D1B-Materials causing immediate and serious toxic effects - Toxic Material

**Australian Regulations:**
References:
Regulations Specifically Applicable to the Chemical Product:
Commonwealth of Australia: Respirators must follow A51715/1716 standard for approved respirators.
New Zeland: Respirators must follow NZS 1715/1716 standard for approved respirators.
International (all countries): In the absence of local approved authorities, follow UIS. NIOSH/MSHA, U.K. BSI, Australian AS1715/1716, or new Zealand NZS 1715/1716 standards.
Australia Poison Schedule: Not applicable.
NZ Dangerous Goods Class: Not applicable.

Contact Point:

ConocoPhillips Lubricants Australia Pty. Ltd.
Emergency Telephone: 1-800-226626
Office Manager
Office Hours 8 a.m.-5 p.m. Monday-Friday (excluding holidays)
Tel: +61 (0) 7 5452.9900
Fax: +61 (0) 7 5452.9999
Website: www.aplubes.conocophillips.com

**International Inventories:**
All components of this material are listed on the following inventories:
Australian (AICS)
Canadian (DSL)
Chinese
European (EC/EINECS)
Japanese (ENCS)
Korean (ECL)
Philippine (PICCS)
United States (TSCA)

## 16. OTHER INFORMATION

| | |
|---|---|
| **Issue Date:** | 04-Feb-2005 |
| **Previous Issue Date:** | 08/09/2004 |
| **Product Code:** | 1044381 |
| **Reason for revision:** | Changes to Physical Properties. SEE SECTION 9.<br>Regulatory information changed. SEE SECTION 15. |
| **Previous Product Code:** | 5590000000 |
| **MSDS Code:** | 720830 |

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# MATERIAL SAFETY DATA SHEET

## Cable Lube

## 1. PRODUCT AND COMPANY IDENTIFICATION

| | |
|---|---|
| **Product Name:** | Cable Lube |
| **Product Code:** | 1044381 |
| **Intended Use:** | Multipurpose wire rope and cable lubricant. Also lubricates open or semi-enclosed gears, pinions, guides, and sliding surfaces. |
| **Chemical Family:** | Petroleum Hydrocarbon |
| **Responsible Party:** | ConocoPhillips<br>600 N. Dairy Ashford<br>Houston, Texas<br>77079-1175 |
| **Customer Service:** | 800-822-6457 |
| **Technical Information:** | 800-766-0050 |

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

### EMERGENCY OVERVIEW

**24 Hour Emergency Telephone Numbers:**
Spill, Leak, Fire or Accident Call CHEMTREC:
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: (800) 356-3219

**NOT CLASSIFIED AS HAZARDOUS ACCORDING TO CRITERIA OF NOHSC**

**Health Hazards/Precautionary Measures:** Causes eye and skin irritation. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Wear appropriate eye protection. Wear appropriate personal protective equipment.

**Physical Hazards/Precautionary Measures:** Keep away from all sources of ignition. Combustible liquid and vapor.

| | |
|---|---|
| **Appearance:** | Black |
| **Physical Form:** | Semi-solid |
| **Odor:** | Aromatic |

**NFPA 704 Hazard Class:**

| | |
|---|---|
| **Health:** | 1 (Slight) |
| **Flammability:** | 2 (Moderate) |
| **Instability:** | 0 (Least) |

**HMIS Hazard Class:**

| | |
|---|---|
| **Health:** | 1 (Slight) |
| **Flammability:** | 2 (Moderate) |
| **Physical Hazards:** | 0 (Least) |

## 2. COMPOSITION / INFORMATION ON INGREDIENTS

| HAZARDOUS COMPONENTS | | | | | |
|---|---|---|---|---|---|
| **Component / CAS No:** | **Percent (%)** | **ACGIH:** | **OSHA:** | **NIOSH:** | **Other:** |
| Calcium Dinonylnaphthalene Sulfonate<br>57855-77-3 | 0.5-2 | NE | NE | NE | NE |

| NON-HAZARDOUS COMPONENTS | | | | | |
|---|---|---|---|---|---|
| **Component / CAS No:** | **Percent (%)** | **ACGIH:** | **OSHA:** | **NIOSH:** | **Other:** |
| Lubricant Base Oil (Petroleum)<br>VARIOUS | 98-100 | 5mg/m$^3$ TWA<br>10 mg/m$^3$ STEL | 5 mg/m$^3$ TWA | 2500 mg/m$^3$ IDLH | as Oil Mist, if Generated<br><br>5 mg/m$^3$ NOHSC TWA |

The base oil for this product can be a mixture of any of the following highly refined petroleum streams: CAS 64741-88-4; CAS 64741-89-5; CAS 64741-96-4; CAS 64741-97-5; CAS 64742-01-4; CAS 64742-52-5; CAS 64742-53-6; CAS 64742-54-7; CAS 64742-55-8; CAS 64742-56-9; CAS 64742-57-0; CAS 64742-62-7; CAS 64742-63-8; CAS 64742-65-0; CAS 72623-83-7; CAS 72623-85-9; CAS 72623-86-0; CAS 72623-87-1

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

1%=10,000 PPM.
NE=Not Established

## 3. HAZARDS IDENTIFICATION

**Potential Health Effects:**

**Eye:** Eye irritant. Contact may cause stinging, watering, redness, and swelling.

**Skin:** Skin irritant. Contact may cause redness, itching, burning, and skin damage. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin, leading to dermatitis (inflammation). No harmful effects from skin absorption are expected.

**Inhalation (Breathing):** No data available. However, inhalation is not an expected route of exposure.

**Ingestion (Swallowing):** No harmful effects expected from ingestion.

**Signs and Symptoms:** Effects of overexposure may include irritation of the respiratory tract, irritation of the digestive tract, nausea, diarrhea.

**Cancer:** Inadequate evidence available to evaluate the cancer hazard of this material. See Section 11 for carcinogenicity information of individual components, if any.

**Target Organs:** No data available for this material.

**Developmental:** No data available for this material.

**Pre-Existing Medical Conditions:** Conditions aggravated by exposure may include skin disorders.

## 4. FIRST AID MEASURES

**Eye:** Move victim away from exposure and into fresh air. If irritation or redness develops, flush eyes with clean water and seek medical attention. For direct contact, hold eyelids apart and flush the affected eye(s) with clean water for at least 15 minutes. Seek medical attention.

**Skin:** Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek medical attention.

**Inhalation (Breathing):** If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

**Ingestion (Swallowing):** First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

**Notes to Physician:** High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. Often these injuries require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury.

Acute aspirations of large amounts of oil-laden material may produce a serious aspiration pneumonia. Patients who aspirate these oils should be followed for the development of long-term sequelae. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities.

## 5. FIRE-FIGHTING MEASURES

**Flammable Properties:**

| | |
|---|---|
| **Flash Point:** | 160°F / 71°C (COC, ASTM D92) |
| **OSHA Flammability Class:** | Combustible liquid |
| **NFPA Flammability Class:** | No data |
| **LEL%:** | No data |
| **UEL%:** | No data |
| **Autoignition Temperature:** | No data |

**Unusual Fire & Explosion Hazards:** This material is combustible and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment). May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

**Extinguishing Media:** Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

**Fire Fighting Instructions:** For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

## 6. ACCIDENTAL RELEASE MEASURES

Combustible. Keep all sources of ignition away from spill/release. The use of explosion-proof electrial equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

# 7. HANDLING AND STORAGE

**Handling:** Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

**Storage:** Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

# 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering controls:** If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional engineering controls may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

**Personal Protective Equipment (PPE):**

**Respiratory:** A NIOSH certified air purifying respirator with a Type 95 (R or P) particulate filter may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a NIOSH approved self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode if there is potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

**Skin:** The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation, and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

**Eye/Face:** Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

**Other Protective Equipment:** A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

Suggestions for the use of specific protective materials are based on readily available published data. Users should check with specific manufacturers to confirm the performance of their products.

# 9. PHYSICAL AND CHEMICAL PROPERTIES

**Note:** Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

| | |
|---|---|
| **Appearance:** | Black |
| **Physical Form:** | Semi-solid |
| **Odor:** | Aromatic |
| **Odor Threshold:** | No data |
| **pH:** | Not applicable |
| **Vapor Pressure (mm Hg):** | >1 |
| **Vapor Density (air=1):** | >1 |
| **Boiling Point:** | > 351°F / 177°C |
| **Solubility in Water:** | Insoluble |
| **Partition Coefficient (n-octanol/water):** | No data |
| **Specific Gravity:** | 0.89 |
| **Bulk Density:** | 7.7 |
| **Bulk Density Units** | lbs/gal |
| **Percent Volatile:** | Negligible |
| **Evaporation Rate (nBuAc=1):** | < 0.01 |
| **Flash Point:** | 160°F / 71°C |
| **Test Method:** | (COC, ASTM D92) |
| **LEL%:** | No data |
| **UEL%:** | No data |
| **Autoignition Temperature:** | No data |

# 10. STABILITY AND REACTIVITY

**Stability:** Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

**Conditions to Avoid:** Extended exposure to high temperatures can cause decomposition.

**Materials to Avoid (Incompatible Materials):** Avoid contact with acids, oxidizing agents.

**Hazardous Decomposition Products:** Combustion can yield carbon oxides.

**Hazardous Polymerization:** Will not occur.

# 11. TOXICOLOGICAL INFORMATION

**Chronic Data:**

**Lubricant Base Oil (Petroleum) - CAS: VARIOUS**
*Carcinogenicity:* The petroleum base oils contained in this product have been highly refined by a variety of processes including solvent extraction, hydrotreating, and dewaxing to remove aromatics and improve performance characteristics. All of the oils meet the IP-346 criteria of less than 3 percent PAH's and therefore none are listed as a carcinogen by NTP, IARC, or OSHA.

**Acute Data:**

**Lubricant Base Oil (Petroleum) - CAS: VARIOUS**
*Dermal LD50* = >2 g/kg
*LC50* = No information available
*Oral LD50* = >5 g/kg

**Calcium Dinonylnaphthalene Sulfonate - CAS: 57855-77-3**
*Dermal LD50* = No information available
*LC50* = No information available
*Oral LD50* = No information available

## 12. ECOLOGICAL INFORMATION

Not evaluated at this time.

## 13. DISPOSAL CONSIDERATIONS

This material under most intended uses would become used oil due to contamination by physical or chemical impurities. RECYCLE ALL USED OIL. While being recycled, used oil is regulated by 40 CFR 279. Use resulting in chemical or physical change or contamination may also subject it to regulation as hazardous waste. Under federal regulations, used oil is a solid waste managed under 40 CFR 279. However, in California, used oil is managed as hazardous waste until tested to show it is not hazardous. Consult state and local regulations regarding the proper handling of used oil. In the case of used oil, the intent to discard it may cause the used oil to be regulated as hazardous waste.

Contents should be completely used and containers emptied prior to discard. Rinsate may be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations. Large empty containers, such as drums, should be returned to the distributor or a drum reconditioner. To assure proper disposal of small empty containers, consult with state and local regulations and disposal authorities.

## 14. TRANSPORTATION INFORMATION

**DOT Proper Shipping Name:** Not classified as hazardous

**Note:** Material is unregulated unless in container of 3500 gallons or more, then provisions of 49 CFR Part 130 apply for land shipment.

**IMDG Shipping Description:** Not regulated

**ICAO/IATA Shipping Description:** Not regulated

## 15. REGULATORY INFORMATION

**U.S. Regulations:**

**EPA SARA 311/312 (Title III Hazard Categories)**

| | |
|---|---|
| **Acute Health:** | Yes |
| **Chronic Health:** | No |
| **Fire Hazard:** | No |
| **Pressure Hazard:** | No |
| **Reactive Hazard:** | No |

**SARA - Section 313 and 40 CFR 372:**
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:
--None Known--

**EPA (CERCLA) Reportable Quantity (in pounds):**
--None Known--

**CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):**
This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:
-- None Known --

**California Proposition 65:**
Warning: This material contains the following chemicals which are known to the State of Calfornia to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):
-- None Known --

**Carcinogen Identification:**
This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any.

**TSCA:**
All components are listed on the TSCA inventory.

**International Regulations:**

**Canadian Regulations:**
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**Domestic Substances List:** Listed
**WHMIS Classification:** B3-Combustible Liquid
**WHMIS Classification:** D1B-Materials causing immediate and serious toxic effects - Toxic Material

**Australian Regulations:**
References:
Regulations Specifically Applicable to the Chemical Product:
Commonwealth of Australia: Respirators must follow A51715/1716 standard for approved respirators.
New Zeland: Respirators must follow NZS 1715/1716 standard for approved respirators.
International (all countries): In the absence of local approved authorities, follow UIS. NIOSH/MSHA, U.K. BSI, Australian AS1715/1716, or new Zealand NZS 1715/1716 standards.
Australia Poison Schedule: Not applicable.
NZ Dangerous Goods Class: Not applicable.

Contact Point:

ConocoPhillips Lubricants Australia Pty. Ltd.
Emergency Telephone: 1-800-226626
Office Manager
Office Hours 8 a.m.-5 p.m. Monday-Friday (excluding holidays)
Tel: +61 (0) 7 5452.9900
Fax: +61 (0) 7 5452.9999
Website: www.aplubes.conocophillips.com

**International Inventories:**
All components of this material are listed on the following inventories:
Australian (AICS)
Canadian (DSL)
Chinese
European (EC/EINECS)
Japanese (ENCS)
Korean (ECL)
Philippine (PICCS)
United States (TSCA)

## 16. OTHER INFORMATION

| | |
|---|---|
| **Issue Date:** | 04-Feb-2005 |
| **Previous Issue Date:** | 08/09/2004 |
| **Product Code:** | 1044381 |
| **Reason for revision:** | Changes to Physical Properties. SEE SECTION 9.<br>Regulatory information changed. SEE SECTION 15. |
| **Previous Product Code:** | 5590000000 |
| **MSDS Code:** | 720830 |

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# Material Safety Data Sheet

## SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

### Chevron RPM® Universal Gear Lubricant

**Product Use:** Gear Lubricant
**Product Number(s):** CPS225039, CPS225040
**Synonyms:** Chevron RPM® Universal Gear Lubricant SAE 80W-90, Chevron RPM® Universal Gear Lubricant SAE 85W-140
**Company Identification**
Chevron Products Company
Global Lubricants
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevron-lubricants.com

**Transportation Emergency Response**
CHEMTREC: (800) 424-9300 or (703) 527-3887
**Health Emergency**
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
**Product Information**
email : lubemsds@chevrontexaco.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

## SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

| COMPONENTS | CAS NUMBER | AMOUNT |
|---|---|---|
| Highly refined mineral oil (C15-C50) | Mixture | 80 - 95 %weight |

## SECTION 3 HAZARDS IDENTIFICATION

**IMMEDIATE HEALTH EFFECTS**
**Eye:** Not expected to cause prolonged or significant eye irritation.
**Skin:** Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin.
**Ingestion:** Not expected to be harmful if swallowed.
**Inhalation:** Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

## SECTION 4 FIRST AID MEASURES

**Eye:** No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
**Skin:** No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean

before reuse.
**Ingestion:** No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
**Inhalation:** No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

## SECTION 5 FIRE FIGHTING MEASURES

**FIRE CLASSIFICATION:**
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

**NFPA RATINGS:** Health: 0 Flammability: 1 Reactivity: 0

**FLAMMABLE PROPERTIES:**
**Flashpoint:** (Cleveland Open Cup) 180 °C (356 °F) (Min)
**Autoignition:** No Data Available
**Flammability (Explosive) Limits (% by volume in air):** Lower: Not Applicable Upper: Not Applicable

**EXTINGUISHING MEDIA:** Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.
**PROTECTION OF FIRE FIGHTERS:**
**Fire Fighting Instructions:** This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
**Combustion Products:** Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

## SECTION 6 ACCIDENTAL RELEASE MEASURES

**Protective Measures:** Eliminate all sources of ignition in vicinity of spilled material.
**Spill Management:** Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
**Reporting:** Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

## SECTION 7 HANDLING AND STORAGE

**Precautionary Measures:** Keep out of the reach of children.
**General Handling Information:** Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
**Static Hazard:** Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
**Container Warnings:** Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

## SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

**GENERAL CONSIDERATIONS:**

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

**ENGINEERING CONTROLS:**
Use in a well-ventilated area.

**PERSONAL PROTECTIVE EQUIPMENT**
**Eye/Face Protection:** No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
**Skin Protection:** No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.
**Respiratory Protection:** No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
**Occupational Exposure Limits:**

| Component | Agency | TWA | STEL | Ceiling | Notation |
|---|---|---|---|---|---|
| Highly refined mineral oil (C15-C50) | ACGIH | 5 mg/m3 | 10 mg/m3 | -- | -- |
| Highly refined mineral oil (C15-C50) | OSHA Z-1 | 5 mg/m3 | -- | -- | -- |

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

**Color:** Brown
**Physical State:** Liquid
**Odor:** Petroleum odor
**pH:** Not Applicable
**Vapor Pressure:** <0.01 mmHg @ 37.8 °C (100 °F)
**Vapor Density (Air = 1):** >1
**Boiling Point:** >371°C (699.8°F)
**Solubility:** Soluble in hydrocarbons; insoluble in water
**Freezing Point:** Not Applicable
**Specific Gravity:** 0.88 - 0.92 @ 15.6°C (60.1°F) / 15.6°C (60.1°F)
**Viscosity:** 13.7 cSt @ 100°C (212°F) (Min)

## SECTION 10 STABILITY AND REACTIVITY

**Chemical Stability:** This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
**Incompatibility With Other Materials:** May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
**Hazardous Decomposition Products:** None known (None expected)
**Hazardous Polymerization:** Hazardous polymerization will not occur.

## SECTION 11 TOXICOLOGICAL INFORMATION

**IMMEDIATE HEALTH EFFECTS**
**Eye Irritation:** The eye irritation hazard is based on evaluation of data for similar materials or product components.
**Skin Irritation:** The skin irritation hazard is based on evaluation of data for similar materials or product

components.
**Skin Sensitization:** No product toxicology data available.
**Acute Dermal Toxicity:** The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
**Acute Oral Toxicity:** The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
**Acute Inhalation Toxicity:** The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

**ADDITIONAL TOXICOLOGY INFORMATION:**
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

## SECTION 12 ECOLOGICAL INFORMATION

**ECOTOXICITY**
The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

**ENVIRONMENTAL FATE**
This material is not expected to be readily biodegradable.

## SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

## SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.
**DOT Shipping Description:** PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR
**Additional Information:**NOT HAZARDOUS BY U.S. DOT. ADR/RID HAZARD CLASS NOT APPLICABLE.

**IMO/IMDG Shipping Description:** PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

**ICAO/IATA Shipping Description:** PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

## SECTION 15 REGULATORY INFORMATION

**EPCRA 311/312 CATEGORIES:** 1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

| | |
|---|---|
| 01-1=IARC Group 1 | 03=EPCRA 313 |
| 01-2A=IARC Group 2A | 04=CA Proposition 65 |
| 01-2B=IARC Group 2B | 05=MA RTK |
| 02=NTP Carcinogen | 06=NJ RTK |
| | 07=PA RTK |

No components of this material were found on the regulatory lists above.

**CHEMICAL INVENTORIES:**
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

**NEW JERSEY RTK CLASSIFICATION:**
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Gear oil)

**WHMIS CLASSIFICATION:**
This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

## SECTION 16 OTHER INFORMATION

**NFPA RATINGS:** Health: 0 Flammability: 1 Reactivity: 0

**HMIS RATINGS:** Health: 1 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

**LABEL RECOMMENDATION:**
Label Category : INDUSTRIAL OIL 1 - IND1

**REVISION STATEMENT:** This revision updates the following sections of this Material Safety Data Sheet: 2,5,8,9,10,11,14,15,16
**Revision Date:** 06/05/2006

**ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:**

| | |
|---|---|
| TLV - Threshold Limit Value | TWA - Time Weighted Average |
| STEL - Short-term Exposure Limit | PEL - Permissible Exposure Limit |
| | CAS - Chemical Abstract Service Number |
| ACGIH - American Conference of Government Industrial Hygienists | IMO/IMDG - International Maritime Dangerous Goods Code |
| API - American Petroleum Institute | MSDS - Material Safety Data Sheet |
| CVX - Chevron | NFPA - National Fire Protection Association (USA) |
| DOT - Department of Transportation (USA) | NTP - National Toxicology Program (USA) |
| IARC - International Agency for Research on Cancer | OSHA - Occupational Safety and Health Administration |

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the ChevronTexaco Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

**The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.**

# Material Safety Data Sheet

## SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

# Chevron Open Gear Grease

**Product Use:** Grease
**Product Number(s):** CPS230002
**Company Identification**
ChevronTexaco Global Lubricants
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevron-lubricants.com

**Transportation Emergency Response**
CHEMTREC: (800) 424-9300 or (703) 527-3887
**Health Emergency**
ChevronTexaco Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
**Product Information**
email : lubemsds@chevrontexaco.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

## SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

| COMPONENTS | CAS NUMBER | AMOUNT |
|---|---|---|
| Asphalt | 8052-42-4 | 60 - 80 %weight |
| Highly refined mineral oil (C15 - C50) | Mixture | 10 - 30 %weight |
| Graphite | 7782-42-5 | 1 - 5 %weight |
| Molybdenum disulphide | 1317-33-5 | 1 - 5 %weight |

## SECTION 3 HAZARDS IDENTIFICATION

**********
***EMERGENCY OVERVIEW***

- CAUSES EYE IRRITATION
**********

**IMMEDIATE HEALTH EFFECTS**
**Eye:** Contact with the eyes causes irritation. Symptoms may include pain, tearing, reddening, swelling and impaired vision.
**Skin:** Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

**Ingestion:** Not expected to be harmful if swallowed.
**Inhalation:** Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

## SECTION 4 FIRST AID MEASURES

**Eye:** Flush eyes with water immediately while holding the eyelids open. Remove contact lenses, if worn, after initial flushing, and continue flushing for at least 15 minutes. Get medical attention if irritation persists.
**Skin:** No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, apply a waterless hand cleaner, mineral oil, or petroleum jelly. Then wash with soap and water. Discard contaminated clothing and shoes or

thoroughly clean before reuse.
**Ingestion:** No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
**Inhalation:** No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.
**Note to Physicians:** In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

## SECTION 5 FIRE FIGHTING MEASURES

**FIRE CLASSIFICATION:**
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

**NFPA RATINGS:** Health: 0 Flammability: 1 Reactivity: 0

**FLAMMABLE PROPERTIES:**
**Flashpoint:** (Cleveland Open Cup) 204 °C (399 °F) (Min)
**Autoignition:** > 316 °C (> 601 °F)
**Flammability (Explosive) Limits (% by volume in air):** Lower: Not Applicable Upper: Not Applicable

**EXTINGUISHING MEDIA:** Use water fog, foam, dry chemical or carbon dioxide ($CO_2$) to extinguish flames.

**PROTECTION OF FIRE FIGHTERS:**
**Fire Fighting Instructions:** This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
**Combustion Products:** Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion. Combustion may form oxides of: Nitrogen .

## SECTION 6 ACCIDENTAL RELEASE MEASURES

**Protective Measures:** Eliminate all sources of ignition in vicinity of spilled material.
**Spill Management:** Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Clean up spills immediately, observing precautions in Exposure Controls/Personal Protection section.
**Reporting:** Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

## SECTION 7 HANDLING AND STORAGE

**Precautionary Measures:** Do not get in eyes.
**General Handling Information:** Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
**Static Hazard:** Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
**Container Warnings:** Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

## SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

**GENERAL CONSIDERATIONS:**
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

**ENGINEERING CONTROLS:**
Use in a well-ventilated area.

**PERSONAL PROTECTIVE EQUIPMENT**

**Eye/Face Protection:** Wear protective equipment to prevent eye contact. Selection of protective equipment may include safety glasses, chemical goggles, face shields, or a combination depending on the work operations conducted.
**Skin Protection:** No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Neoprene, Nitrile Rubber, Viton.
**Respiratory Protection:** No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
**Occupational Exposure Limits:**

| Component | Agency | TWA | STEL | Ceiling | Notation |
|---|---|---|---|---|---|
| Asphalt | ACGIH | .5 mg/m3 | -- | -- | -- |
| Graphite | ACGIH | 2 mg/m3 | -- | -- | -- |
| Graphite | OSHA Z-1 | 5 mg/m3 | -- | -- | -- |
| Highly refined mineral oil (C15 - C50) | ACGIH | 5 mg/m3 | 10 mg/m3 | -- | -- |
| Highly refined mineral oil (C15 - C50) | OSHA Z-1 | 5 mg/m3 | -- | -- | -- |
| Molybdenum disulphide | ACGIH | 3 mg/m3 | -- | -- | -- |
| Molybdenum disulphide | OSHA Z-1 | 5 mg/m3 | -- | -- | -- |

The ACGIH TLV is 0.5 mg/m3 as the benzene extractable portion of the inhalable fraction of asphalt fume. The TLV may also be determined by unspecified 'equivalent' methods.

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

**Color:** Black
**Physical State:** Semi-solid
**Odor:** Petroleum odor
**pH:** Not Applicable
**Vapor Pressure:**
**Vapor Density (Air = 1):** >1
**Boiling Point:** No Data Available
**Solubility:** Negligible
**Freezing Point:** Not Applicable
**Density:** 0.97
**Viscosity:** No data available

## SECTION 10 STABILITY AND REACTIVITY

**Chemical Stability:** Material is dangerously unstable. See 'Conditions to Avoid' and/or 'Incompatibility With Other Materials' in this section.
**Incompatibility With Other Materials:** May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
**Hazardous Decomposition Products:** None known (None expected)
**Hazardous Polymerization:** Hazardous polymerization will not occur.

## SECTION 11 TOXICOLOGICAL INFORMATION

**IMMEDIATE HEALTH EFFECTS**
**Eye Irritation:** The eye irritation hazard is based on evaluation of data for similar materials or product components.
**Skin Irritation:** The skin irritation hazard is based on evaluation of data for similar materials or product components.
**Skin Sensitization:** The skin sensitization hazard is based on evaluation of data for similar materials or product components.
**Acute Dermal Toxicity:** The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
**Acute Oral Toxicity:** The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
**Acute Inhalation Toxicity:** The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

**ADDITIONAL TOXICOLOGY INFORMATION:**
There is concern about the carcinogenicity of chemical compounds found in asphalts. The International Agency for Research on Cancer (IARC) reviewed the carcinogenic potential of asphalts in 1985 and again in 1987. At that time, they concluded there was inadequate evidence to decide that asphalts were carcinogenic to humans. Overall, findings from health monitoring studies of asphalt workers are not conclusive. However, asphalt fume condensates and certain chemical components of asphalt fume have been shown to cause cancer in mice when repeatedly applied to the skin and allowed to remain on the skin for a prolonged period of time. In addition, asphalt fume condensates have been shown to be weakly positive in Ames mutagenicity tests. Skin contact and breathing of fumes, mists and vapors should be reduced to a minimum.

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

## SECTION 12 ECOLOGICAL INFORMATION

**ECOTOXICITY**
The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

**ENVIRONMENTAL FATE**
This material is not expected to be readily biodegradable.

## SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

## SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

**DOT Shipping Description:** PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A HAZARDOUS MATERIAL

**IMO/IMDG Shipping Description:** PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A DANGEROUS GOOD

**ICAO/IATA Shipping Description:** PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A DANGEROUS GOOD

## SECTION 15 REGULATORY INFORMATION

**EPCRA 311/312 CATEGORIES:** 1. Immediate (Acute) Health Effects: YES
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

| | |
|---|---|
| 01-1=IARC Group 1 | 03=EPCRA 313 |
| 01-2A=IARC Group 2A | 04=CA Proposition 65 |
| 01-2B=IARC Group 2B | 05=MA RTK |
| 02=NTP Carcinogen | 06=NJ RTK |
| | 07=PA RTK |

The following components of this material are found on the regulatory lists indicated.

| | |
|---|---|
| Asphalt | 05, 06, 07 |
| Graphite | 05, 07 |
| Molybdenum disulphide | 05, 06 |

**CHEMICAL INVENTORIES:**
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

One or more components does not comply with the following chemical inventory requirements: ENCS (Japan).

**NEW JERSEY RTK CLASSIFICATION:**
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Grease)

**WHMIS CLASSIFICATION:**
Class D, Division 2, Subdivision B: Toxic Material -
Skin or Eye Irritation

## SECTION 16 OTHER INFORMATION

**NFPA RATINGS:** Health: 0 Flammability: 1 Reactivity: 0

**HMIS RATINGS:** Health: 1 Flammability: 1 Reactivity: 0 PPE: B
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

**LABEL RECOMMENDATION:**
Label Category : GREASE 4

**REVISION STATEMENT:** This revision updates the following sections of this Material Safety Data Sheet: 1-16
**Revision Date:** 07/16/2004

**ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:**

| | |
|---|---|
| TLV - Threshold Limit Value | TWA - Time Weighted Average |
| STEL - Short-term Exposure Limit | PEL - Permissible Exposure Limit |
| | CAS - Chemical Abstract Service Number |
| ACGIH - American Conference of Government Industrial Hygienists | IMO/IMDG - International Maritime Dangerous Goods Code |
| API - American Petroleum Institute | MSDS - Material Safety Data Sheet |
| CVX - ChevronTexaco | NFPA - National Fire Protection Association (USA) |
| DOT - Department of Transportation (USA) | NTP - National Toxicology Program (USA) |
| IARC - International Agency for Research on Cancer | OSHA - Occupational Safety and Health Administration |

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the ChevronTexaco Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

**The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.**

# CHEVRON CLARITY® HYDRAULIC OILS AW

## ISO 32, 46, 68

### CUSTOMER BENEFITS

Chevron Clarity Hydraulic Oils AW deliver value through:

- **Premium performance** — Ashless formulation meets or exceeds pump manufacturer's requirements for viscosity, rust and corrosion protection, hydrolytic stability, water separability, foam inhibition, and filterability.
- **Superior oxidation stability** — Longer service life than conventional antiwear hydraulic oils or vegetable hydraulic oils.
- **Excellent antiwear properties** — Provides excellent wear protection.
- **Environmental sensitivity** — Passes the stringent acute aquatic toxicity (L-50) test and is inherently biodegradable, minimizing long-term environmental concerns. Suitable for conventional recycling programs - unlike vegetable hydraulic oils.

### FEATURES

Chevron Clarity Hydraulic Oils AW are designed to give maximum protection to hydraulic pumps in high-performance industrial applications as well as in environmentally sensitive areas.

They are formulated with ISOSYN® base stocks and an ashless ("zinc-free") additive system that provides superior oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion.

They are designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps, while providing an additional level of safety in case of leaks or incidental discharge to the environment.

Chevron Clarity Hydraulic Oils AW are long-life lubricants, with dramatically longer TOST (oxidation stability) lives than conventional hydraulic fluids. A longer TOST life equates to longer service life, which improves the customer's bottom line. This level of oxidation stability is especially applicable in high efficiency (high speed, high temperature, high output) applications where severe stress is placed on the hydraulic fluid.

Many hydraulic systems are required to operate in environmentally sensitive areas where leaks or spills of hydraulic fluid may result in contamination of the soil or nearby waterways. Conventional antiwear hydraulic oils are formulated with metal-containing performance additives which will persist in the environment in the event of leaks. Vegetable-based hydraulic oils meet the environmental requirements, but fall short of the performance requirements.

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IO-25

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## APPLICATIONS

Chevron Clarity Hydraulic Oils AW are designed for use in mobile and stationary hydraulic vane-, piston , and gear-type pumps.

The antiwear performance of these oils makes them especially suited for high performance industrial applications utilizing axial piston pumps where pressures may exceed 5000 psi.

The zinc-free formula makes it perfectly suited for applications involving yellow metals found in axial piston pumps.

They are well suited for applications situated in environmentally sensitive areas.

Chevron Clarity Hydraulic Oils AW have shown excellent performance in applications involving servo-valves using multimetal components.

The ashless formulation of Chevron Clarity Hydraulic Oils AW passes the acute aquatic toxicity (LC-50) criteria adopted by the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency.

Chevron Clarity Hydraulic Oils AW meet the requirements of:

- **Denison** HF-0, HF-2
- **Cincinnati Machine** P 68 (ISO 32), P-70 (ISO 46), P 69 (ISO 68)
- **Vickers** for use in M-2950-S (mobile) and I-286-S (stationary) hydraulic systems. Passes Vickers 35VQ25 pump test.

Chevron Clarity Hydraulic Oils AW is registered with NSF and is acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

## TYPICAL TEST DATA

| **ISO Grade** | **32** | **46** | **68** |
|---|---|---|---|
| *Product Number* | *230342* | *230341* | *230340* |
| *MSDS Number* | *6691* | *6691* | *6691* |
| AGMA Grade | — | 1 | 2 |
| API Gravity | 32.8 | 31.9 | 31.8 |
| Viscosity, Kinematic<br>cSt at 40°C<br>cSt at 100°C | <br>33.6<br>5.6 | <br>46.0<br>6.8 | <br>64.6<br>8.5 |
| Viscosity, Saybolt<br>SUS at 100°F<br>SUS at 210°F | <br>173<br>45.0 | <br>237<br>49.0 | <br>334<br>54.8 |
| Viscosity Index | 104 | 101 | 102 |
| Flash Point,°C(°F) | 222(432) | 224(435) | 224(435) |
| Pour Point, °C(°F) | -33(-27) | -30(-22) | -30(-22) |
| Oxidation Stability<br>Hours to 2.0 mg KOH/g acid number, modified ASTM D 943 | >18,000 | >18,000 | >18,000 |

Typical test data are average values only. Minor variations which do not affect product performance are to be expected in normal manufacturing.

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# Material Safety Data Sheet

## SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

### Chevron RPM® Universal Gear Lubricant

**Product Use:** Gear Lubricant
**Product Number(s):** CPS225039, CPS225040
**Synonyms:** Chevron RPM® Universal Gear Lubricant SAE 80W-90, Chevron RPM® Universal Gear Lubricant SAE 85W-140
**Company Identification**
Chevron Products Company
Global Lubricants
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevron-lubricants.com

**Transportation Emergency Response**
CHEMTREC: (800) 424-9300 or (703) 527-3887
**Health Emergency**
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
**Product Information**
email : lubemsds@chevrontexaco.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

## SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

| COMPONENTS | CAS NUMBER | AMOUNT |
|---|---|---|
| Highly refined mineral oil (C15-C50) | Mixture | 80 - 95 %weight |

## SECTION 3 HAZARDS IDENTIFICATION

**IMMEDIATE HEALTH EFFECTS**
**Eye:** Not expected to cause prolonged or significant eye irritation.
**Skin:** Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin.
**Ingestion:** Not expected to be harmful if swallowed.
**Inhalation:** Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

## SECTION 4 FIRST AID MEASURES

**Eye:** No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
**Skin:** No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean

before reuse.
**Ingestion:** No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
**Inhalation:** No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

## SECTION 5 FIRE FIGHTING MEASURES

**FIRE CLASSIFICATION:**
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

**NFPA RATINGS:** Health: 0 Flammability: 1 Reactivity: 0

**FLAMMABLE PROPERTIES:**
**Flashpoint:** (Cleveland Open Cup) 180 °C (356 °F) (Min)
**Autoignition:** No Data Available
**Flammability (Explosive) Limits (% by volume in air):** Lower: Not Applicable Upper: Not Applicable

**EXTINGUISHING MEDIA:** Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.
**PROTECTION OF FIRE FIGHTERS:**
**Fire Fighting Instructions:** This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
**Combustion Products:** Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

## SECTION 6 ACCIDENTAL RELEASE MEASURES

**Protective Measures:** Eliminate all sources of ignition in vicinity of spilled material.
**Spill Management:** Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
**Reporting:** Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

## SECTION 7 HANDLING AND STORAGE

**Precautionary Measures:** Keep out of the reach of children.
**General Handling Information:** Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
**Static Hazard:** Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
**Container Warnings:** Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

## SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

**GENERAL CONSIDERATIONS:**

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

**ENGINEERING CONTROLS:**
Use in a well-ventilated area.

**PERSONAL PROTECTIVE EQUIPMENT**
**Eye/Face Protection:** No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
**Skin Protection:** No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.
**Respiratory Protection:** No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
**Occupational Exposure Limits:**

| Component | Agency | TWA | STEL | Ceiling | Notation |
|---|---|---|---|---|---|
| Highly refined mineral oil (C15-C50) | ACGIH | 5 mg/m3 | 10 mg/m3 | -- | -- |
| Highly refined mineral oil (C15-C50) | OSHA Z-1 | 5 mg/m3 | -- | -- | -- |

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

**Color:** Brown
**Physical State:** Liquid
**Odor:** Petroleum odor
**pH:** Not Applicable
**Vapor Pressure:** <0.01 mmHg @ 37.8 °C (100 °F)
**Vapor Density (Air = 1):** >1
**Boiling Point:** >371°C (699.8°F)
**Solubility:** Soluble in hydrocarbons; insoluble in water
**Freezing Point:** Not Applicable
**Specific Gravity:** 0.88 - 0.92 @ 15.6°C (60.1°F) / 15.6°C (60.1°F)
**Viscosity:** 13.7 cSt @ 100°C (212°F) (Min)

## SECTION 10 STABILITY AND REACTIVITY

**Chemical Stability:** This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
**Incompatibility With Other Materials:** May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
**Hazardous Decomposition Products:** None known (None expected)
**Hazardous Polymerization:** Hazardous polymerization will not occur.

## SECTION 11 TOXICOLOGICAL INFORMATION

**IMMEDIATE HEALTH EFFECTS**
**Eye Irritation:** The eye irritation hazard is based on evaluation of data for similar materials or product components.
**Skin Irritation:** The skin irritation hazard is based on evaluation of data for similar materials or product

components.
**Skin Sensitization:** No product toxicology data available.
**Acute Dermal Toxicity:** The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
**Acute Oral Toxicity:** The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
**Acute Inhalation Toxicity:** The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

**ADDITIONAL TOXICOLOGY INFORMATION:**
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

## SECTION 12 ECOLOGICAL INFORMATION

**ECOTOXICITY**
The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

**ENVIRONMENTAL FATE**
This material is not expected to be readily biodegradable.

## SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

## SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.
**DOT Shipping Description:** PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR
**Additional Information:**NOT HAZARDOUS BY U.S. DOT. ADR/RID HAZARD CLASS NOT APPLICABLE.

**IMO/IMDG Shipping Description:** PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

**ICAO/IATA Shipping Description:** PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

## SECTION 15 REGULATORY INFORMATION

**EPCRA 311/312 CATEGORIES:** 1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

| | |
|---|---|
| 01-1=IARC Group 1 | 03=EPCRA 313 |
| 01-2A=IARC Group 2A | 04=CA Proposition 65 |
| 01-2B=IARC Group 2B | 05=MA RTK |
| 02=NTP Carcinogen | 06=NJ RTK |
| | 07=PA RTK |

No components of this material were found on the regulatory lists above.

**CHEMICAL INVENTORIES:**
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

**NEW JERSEY RTK CLASSIFICATION:**
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Gear oil)

**WHMIS CLASSIFICATION:**
This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

## SECTION 16 OTHER INFORMATION

**NFPA RATINGS:** Health: 0 Flammability: 1 Reactivity: 0

**HMIS RATINGS:** Health: 1 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

**LABEL RECOMMENDATION:**
Label Category : INDUSTRIAL OIL 1 - IND1

**REVISION STATEMENT:** This revision updates the following sections of this Material Safety Data Sheet: 2,5,8,9,10,11,14,15,16
**Revision Date:** 06/05/2006

**ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:**

| | |
|---|---|
| TLV - Threshold Limit Value | TWA - Time Weighted Average |
| STEL - Short-term Exposure Limit | PEL - Permissible Exposure Limit |
| | CAS - Chemical Abstract Service Number |
| ACGIH - American Conference of Government Industrial Hygienists | IMO/IMDG - International Maritime Dangerous Goods Code |
| API - American Petroleum Institute | MSDS - Material Safety Data Sheet |
| CVX - Chevron | NFPA - National Fire Protection Association (USA) |
| DOT - Department of Transportation (USA) | NTP - National Toxicology Program (USA) |
| IARC - International Agency for Research on Cancer | OSHA - Occupational Safety and Health Administration |

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the ChevronTexaco Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

**The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.**

# Material Safety Data Sheet

## SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

# Chevron Open Gear Grease

**Product Use:** Grease
**Product Number(s):** CPS230002
**Company Identification**
ChevronTexaco Global Lubricants
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevron-lubricants.com

**Transportation Emergency Response**
CHEMTREC: (800) 424-9300 or (703) 527-3887
**Health Emergency**
ChevronTexaco Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
**Product Information**
email : lubemsds@chevrontexaco.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

## SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

| COMPONENTS | CAS NUMBER | AMOUNT |
|---|---|---|
| Asphalt | 8052-42-4 | 60 - 80 %weight |
| Highly refined mineral oil (C15 - C50) | Mixture | 10 - 30 %weight |
| Graphite | 7782-42-5 | 1 - 5 %weight |
| Molybdenum disulphide | 1317-33-5 | 1 - 5 %weight |

## SECTION 3 HAZARDS IDENTIFICATION

**********
***EMERGENCY OVERVIEW***

- CAUSES EYE IRRITATION
**********

**IMMEDIATE HEALTH EFFECTS**
**Eye:** Contact with the eyes causes irritation. Symptoms may include pain, tearing, reddening, swelling and impaired vision.
**Skin:** Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

**Ingestion:** Not expected to be harmful if swallowed.
**Inhalation:** Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

## SECTION 4 FIRST AID MEASURES

**Eye:** Flush eyes with water immediately while holding the eyelids open. Remove contact lenses, if worn, after initial flushing, and continue flushing for at least 15 minutes. Get medical attention if irritation persists.
**Skin:** No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, apply a waterless hand cleaner, mineral oil, or petroleum jelly. Then wash with soap and water. Discard contaminated clothing and shoes or

thoroughly clean before reuse.
**Ingestion:** No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
**Inhalation:** No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.
**Note to Physicians:** In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

## SECTION 5 FIRE FIGHTING MEASURES

**FIRE CLASSIFICATION:**
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

**NFPA RATINGS:** Health: 0 Flammability: 1 Reactivity: 0

**FLAMMABLE PROPERTIES:**
**Flashpoint:** (Cleveland Open Cup) 204 °C (399 °F) (Min)
**Autoignition:** > 316 °C (> 601 °F)
**Flammability (Explosive) Limits (% by volume in air):** Lower: Not Applicable Upper: Not Applicable

**EXTINGUISHING MEDIA:** Use water fog, foam, dry chemical or carbon dioxide ($CO_2$) to extinguish flames.

**PROTECTION OF FIRE FIGHTERS:**
**Fire Fighting Instructions:** This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
**Combustion Products:** Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion. Combustion may form oxides of: Nitrogen .

## SECTION 6 ACCIDENTAL RELEASE MEASURES

**Protective Measures:** Eliminate all sources of ignition in vicinity of spilled material.
**Spill Management:** Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Clean up spills immediately, observing precautions in Exposure Controls/Personal Protection section.
**Reporting:** Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

## SECTION 7 HANDLING AND STORAGE

**Precautionary Measures:** Do not get in eyes.
**General Handling Information:** Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
**Static Hazard:** Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
**Container Warnings:** Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

## SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

**GENERAL CONSIDERATIONS:**
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

**ENGINEERING CONTROLS:**
Use in a well-ventilated area.

**PERSONAL PROTECTIVE EQUIPMENT**

**Eye/Face Protection:** Wear protective equipment to prevent eye contact. Selection of protective equipment may include safety glasses, chemical goggles, face shields, or a combination depending on the work operations conducted.
**Skin Protection:** No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Neoprene, Nitrile Rubber, Viton.
**Respiratory Protection:** No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
**Occupational Exposure Limits:**

| Component | Agency | TWA | STEL | Ceiling | Notation |
|---|---|---|---|---|---|
| Asphalt | ACGIH | .5 mg/m3 | -- | -- | -- |
| Graphite | ACGIH | 2 mg/m3 | -- | -- | -- |
| Graphite | OSHA Z-1 | 5 mg/m3 | -- | -- | -- |
| Highly refined mineral oil (C15 - C50) | ACGIH | 5 mg/m3 | 10 mg/m3 | -- | -- |
| Highly refined mineral oil (C15 - C50) | OSHA Z-1 | 5 mg/m3 | -- | -- | -- |
| Molybdenum disulphide | ACGIH | 3 mg/m3 | -- | -- | -- |
| Molybdenum disulphide | OSHA Z-1 | 5 mg/m3 | -- | -- | -- |

The ACGIH TLV is 0.5 mg/m3 as the benzene extractable portion of the inhalable fraction of asphalt fume. The TLV may also be determined by unspecified 'equivalent' methods.

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

**Color:** Black
**Physical State:** Semi-solid
**Odor:** Petroleum odor
**pH:** Not Applicable
**Vapor Pressure:**
**Vapor Density (Air = 1):** >1
**Boiling Point:** No Data Available
**Solubility:** Negligible
**Freezing Point:** Not Applicable
**Density:** 0.97
**Viscosity:** No data available

## SECTION 10 STABILITY AND REACTIVITY

**Chemical Stability:** Material is dangerously unstable. See 'Conditions to Avoid' and/or 'Incompatibility With Other Materials' in this section.
**Incompatibility With Other Materials:** May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
**Hazardous Decomposition Products:** None known (None expected)
**Hazardous Polymerization:** Hazardous polymerization will not occur.

## SECTION 11 TOXICOLOGICAL INFORMATION

**IMMEDIATE HEALTH EFFECTS**
**Eye Irritation:** The eye irritation hazard is based on evaluation of data for similar materials or product components.
**Skin Irritation:** The skin irritation hazard is based on evaluation of data for similar materials or product components.
**Skin Sensitization:** The skin sensitization hazard is based on evaluation of data for similar materials or product components.
**Acute Dermal Toxicity:** The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
**Acute Oral Toxicity:** The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
**Acute Inhalation Toxicity:** The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

**ADDITIONAL TOXICOLOGY INFORMATION:**
There is concern about the carcinogenicity of chemical compounds found in asphalts. The International Agency for Research on Cancer (IARC) reviewed the carcinogenic potential of asphalts in 1985 and again in 1987. At that time, they concluded there was inadequate evidence to decide that asphalts were carcinogenic to humans. Overall, findings from health monitoring studies of asphalt workers are not conclusive. However, asphalt fume condensates and certain chemical components of asphalt fume have been shown to cause cancer in mice when repeatedly applied to the skin and allowed to remain on the skin for a prolonged period of time. In addition, asphalt fume condensates have been shown to be weakly positive in Ames mutagenicity tests. Skin contact and breathing of fumes, mists and vapors should be reduced to a minimum.

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

## SECTION 12 ECOLOGICAL INFORMATION

**ECOTOXICITY**
The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

**ENVIRONMENTAL FATE**
This material is not expected to be readily biodegradable.

## SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

## SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

**DOT Shipping Description:** PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A HAZARDOUS MATERIAL

**IMO/IMDG Shipping Description:** PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A DANGEROUS GOOD

**ICAO/IATA Shipping Description:** PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A DANGEROUS GOOD

## SECTION 15 REGULATORY INFORMATION

**EPCRA 311/312 CATEGORIES:** 1. Immediate (Acute) Health Effects: YES
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

| | |
|---|---|
| 01-1=IARC Group 1 | 03=EPCRA 313 |
| 01-2A=IARC Group 2A | 04=CA Proposition 65 |
| 01-2B=IARC Group 2B | 05=MA RTK |
| 02=NTP Carcinogen | 06=NJ RTK |
| | 07=PA RTK |

The following components of this material are found on the regulatory lists indicated.

| | |
|---|---|
| Asphalt | 05, 06, 07 |
| Graphite | 05, 07 |
| Molybdenum disulphide | 05, 06 |

**CHEMICAL INVENTORIES:**
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

One or more components does not comply with the following chemical inventory requirements: ENCS (Japan).

**NEW JERSEY RTK CLASSIFICATION:**
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Grease)

**WHMIS CLASSIFICATION:**
Class D, Division 2, Subdivision B: Toxic Material -
Skin or Eye Irritation

## SECTION 16 OTHER INFORMATION

**NFPA RATINGS:** Health: 0 Flammability: 1 Reactivity: 0

**HMIS RATINGS:** Health: 1 Flammability: 1 Reactivity: 0 PPE: B
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

**LABEL RECOMMENDATION:**
Label Category : GREASE 4

**REVISION STATEMENT:** This revision updates the following sections of this Material Safety Data Sheet: 1-16
**Revision Date:** 07/16/2004

**ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:**

| | |
|---|---|
| TLV - Threshold Limit Value | TWA - Time Weighted Average |
| STEL - Short-term Exposure Limit | PEL - Permissible Exposure Limit |
| | CAS - Chemical Abstract Service Number |
| ACGIH - American Conference of Government Industrial Hygienists | IMO/IMDG - International Maritime Dangerous Goods Code |
| API - American Petroleum Institute | MSDS - Material Safety Data Sheet |
| CVX - ChevronTexaco | NFPA - National Fire Protection Association (USA) |
| DOT - Department of Transportation (USA) | NTP - National Toxicology Program (USA) |
| IARC - International Agency for Research on Cancer | OSHA - Occupational Safety and Health Administration |

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the ChevronTexaco Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

**The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.**

# CHEVRON CLARITY® HYDRAULIC OILS AW

## ISO 32, 46, 68

### CUSTOMER BENEFITS

Chevron Clarity Hydraulic Oils AW deliver value through:

- **Premium performance** — Ashless formulation meets or exceeds pump manufacturer's requirements for viscosity, rust and corrosion protection, hydrolytic stability, water separability, foam inhibition, and filterability.
- **Superior oxidation stability** — Longer service life than conventional antiwear hydraulic oils or vegetable hydraulic oils.
- **Excellent antiwear properties** — Provides excellent wear protection.
- **Environmental sensitivity** — Passes the stringent acute aquatic toxicity (L-50) test and is inherently biodegradable, minimizing long-term environmental concerns. Suitable for conventional recycling programs - unlike vegetable hydraulic oils.

### FEATURES

Chevron Clarity Hydraulic Oils AW are designed to give maximum protection to hydraulic pumps in high-performance industrial applications as well as in environmentally sensitive areas.

They are formulated with ISOSYN® base stocks and an ashless ("zinc-free") additive system that provides superior oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion.

They are designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps, while providing an additional level of safety in case of leaks or incidental discharge to the environment.

Chevron Clarity Hydraulic Oils AW are long-life lubricants, with dramatically longer TOST (oxidation stability) lives than conventional hydraulic fluids. A longer TOST life equates to longer service life, which improves the customer's bottom line. This level of oxidation stability is especially applicable in high efficiency (high speed, high temperature, high output) applications where severe stress is placed on the hydraulic fluid.

Many hydraulic systems are required to operate in environmentally sensitive areas where leaks or spills of hydraulic fluid may result in contamination of the soil or nearby waterways. Conventional antiwear hydraulic oils are formulated with metal-containing performance additives which will persist in the environment in the event of leaks. Vegetable-based hydraulic oils meet the environmental requirements, but fall short of the performance requirements.

A **Chevron** company brand

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2 February 2005
IO-25

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## APPLICATIONS

Chevron Clarity Hydraulic Oils AW are designed for use in mobile and stationary hydraulic vane-, piston , and gear-type pumps.

The antiwear performance of these oils makes them especially suited for high performance industrial applications utilizing axial piston pumps where pressures may exceed 5000 psi.

The zinc-free formula makes it perfectly suited for applications involving yellow metals found in axial piston pumps.

They are well suited for applications situated in environmentally sensitive areas.

Chevron Clarity Hydraulic Oils AW have shown excellent performance in applications involving servo-valves using multimetal components.

The ashless formulation of Chevron Clarity Hydraulic Oils AW passes the acute aquatic toxicity (LC-50) criteria adopted by the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency.

Chevron Clarity Hydraulic Oils AW meet the requirements of:

- **Denison** HF-0, HF-2
- **Cincinnati Machine** P 68 (ISO 32), P-70 (ISO 46), P 69 (ISO 68)
- **Vickers** for use in M-2950-S (mobile) and I-286-S (stationary) hydraulic systems. Passes Vickers 35VQ25 pump test.

Chevron Clarity Hydraulic Oils AW is registered with NSF and is acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

## TYPICAL TEST DATA

| **ISO Grade** | **32** | **46** | **68** |
|---|---|---|---|
| *Product Number* | *230342* | *230341* | *230340* |
| *MSDS Number* | *6691* | *6691* | *6691* |
| AGMA Grade | — | 1 | 2 |
| API Gravity | 32.8 | 31.9 | 31.8 |
| Viscosity, Kinematic<br>cSt at 40°C<br>cSt at 100°C | <br>33.6<br>5.6 | <br>46.0<br>6.8 | <br>64.6<br>8.5 |
| Viscosity, Saybolt<br>SUS at 100°F<br>SUS at 210°F | <br>173<br>45.0 | <br>237<br>49.0 | <br>334<br>54.8 |
| Viscosity Index | 104 | 101 | 102 |
| Flash Point,°C(°F) | 222(432) | 224(435) | 224(435) |
| Pour Point, °C(°F) | -33(-27) | -30(-22) | -30(-22) |
| Oxidation Stability<br>Hours to 2.0 mg KOH/g acid number, modified ASTM D 943 | >18,000 | >18,000 | >18,000 |

Typical test data are average values only. Minor variations which do not affect product performance are to be expected in normal manufacturing.

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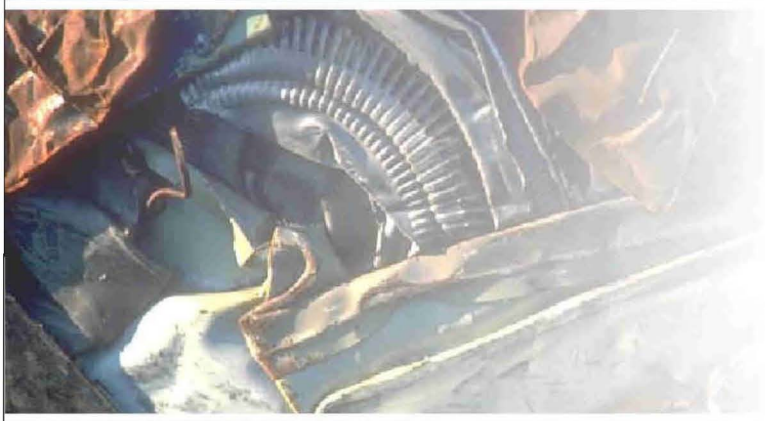

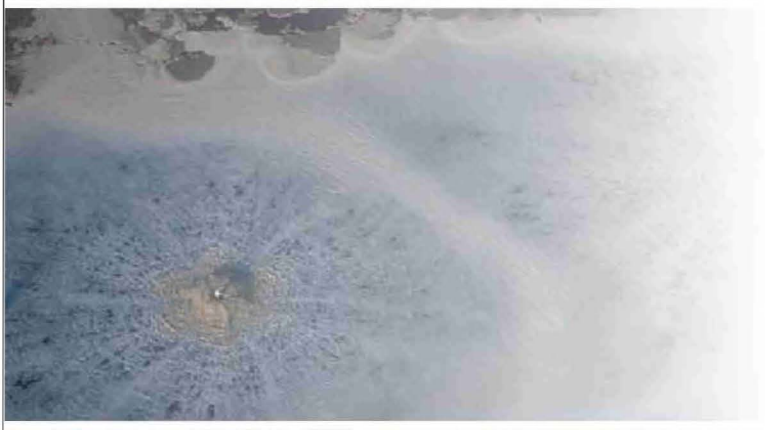

# *Progress Report – Second Quarter 2008*
## *Brix Maritime Company*
## *9030 NW St. Helens Road*
## *Portland, Oregon*
## *ECSI No. 2364*

***Prepared for***
***Brix Maritime Company***

***July 15, 2008***
***15634-00/Task 3***

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*Delivering smarter solutions*

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Delivering smarter solutions

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***Prepared for***
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***July 15, 2008***
***15634-00/Task 3***

Prepared by
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## CONTENTS


| | Page |
|---|---|
| **1.0 INTRODUCTION** | 1 |
| **2.0 ACTIONS TAKEN DURING THE SECOND QUARTER 2008** | 1 |
| **3.0 ACTIONS SCHEDULED FOR THE THIRD QUARTER 2008** | 2 |
| **4.0 DATA GENERATED IN THE SECOND QUARTER 2008** | 2 |
| ***4.1 Groundwater Monitoring*** | 2 |
| **5.0 SUMMARY OF PROBLEMS AND RESOLUTIONS** | 3 |


## TABLES


1 Hydrology Data
2 Total Petroleum Hydrocarbons in Groundwater
3 Polynuclear Aromatic Hydrocarbons
4 Detectable Volatile Organic Compounds in Groundwater


## FIGURES


1 Site Location Map
2 Well Location and Potentiometric Surface (May 23, 2008)



**APPENDIX A**
**FIELD ACTIVITIES DOCUMENTATION**

**APPENDIX B**
**ANAYTICAL TESTING PROGRAM, QUALITY ASSURANCE REVIEW, AND ANALYTICAL LABORATORY REPORT**





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**PROGRESS REPORT – SECOND QUARTER 2008**
**BRIX MARITIME COMPANY**
**9030 NW ST. HELENS ROAD**
**PORTLAND, OREGON**
**ECSI NO. 2364**

## 1.0 INTRODUCTION

This report documents environmental activities completed from April 1, 2008, through June 30, 2008 (Second Quarter 2008) at the Brix Maritime site in Portland, Oregon (Figure 1). The report was prepared in accordance with Section II(H) of the Oregon Department of Environmental Quality (DEQ) Voluntary Agreement for Remedial Investigation and Source Control Measures, No. LQDVC-NWR-02-03. The following items are discussed in this report.

- Actions Taken During the Second Quarter 2008;
- Actions Scheduled for Third Quarter 2008;
- Data Generated During Second Quarter 2008; and
- Summaries of Problems and Resolutions.

## 2.0 ACTIONS TAKEN DURING SECOND QUARTER 2008

- The First Quarter 2008 progress report was submitted to the DEQ on April 15, 2008.
- Water levels were measured in monitoring wells MW-1 through MW-7, and the River Staff Gauge on May 23, 2008.
- Groundwater samples were collected from monitoring wells MW-1 through MW-7 on May 23, 2008. The samples were received by ESC for chemical analyses on May 28, 2008.
- The EPA extended the response date for the CERCLA Section 104(e) First Request for Information to August 18, 2008. Preparation of Brix's response continued during the Second Quarter 2008.



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## 3.0 ACTIONS SCHEDULED FOR THIRD QUARTER 2008

- Water levels will be measured in monitoring wells MW-1 through MW-7 and at the River Staff Gauge.
- Groundwater samples will be collected from monitoring wells MW-1, MW-3, and MW-4 and submitted for chemical analyses.
- The Progress Report - Second Quarter 2008 (this report) will be submitted to the DEQ.
- Pending the occurrence of a first flush storm event, on-site stormwater discharge samples will be collected and submitted for chemical analyses.
- The response to EPA's CERCLA Section 104(e) First Request for Information is being prepared and will be submitted to EPA during the Third Quarter 2008.
- The source control evaluation and preparation of the remedial investigation report are underway and will continue during the Third Quarter 2008.

## 4.0 DATA GENERATED DURING SECOND QUARTER 2008

### *4.1 Groundwater Monitoring*

Second quarter 2008 groundwater monitoring activities were conducted on May 23, 2008. The results of these activities and analytical results are discussed below.

#### *4.1.1 Hydrology Data and Potentiometric Surface*

Table 1 presents depth to groundwater and groundwater elevation data relative to the 1988 North American Vertical Datum (NAVD 88). A petroleum-like odor was observed in monitoring well MW-1. A slight petroleum-like sheen was noted in purge water from wells MW-1 and MW-3 and a biological-like residue was observed in well MW-3. No measureable (i.e., thickness greater than 0.01 foot) non-aqueous phase liquid (NAPL) was in the wells.

The bank of the Willamette River was examined for petroleum hydrocarbon seeps or sheen. Petroleum hydrocarbon seeps or sheen were not observed along or adjacent to the riverbank.



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Figure 2 presents groundwater elevations and potentiometric surface contours from the May 23, 2008 measurement event. The apparent shallow groundwater flow direction is to the east toward the Willamette River, consistent with previous observations.

### *4.1.2 Groundwater Sampling*

Groundwater samples were collected from monitoring wells MW-1 through MW-7. A description of field sampling procedures, field parameter data, and copies of field sampling data sheets are presented in Appendix A.

### *4.1.3 Groundwater Analytical Testing*

The groundwater samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline by Northwest Method NWTPH-Gx, diesel and heavy oil range TPH by Northwest Method NWTPH-Dx, polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270-SIM, and volatile organic compounds (VOCs) by EPA Method 8260B. The analytical results are presented in Tables 2 through 4. Laboratory documentation is included in Appendix B.

### *4.1.4 Data Validation*

A review of the sampling and laboratory records did not identify any apparent discrepancies between samples collected in the field and those analyzed in the laboratory. The analytical data have been reviewed and the data are of a suitable quality for the purposes of this investigation. Appendix B documents the results of the analytical data quality assurance review and includes a copy of the analytical laboratory report.

## 5.0 SUMMARY OF PROBLEMS AND RESOLUTIONS

No problems were encountered during this reporting period.



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**Table 1 - Hydrology Data**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well Number (Elevation) | Measurement Date | Screened Interval In Feet | Depth to Groundwater In Feet | Groundwater Above Base of Screen In Feet | Groundwater Elevation In Feet | Comments |
|---|---|---|---|---|---|---|
| MW-1 (41.81) | 28-Feb-03 | 35.1 - 20.1 | 18.89 | 3.21 | 22.92 | |
| | 31-Mar-03 | 35.1 - 20.1 | 19.43 | 2.67 | 22.38 | |
| | 29-Apr-03 | 35.1 - 20.1 | 19.69 | 2.41 | 22.12 | |
| | 22-May-03 | 35.1 - 20.1 | 20.22 | 1.88 | 21.59 | |
| | 7-Jul-03 | 35.1 - 20.1 | 21.08 | 1.02 | 20.73 | |
| | 30-Jul-03 | 35.1 - 20.1 | 21.13 | 0.97 | 20.68 | |
| | 28-Aug-03 | 35.1 - 20.1 | 21.24 | 0.86 | 20.57 | |
| | 30-Sep-03 | 35.1 - 20.1 | 21.15 | 0.95 | 20.66 | |
| | 16-Oct-03 | 35.1 - 20.1 | 21.10 | 1.00 | 20.71 | |
| | 3-Dec-03 | 35.1 - 20.1 | 21.06 | 1.04 | 20.75 | |
| | 26-Dec-03 | 35.1 - 20.1 | 20.46 | 1.64 | 21.35 | |
| | 30-Jan-04 | 35.1 - 20.1 | 19.01 | 3.09 | 22.80 | |
| | 4-Mar-04 | 35.1 - 20.1 | 19.60 | 2.50 | 22.21 | |
| | 29-Apr-04 | 35.1 - 20.1 | 20.91 | 1.19 | 20.90 | |
| | 27-May-04 | 35.1 - 20.1 | 21.13 | 0.97 | 20.68 | |
| | 6-Jul-04 | 35.1 - 20.1 | 21.22 | 0.88 | 20.59 | |
| | 26-Jul-04 | 35.1 - 20.1 | 21.28 | 0.82 | 20.53 | |
| | 29-Oct-04 | 35.1 - 20.1 | 21.25 | 0.85 | 20.56 | |
| | 25-Feb-05 | 35.1 - 20.1 | 20.81 | 1.29 | 21.00 | |
| | 5-May-05 | 35.1 - 20.1 | 20.63 | 1.47 | 21.18 | |
| | 2-Aug-05 | 35.1 - 20.1 | 21.18 | 0.92 | 20.63 | |
| | 29-Sep-05 | 35.1 - 20.1 | 21.21 | 0.89 | 20.60 | |
| | 22-Nov-05 | 35.1 - 20.1 | 20.78 | 1.32 | 21.03 | |
| | 16-Feb-06 | 35.1 - 20.1 | 18.10 | 4.00 | 23.71 | |
| | 9-May-06 | 35.1 - 20.1 | 20.71 | 1.39 | 21.10 | |
| | 31-Aug-06 | 35.1 - 20.1 | 21.22 | 0.88 | 20.59 | |
| | 28-Dec-06 | 35.1 - 20.1 | 18.36 | 3.74 | 23.45 | |
| | 16-Feb-07 | 35.1 - 20.1 | 19.70 | 2.40 | 22.11 | |
| | 30-May-07 | 35.1 - 20.1 | 20.92 | 1.18 | 20.89 | Slight petroleum-like odor |
| | 16-Aug-07 | 35.1 - 20.1 | 21.19 | 0.91 | 20.62 | Strong petroleum-like odor |
| | 12-Nov-07 | 35.1 - 20.1 | 20.93 | 1.17 | 20.88 | Strong petroleum-like odor |
| | 28-Feb-08 | 35.1 - 20.1 | 19.06 | 3.04 | 22.75 | Strong petroleum-like odor |
| | 23-May-08 | 35.1 - 20.1 | 20.70 | 1.40 | 21.11 | Strong petroleum-like odor w/sheen |
| MW-2 (42.13) | 28-Feb-03 | 32.9 - 17.9 | 19.88 | 4.72 | 22.25 | |
| | 31-Mar-03 | 32.9 - 17.9 | 20.36 | 4.24 | 21.77 | |
| | 29-Apr-03 | 32.9 - 17.9 | 20.64 | 3.96 | 21.49 | |
| | 22-May-03 | 32.9 - 17.9 | 21.06 | 3.54 | 21.07 | |
| | 7-Jul-03 | 32.9 - 17.9 | 22.17 | 2.43 | 19.96 | |
| | 30-Jul-03 | 32.9 - 17.9 | 22.50 | 2.10 | 19.63 | |
| | 28-Aug-03 | 32.9 - 17.9 | 22.84 | 1.76 | 19.29 | |
| | 30-Sep-03 | 32.9 - 17.9 | 23.07 | 1.53 | 19.06 | |
| | 16-Oct-03 | 32.9 - 17.9 | 23.06 | 1.54 | 19.07 | |
| | 3-Dec-03 | 32.9 - 17.9 | 22.54 | 2.06 | 19.59 | |
| | 26-Dec-03 | 32.9 - 17.9 | 21.58 | 3.02 | 20.55 | |
| | 30-Jan-04 | 32.9 - 17.9 | 20.05 | 4.55 | 22.08 | |
| | 4-Mar-04 | 32.9 - 17.9 | 20.57 | 4.03 | 21.56 | |
| | 29-Apr-04 | 32.9 - 17.9 | 21.89 | 2.71 | 20.24 | |
| | 27-May-04 | 32.9 - 17.9 | 22.29 | 2.31 | 19.84 | |
| | 6-Jul-04 | 32.9 - 17.9 | 22.70 | 1.90 | 19.43 | |
| | 26-Jul-04 | 32.9 - 17.9 | 22.85 | 1.75 | 19.28 | |
| | 29-Oct-04 | 32.9 - 17.9 | 22.90 | 1.70 | 19.23 | |
| | 25-Feb-05 | 32.9 - 17.9 | 22.20 | 2.40 | 19.93 | |
| | 5-May-05 | 32.9 - 17.9 | 21.73 | 2.87 | 20.40 | |
| | 2-Aug-05 | 32.9 - 17.9 | 22.48 | 2.12 | 19.65 | |
| | 29-Sep-05 | 32.9 - 17.9 | 22.90 | 1.70 | 19.23 | |

**Please refer to notes at end of table.**

**Table 1 - Hydrology Data**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well Number (Elevation) | Measurement Date | Screened Interval In Feet | Depth to Groundwater In Feet | Groundwater Above Base of Screen In Feet | Groundwater Elevation In Feet | Comments |
|---|---|---|---|---|---|---|
| MW-2 cont. (42.13) | 22-Nov-05 | 32.9 - 17.9 | 22.07 | 2.53 | 20.06 | |
| | 16-Feb-06 | 32.9 - 17.9 | 19.24 | 5.36 | 22.89 | |
| | 9-May-06 | 32.9 - 17.9 | 21.65 | 2.95 | 20.48 | |
| | 31-Aug-06 | 32.9 - 17.9 | 22.88 | 1.72 | 19.25 | |
| | 28-Dec-06 | 32.9 - 17.9 | 19.56 | 5.04 | 22.57 | |
| | 16-Feb-07 | 32.9 - 17.9 | 20.48 | 4.12 | 21.65 | |
| | 30-May-07 | 32.9 - 17.9 | 21.75 | 2.85 | 20.38 | |
| | 16-Aug-07 | 32.9 - 17.9 | 22.63 | 1.97 | 19.50 | Slight petroleum-like odor |
| | 12-Nov-07 | 32.9 17.9 | 22.65 | 1.95 | 19.48 | Slight petroleum-like sheen |
| | 28-Feb-08 | 32.9 17.9 | 20.56 | 4.04 | 21.57 | |
| | 23-May-08 | 32.9 17.9 | 21.53 | 3.07 | 20.60 | |
| MW-3 (41.93) | 29-Jul-02 | 32.9 - 17.9 | 22.91 | 1.39 | 19.02 | |
| | 22-Aug-02 | 32.9 - 17.9 | 23.50 | 0.80 | 18.43 | Estimated 0.02 feet of product |
| | 30-Sep-02 | 32.9 - 17.9 | 23.37 | 0.93 | 18.56 | Estimated 0.02 feet of product |
| | 30-Oct-02 | 32.9 - 17.9 | 23.68 | 0.62 | 18.25 | DTP = 23.49 (0.19 foot thick) |
| | 27-Nov-02 | 32.9 - 17.9 | 23.30 | 1.00 | 18.63 | DTP = 23.16 (0.14 foot thick) |
| | 30-Dec-02 | 32.9 - 17.9 | 21.99 | 2.31 | 19.94 | Sheen noted on probe |
| | 28-Feb-03 | 32.9 - 17.9 | 19.75 | 4.55 | 22.18 | Sheen noted on probe |
| | 31-Mar-03 | 32.9 - 17.9 | 20.24 | 4.06 | 21.69 | No oil noted on probe |
| | 29-Apr-03 | 32.9 - 17.9 | 20.50 | 3.80 | 21.43 | No oil noted on probe |
| | 22-May-03 | 32.9 - 17.9 | 20.94 | 3.36 | 20.99 | No oil noted on probe |
| | 7-Jul-03 | 32.9 - 17.9 | 22.21 | 2.09 | 19.72 | No oil noted on probe |
| | 30-Jul-03 | 32.9 - 17.9 | 22.62 | 1.68 | 19.31 | No oil noted on probe |
| | 28-Aug-03 | 32.9 - 17.9 | 22.95 | 1.35 | 18.98 | Sheen noted on probe |
| | 30-Sep-03 | 32.9 - 17.9 | 23.15 | 1.15 | 18.78 | DTP = 23.04 (0.11 foot thick) |
| | 16-Oct-03 | 32.9 - 17.9 | 22.40 | 1.90 | 19.53 | No oil noted on probe |
| | 3-Dec-03 | 32.9 - 17.9 | 22.21 | 2.09 | 19.72 | Sheen noted on probe |
| | 26-Dec-03 | 32.9 - 17.9 | 21.44 | 2.86 | 20.49 | No oil noted on probe |
| | 30-Jan-04 | 32.9 - 17.9 | 19.80 | 4.50 | 22.13 | No oil noted on probe |
| | 4-Mar-04 | 32.9 - 17.9 | 20.41 | 3.89 | 21.52 | No oil noted on probe |
| | 29-Apr-04 | 32.9 - 17.9 | 21.82 | 2.48 | 20.11 | No oil noted on probe |
| | 27-May-04 | 32.9 - 17.9 | 22.25 | 2.05 | 19.68 | No oil noted on probe |
| | 6-Jul-04 | 32.9 - 17.9 | 22.66 | 1.64 | 19.27 | No oil noted on probe |
| | 26-Jul-04 | 32.9 - 17.9 | 22.91 | 1.39 | 19.02 | DTP = 22.89 (0.02 foot thick) |
| | 29-Oct-04 | 32.9 - 17.9 | 22.29 | 2.01 | 19.64 | Sheen noted on probe |
| | 25-Feb-05 | 32.9 - 17.9 | 22.03 | 2.27 | 19.90 | No oil noted on probe |
| | 5-May-05 | 32.9 - 17.9 | 21.55 | 2.75 | 20.40 | No oil noted on probe |
| | 2-Aug-05 | 32.9 - 17.9 | 22.32 | 1.98 | 19.63 | DTP = 22.31 (0.01 foot thick) |
| | 29-Sep-05 | 32.9 - 17.9 | 22.37 | 1.93 | 19.58 | Sheen noted on probe |
| | 22-Nov-05 | 32.9 - 17.9 | 21.97 | 2.33 | 19.98 | Sheen noted on probe |
| | 16-Feb-06 | 32.9 - 17.9 | 19.12 | 5.18 | 22.83 | No oil noted on probe |
| | 9-May-06 | 32.9 - 17.9 | 21.52 | 2.78 | 20.43 | No oil noted on probe |
| | 31-Aug-06 | 32.9 - 17.9 | Dry | -- | -- | Product present in end cap |
| | 28-Dec-06 | 32.9 - 17.9 | 19.35 | 4.95 | 22.60 | |
| | 16-Feb-07 | 32.9 - 17.9 | 20.38 | 3.92 | 21.57 | Sheen/strong petroleum-like odor |
| | 30-May-07 | 32.9 - 17.9 | 21.75 | 2.55 | 20.20 | |
| | 16-Aug-07 | 32.9 - 17.9 | 22.70 | 1.60 | 19.25 | Trace of Free Product (<0.01 foot) |
| | 12-Nov-07 | 32.9 17.9 | 23.35 | 0.95 | 18.60 | DTP = 23.34 (0.01 foot thick) |
| | 28-Feb-08 | 32.9 17.9 | 19.93 | 4.37 | 22.02 | Slight petroleum-like sheen |
| | 23-May-08 | 32.9 17.9 | 21.43 | 2.87 | 20.52 | Biological residue observed |
| MW-4 (23.55) | 29-Jul-02 | 19.4 - 9.4 | 11.62 | 2.88 | 11.93 | |
| | 22-Aug-02 | 19.4 - 9.4 | 11.77 | 2.73 | 11.78 | |
| | 30-Sep-02 | 19.4 - 9.4 | 11.94 | 2.56 | 11.61 | |
| | 30-Oct-02 | 19.4 - 9.4 | 12.06 | 2.44 | 11.49 | |

**Please refer to notes at end of table.**

**Table 1 - Hydrology Data**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well Number (Elevation) | Measurement Date | Screened Interval In Feet | Depth to Groundwater In Feet | Groundwater Above Base of Screen In Feet | Groundwater Elevation In Feet | Comments |
|---|---|---|---|---|---|---|
| MW-4 cont. (23.55) | 27-Nov-02 | 19.4 - 9.4 | 11.85 | 2.65 | 11.70 | |
| | 30-Dec-02 | 19.4 - 9.4 | 10.24 | 4.26 | 13.31 | |
| | 28-Feb-03 | 19.4 - 9.4 | 4.34 | 10.16 | 19.21 | |
| | 31-Mar-03 | 19.4 - 9.4 | 4.59 | 9.91 | 18.96 | |
| | 29-Apr-03 | 19.4 - 9.4 | 5.46 | 9.04 | 18.09 | |
| | 22-May-03 | 19.4 - 9.4 | 8.59 | 5.91 | 14.96 | |
| | 7-Jul-03 | 19.4 - 9.4 | 10.69 | 3.81 | 12.86 | |
| | 30-Jul-03 | 19.4 - 9.4 | 11.03 | 3.47 | 12.52 | |
| | 28-Aug-03 | 19.4 - 9.4 | 11.40 | 3.10 | 12.15 | |
| | 30-Sep-03 | 19.4 - 9.4 | 11.74 | 2.76 | 11.81 | |
| | 16-Oct-03 | 19.4 - 9.4 | 11.40 | 3.10 | 12.15 | |
| | 3-Dec-03 | 19.4 - 9.4 | 10.59 | 3.91 | 12.96 | |
| | 26-Dec-03 | 19.4 - 9.4 | 9.50 | 5.00 | 14.05 | |
| | 30-Jan-04 | 19.4 - 9.4 | 5.41 | 9.09 | 18.14 | |
| | 4-Mar-04 | 19.4 - 9.4 | 9.05 | 5.45 | 14.50 | |
| | 29-Apr-04 | 19.4 - 9.4 | 11.00 | 3.50 | 12.55 | |
| | 27-May-04 | 19.4 - 9.4 | 10.89 | 3.61 | 12.66 | |
| | 6-Jul-04 | 19.4 - 9.4 | 11.26 | 3.24 | 12.29 | |
| | 26-Jul-04 | 19.4 - 9.4 | 11.56 | 2.94 | 11.99 | |
| | 29-Oct-04 | 19.4 - 9.4 | 11.06 | 3.44 | 12.49 | |
| | 25-Feb-05 | 19.4 - 9.4 | 10.60 | 3.90 | 12.95 | |
| | 5-May-05 | 19.4 - 9.4 | 9.55 | 4.95 | 14.00 | |
| | 2-Aug-05 | 19.4 - 9.4 | 10.95 | 3.55 | 12.60 | |
| | 29-Sep-05 | 19.4 - 9.4 | 11.19 | 3.31 | 12.36 | |
| | 22-Nov-05 | 19.4 - 9.4 | 10.85 | 3.65 | 12.70 | |
| | 16-Feb-06 | 19.4 - 9.4 | 8.30 | 6.20 | 15.25 | |
| | 16-Mar-06 | 19.4 - 9.4 | 8.45 | 6.05 | 15.10 | |
| | 9-May-06 | 19.4 - 9.4 | 8.13 | 6.37 | 15.42 | |
| | 31-Aug-06 | 19.4 - 9.4 | 11.47 | 3.03 | 12.08 | |
| | 28-Dec-06 | 19.4 - 9.4 | 4.64 | 9.86 | 18.91 | |
| | 16-Feb-07 | 19.4 - 9.4 | 6.71 | 7.79 | 16.84 | Slight petroluem-like odor |
| | 30-May-07 | 19.4 - 9.4 | 10.01 | 4.49 | 13.54 | |
| | 16-Aug-07 | 19.4 - 9.4 | 11.10 | 3.40 | 12.45 | Petroleum odor |
| | 12-Nov-07 | 19.4 9.4 | 11.05 | 3.45 | 12.50 | Slight sheen |
| | 28-Feb-08 | 19.4 9.4 | 3.61 | 10.89 | 19.94 | |
| | 23-May-08 | 19.4 9.4 | 3.70 | 10.80 | 19.85 | |
| MW-5 (41.66) | 28-Feb-03 | 34.9 - 19.9 | 19.45 | 2.65 | 22.21 | |
| | 31-Mar-03 | 34.9 - 19.9 | 19.99 | 2.11 | 21.67 | |
| | 29-Apr-03 | 34.9 - 19.9 | 20.25 | 1.85 | 21.41 | |
| | 22-May-03 | 34.9 - 19.9 | 20.75 | 1.35 | 20.91 | |
| | 7-Jul-03 | 34.9 - 19.9 | 21.93 | 0.17 | 19.73 | Insufficient water to collect sample |
| | 30-Jul-03 | 34.9 - 19.9 | 22.08 | 0.02 | 19.58 | Dry |
| | 28-Aug-03 | 34.9 - 19.9 | 22.08 | 0.02 | 19.58 | Dry |
| | 30-Sep-03 | 34.9 - 19.9 | 22.13 | -0.03 | 19.53 | Dry |
| | 16-Oct-03 | 34.9 - 19.9 | 22.10 | 0.00 | 19.56 | Insufficient water to collect sample |
| | 3-Dec-03 | 34.9 - 19.9 | 22.13 | -0.03 | 19.53 | Dry |
| | 26-Dec-03 | 34.9 - 19.9 | 21.35 | 0.75 | 20.31 | |
| | 30-Jan-04 | 34.9 - 19.9 | 19.59 | 2.51 | 22.07 | |
| | 4-Mar-04 | 34.9 - 19.9 | 20.16 | 1.94 | 21.50 | |
| | 29-Apr-04 | 34.9 - 19.9 | 21.67 | 0.43 | 19.99 | Insufficient water to collect sample |
| | 27-May-04 | 34.9 - 19.9 | 21.99 | 0.11 | 19.67 | Water level below screen (dry) |
| | 6-Jul-04 | 34.9 - 19.9 | 21.98 | 0.12 | 19.68 | Water level below screen (dry) |
| | 26-Jul-04 | 34.9 - 19.9 | Dry | -- | -- | |
| | 29-Oct-04 | 34.9 - 19.9 | 22.00 | 0.10 | 19.66 | Water level below screen (dry) |
| | 25-Feb-05 | 34.9 - 19.9 | 21.85 | 0.25 | 19.81 | Water level below screen (dry) |

**Please refer to notes at end of table.**

**Table 1 - Hydrology Data**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well Number (Elevation) | Measurement Date | Screened Interval In Feet | Depth to Groundwater In Feet | Groundwater Above Base of Screen In Feet | Groundwater Elevation In Feet | Comments |
|---|---|---|---|---|---|---|
| MW-5 cont. | 5-May-05 | 34.9 - 19.9 | 21.41 | 0.69 | 20.25 | |
| (41.66) | 2-Aug-05 | 34.9 - 19.9 | 22.01 | 0.09 | 19.65 | Water level below screen (dry) |
| | 29-Sep-05 | 34.9 - 19.9 | 22.01 | 0.09 | 19.65 | Water level below screen (dry) |
| | 22-Nov-05 | 34.9 - 19.9 | 22.00 | 0.10 | 19.66 | Water level below screen (dry) |
| | 16-Feb-06 | 34.9 - 19.9 | 18.91 | 3.19 | 22.75 | |
| | 9-May-06 | 34.9 - 19.9 | 21.35 | 0.75 | 20.31 | |
| | 31-Aug-06 | 34.9 - 19.9 | Dry | -- | -- | Water level below screen (dry) |
| | 28-Dec-06 | 34.9 - 19.9 | 19.10 | 3.00 | 22.56 | |
| | 16-Feb-07 | 34.9 - 19.9 | 20.30 | 1.80 | 21.36 | Strong petroleum-like odor |
| | 30-May-07 | 34.9 - 19.9 | 21.68 | 0.42 | 19.98 | |
| | 16-Aug-07 | 34.9 - 19.9 | 21.93 | 0.17 | 19.73 | Water level below screen (dry) |
| | 12-Nov-07 | 34.9 - 19.9 | 21.95 | 0.15 | 19.71 | Water level below screen (dry) |
| | 28-Feb-08 | 34.9 - 19.9 | 19.78 | 2.32 | 21.88 | Slight petroleum-like odor |
| | 23-May-08 | 34.9 - 19.9 | 21.27 | 0.83 | 20.39 | |
| MW-6 | 7-Jul-03 | 31.4 - 16.4 | 20.26 | 4.84 | 21.40 | |
| (41.21) | 30-Jul-03 | 31.4 - 16.4 | 20.57 | 4.53 | 21.09 | Sheen/slight petroleum-like odor |
| | 28-Aug-03 | 31.4 - 16.4 | 21.02 | 4.08 | 20.64 | |
| | 30-Sep-03 | 31.4 - 16.4 | 21.02 | 4.08 | 20.64 | |
| | 16-Oct-03 | 31.4 - 16.4 | 20.93 | 4.17 | 20.73 | |
| | 3-Dec-03 | 31.4 - 16.4 | 21.53 | 3.57 | 20.13 | |
| | 26-Dec-03 | 31.4 - 16.4 | 19.24 | 5.86 | 22.42 | |
| | 30-Jan-04 | 31.4 - 16.4 | 17.70 | 7.40 | 23.96 | |
| | 4-Mar-04 | 31.4 - 16.4 | 18.16 | 6.94 | 23.50 | |
| | 29-Apr-04 | 31.4 - 16.4 | 19.66 | 5.44 | 22.00 | |
| | 27-May-04 | 31.4 - 16.4 | 20.17 | 4.93 | 21.49 | |
| | 6-Jul-04 | 31.4 - 16.4 | 20.71 | 4.39 | 20.95 | |
| | 26-Jul-04 | 31.4 - 16.4 | 21.23 | 3.87 | 20.43 | |
| | 29-Oct-04 | 31.4 - 16.4 | 21.48 | 3.62 | 20.18 | |
| | 25-Feb-05 | 31.4 - 16.4 | 19.78 | 5.32 | 21.88 | |
| | 5-May-05 | 31.4 - 16.4 | 19.19 | 5.91 | 22.47 | |
| | 2-Aug-05 | 31.4 - 16.4 | 20.57 | 4.53 | 21.09 | |
| | 29-Sep-05 | 31.4 - 16.4 | 21.25 | 3.85 | 20.41 | |
| | 22-Nov-05 | 31.4 - 16.4 | 20.58 | 4.52 | 21.08 | |
| | 16-Feb-06 | 31.4 - 16.4 | 17.45 | 7.65 | 24.21 | |
| | 9-May-06 | 31.4 - 16.4 | 19.16 | 5.94 | 22.50 | |
| | 31-Aug-06 | 31.4 - 16.4 | 21.25 | 3.85 | 20.41 | |
| | 28-Dec-06 | 31.4 - 16.4 | 17.18 | 7.92 | 24.48 | |
| | 16-Feb-07 | 31.4 - 16.4 | 19.06 | 6.04 | 22.60 | |
| | 30-May-07 | 31.4 - 16.4 | 19.80 | 5.30 | 21.86 | |
| | 16-Aug-07 | 31.4 - 16.4 | 21.28 | 3.82 | 20.38 | |
| | 12-Nov-07 | 31.4 16.4 | 21.68 | 3.42 | 19.98 | |
| | 28-Feb-08 | 31.4 16.4 | 20.23 | 4.87 | 21.43 | |
| | 23-May-08 | 31.4 16.4 | 19.43 | 5.67 | 22.23 | |
| MW-7 | 7-Jul-03 | 31.5 - 16.5 | 21.21 | 3.59 | 19.74 | |
| (40.95) | 30-Jul-03 | 31.5 - 16.5 | 21.76 | 3.04 | 19.19 | |
| | 28-Aug-03 | 31.5 - 16.5 | 22.32 | 2.48 | 18.63 | |
| | 30-Sep-03 | 31.5 - 16.5 | 22.67 | 2.13 | 18.28 | |
| | 16-Oct-03 | 31.5 - 16.5 | 22.72 | 2.08 | 18.23 | |
| | 3-Dec-03 | 31.5 - 16.5 | 22.90 | 1.90 | 18.05 | |
| | 26-Dec-03 | 31.5 - 16.5 | 20.32 | 4.48 | 20.63 | |
| | 30-Jan-04 | 31.5 - 16.5 | 18.26 | 6.54 | 22.69 | |
| | 4-Mar-04 | 31.5 - 16.5 | 18.96 | 5.84 | 21.99 | |
| | 29-Apr-04 | 31.5 - 16.5 | 20.49 | 4.31 | 20.46 | |
| | 27-May-04 | 31.5 - 16.5 | 21.10 | 3.70 | 19.85 | |

**Please refer to notes at end of table.**

**Table 1 - Hydrology Data**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well Number (Elevation) | Measurement Date | Screened Interval In Feet | Depth to Groundwater In Feet | Groundwater Above Base of Screen In Feet | Groundwater Elevation In Feet | Comments |
|---|---|---|---|---|---|---|
| MW-7 cont. (40.95) | 6-Jul-04 | 31.5 - 16.5 | 21.98 | 2.82 | 18.97 | |
| | 26-Jul-04 | 31.5 - 16.5 | 22.40 | 2.40 | 18.55 | |
| | 29-Oct-04 | 31.5 - 16.5 | 22.99 | 1.81 | 17.96 | |
| | 25-Feb-05 | 31.5 - 16.5 | 20.80 | 4.00 | 20.15 | |
| | 5-May-05 | 31.5 - 16.5 | 20.20 | 4.60 | 20.75 | |
| | 2-Aug-05 | 31.5 - 16.5 | 21.60 | 3.20 | 19.35 | |
| | 29-Sep-05 | 31.5 - 16.5 | 22.47 | 2.33 | 18.48 | |
| | 22-Nov-05 | 31.5 - 16.5 | 22.05 | 2.75 | 18.90 | |
| | 16-Feb-06 | 31.5 - 16.5 | 18.31 | 6.49 | 22.64 | |
| | 9-May-06 | 31.5 - 16.5 | 20.01 | 4.79 | 20.94 | |
| | 31-Aug-06 | 31.5 - 16.5 | 22.42 | 2.38 | 18.53 | |
| | 28-Dec-06 | 31.5 - 16.5 | 17.93 | 6.87 | 23.02 | |
| | 16-Feb-07 | 31.5 - 16.5 | 20.02 | 4.78 | 20.93 | |
| | 30-May-07 | 31.5 - 16.5 | 20.73 | 4.07 | 20.22 | |
| | 16-Aug-07 | 31.5 - 16.5 | 22.48 | 2.32 | 18.47 | |
| | 12-Nov-07 | 31.5 - 16.5 | 23.47 | 1.33 | 17.48 | |
| | 28-Feb-08 | 31.5 - 16.5 | 21.12 | 3.68 | 19.83 | |
| | 23-May-08 | 31.5 16.5 | 20.21 | 4.59 | 20.74 | |
| MW-8 (41.73) | 25-Feb-05 | 24.8 - 19.8 | 21.15 | 1.05 | 20.58 | |
| | 5-May-05 | 24.8 - 19.8 | 21.81 | 0.39 | 19.92 | |
| | 2-Aug-05 | 24.8 - 19.8 | 21.19 | 1.01 | 20.54 | |
| | 29-Sep-05 | 24.8 - 19.8 | 21.33 | 0.87 | 20.40 | |
| | 22-Nov-05 | 24.8 - 19.8 | 20.63 | 1.57 | 21.10 | |
| | 16-Feb-06 | 24.8 - 19.8 | 19.39 | 2.81 | 22.34 | |
| | 9-May-06 | 24.8 - 19.8 | 20.17 | 2.03 | 21.56 | |
| | 31-Aug-06 | 24.8 - 19.8 | 21.34 | 0.86 | 20.39 | |
| | 28-Dec-06 | 24.8 - 19.8 | 18.74 | 3.46 | 22.99 | |
| | 16-Feb-07 | 24.8 - 19.8 | -- | -- | -- | Not measured - well damaged |
| | 30-May-07 | 24.8 - 19.8 | -- | -- | -- | Not measured - well damaged |
| | 16-Aug-07 | 24.8 - 19.8 | -- | -- | -- | Not measured - well damaged |
| | 12-Nov-07 | -- -- | -- | -- | -- | Well abandoned |

**Please refer to notes at end of table.**

**Table 1 - Hydrology Data**
**Brix Maritime**
**Portland, Oregon**

| River Stage Gauge | Measurement Date | Guage Reading In Feet | Comments |
|---|---|---|---|
| | 30-Oct-02 | 2.8 | |
| | 27-Nov-02 | 3.1 | |
| | 30-Dec-02 | 7.5 | |
| | 28-Feb-03 | 6.1 | |
| | 31-Mar-03 | 8.0 | |
| | 29-Apr-03 | 8.0 | |
| | 22-May-03 | 6.5 | |
| | 7-Jul-03 | 4.0 | |
| | 30-Jul-03 | 3.5 | |
| | 28-Aug-03 | 3.3 | |
| | 30-Sep-03 | 2.1 | |
| | 16-Oct-03 | 2.2 | |
| | 3-Dec-03 | 3.5 | |
| | 26-Dec-03 | 6.7 | |
| | 30-Jan-04 | 11.0 | |
| | 4-Mar-04 | 5.0 | |
| | 29-Apr-04 | 4.0 | |
| | 27-May-04 | 6.6 | |
| | 6-Jul-04 | 5.5 | |
| | 26-Jul-04 | 2.8 | |
| | 29-Oct-04 | 3.8 | |
| | 25-Feb-05 | 4.0 | |
| | 5-May-05 | 5.0 | |
| | 2-Aug-05 | 4.4 | |
| | 25-Aug-05 | 3.6 | |
| | 29-Sep-05 | 1.0 | |
| | 22-Nov-05 | 3.4 | |
| | 16-Feb-06 | 5.9 | |
| | 9-May-06 | 9.0 | |
| | 31-Aug-06 | 2.8 | |
| | 28-Dec-06 | 7.9 | |
| | 16-Feb-07 | 6.0 | |
| | 30-May-07 | 6.5 | |
| | 16-Aug-07 | 5.5 | |
| | 12-Nov-07 | 4.0 | |
| | 28-Feb-08 | 5.1 | |
| | 23-May-08 | 14.8 | |

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**Notes:**

1. Monitoring well elevations are top of casing referenced to North American Vertical Dautum 88 (NAVD88).
2. Screened intervals and groundwater elevations are referenced to NAVD88.
3. DTP = Depth to Liquid Phase Petroleum Hydrocarbons.
4. -- = Not measured or not applicable.
5. July 2002 to May 2006 monitoring activities were performed by Anchor Environmental.
6. The river gauge is marked in 1-foot increments, field measurements are estimated to the nearest 0.1 feet.

**Table 2 - Total Petroleum Hydrocarbons in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well Identification | Sampling Date | Concentrations in Milligrams Per Liter (mg/L) | | |
|---|---|---|---|---|
| | | DRO | RRO | GRO |
| MW-1 | 7-Jul-03 | **0.27** L | 0.50 U | **1.3** H |
| | 16-Oct-03 | **0.73** L | 0.50 U | **8.1** H |
| | 30-Jan-04 | **0.60** L | 0.50 U | **4.0** H |
| | 29-Apr-04 | **0.71** L | 0.05 U | **5.8** H |
| | 26-Jul-04 | **0.92** L | 0.50 U | **9.3** Y |
| | 29-Oct-04 | **1.10** L | 0.50 U | **8.8** Y |
| | 25-Feb-05 | **1.40** L | 0.50 U | **12.0** DY |
| | 5-May-05 | **0.88** L | 0.54 U | **12.0** DY |
| | 2-Aug-05 | **1.00** L | 0.52 U | **14.0** DY |
| | 22-Nov-05 | **1.30** Z | 0.53 U | **13.0** D |
| | 16-Feb-06 | **0.73** L | 0.53 U | **12.0** Y |
| | 9-May-06 | **0.65** Z | 0.53 U | **14.0** DY |
| | 31-Aug-06 | 0.25 U | 0.50 U | **1.1** Y |
| | 28-Dec-06 | 0.22 J | 0.02 U | **1.3** Y |
| | 16-Feb-07 | 0.270 U | 0.53 U | **0.45** Y |
| | 30-May-07 | **0.350** L | 0.50 U | **3.50** Y |
| | 16-Aug-07 | **0.320** L | 0.50 U | **2.30** Y |
| | 12-Nov-07 | **0.54** | **0.30** | **1.3** |
| | 28-Feb-08 | 0.10 UJ3 | 0.25 UJ3 | **0.13** |
| | 23-May-08 | **0.11** | 0.25 U | 0.10 U |
| MW-1 Dup | 29-Apr-04 | **0.79** L | 0.50 U | **5.7** H |
| | 26-Jul-04 | **0.93** L | 0.50 U | **9.3** Y |
| | 25-Feb-05 | **1.30** L | 0.50 U | **11.0** DY |
| | 5-May-05 | **0.85** L | 0.52 U | **12.0** DY |
| | 31-Aug-06 | **0.30** L | 0.50 U | **1.5** Y |
| | 28-Dec-06 | 0.20 J | 0.02 U | **1.1** Y |
| | 16-Aug-07 | **0.410** L | 0.50 U | **1.6** Y |
| | 12-Nov-07 | **0.46** | **0.31** | **0.86** |
| MW-2 | 7-Jul-03 | 0.25 U | 0.50 U | 0.05 U |
| | 16-Oct-03 | 0.27 U | 0.53 U | 0.05 U |
| | 30-Jan-04 | 0.25 U | 0.50 U | 0.05 U |
| | 29-Apr-04 | 0.25 U | 0.50 U | 0.05 U |
| | 26-Jul-04 | 0.25 U | 0.50 U | 0.25 U |
| | 29-Oct-04 | 0.25 U | 0.50 U | 0.25 U |
| | 5-May-05 | 0.27 U | 0.53 U | 0.25 U |
| | 22-Nov-05 | 0.28 U | 0.55 U | 0.25 U |
| | 9-May-06 | 0.28 U | 0.56 U | 0.25 U |
| | 28-Dec-06 | 0.025 J | 0.042 J | 0.25 U |
| | 16-Aug-07 | 0.25 U | 0.5 U | 0.25 U |
| | 12-Nov-07 | 0.059 J | 0.17 J | 0.10 U |
| | 23-May-08 | 0.10 U | 0.11 J | 0.10 U |
| MW-3 | 30-Jul-02 | **3.4** Y | **1.6** O | -- |
| | 7-Jul-03 | **1.9** Y | **8.5** O | 0.05 U |
| | 16-Oct-03 | **0.92** Y | **1.8** O | **0.059** Y |
| | 30-Jan-04 | **0.79** Y | **0.6** O | 0.05 U |
| | 29-Apr-04 | **0.7** Y | **0.77** O | 0.05 U |
| | 26-Jul-04 | **2.5** Y | **8.3** O | 0.25 U |
| | 29-Oct-04 | **1.2** Y | **3.1** O | 0.25 U |
| | 25-Feb-05 | **1.2** Y | **1.8** O | 0.25 U |
| | 5-May-05 | **1.0** Z | **1.2** Z | 0.25 U |
| | 2-Aug-05 | **1.2** Y | **4.0** OJ | 0.25 U |
| | 22-Nov-05 | **0.78** Z | **0.77** Z | 0.25 U |
| | 9-May-06 | **0.34** Z | 0.56 U | 0.25 U |

**Please refer to notes at end of table.**

**Table 2 - Total Petroleum Hydrocarbons in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well Identification | Sampling Date | Concentrations in Milligrams Per Liter (mg/L) | | |
|---|---|---|---|---|
| | | DRO | RRO | GRO |
| MW-3 - cont. | 28-Dec-06 | **0.31** Z | **0.53** Z | 0.026 J |
| | 16-Feb-06 | **0.56** Z | **0.62** Z | 0.25 U |
| | 16-Feb-07 | 0.27 U | 0.53 U | 0.250 U |
| | 30-May-07 | **0.680** Z | **0.930** Z | 0.250 U |
| | 12-Nov-07 | **3.3** | **4.4** | 0.56 J |
| | 28-Feb-08 | 0.49 J3 | 0.094 JJ3 | 0.041 J |
| | 23-May-08 | **1.1** | **7.1** | 0.10 U |
| MW-3-Dup | 2-Aug-05 | **1.1** Z | **1.7** OJ | 0.25 U |
| | 22-Nov-05 | **0.67** Z | **0.71** Z | 0.25 U |
| | 16-Feb-06 | **0.54** Z | 0.55 U | 0.25 U |
| MW-4 | 29-Jul-02 | 0.26 U | 0.52 U | -- |
| | 7-Jul-03 | 0.25 U | **0.52** O | 0.05 U |
| | 16-Oct-03 | 0.25 U | 0.50 U | **0.65** Y |
| | 30-Jan-04 | 0.25 U | 0.50 U | 0.05 U |
| | 29-Apr-04 | 0.25 U | 0.50 U | 0.05 U |
| | 26-Jul-04 | 0.25 U | 0.50 U | 0.25 U |
| | 29-Oct-04 | **0.73** Z | **1.0** Z | 0.25 U |
| | 25-Feb-05 | 0.25 U | 0.50 U | 0.25 U |
| | 5-May-05 | 0.26 U | 0.51 U | 0.25 U |
| | 2-Aug-05 | 0.28 U | 0.55 U | 0.25 U |
| | 22-Nov-05 | 0.27 U | 0.53 U | 0.25 U |
| | 16-Feb-06 | **0.54** Y | 0.55 U | **1.1** Y |
| | 16-Mar-06 | 0.28 U | 0.55 U | 0.25 U |
| | 9-May-06 | 0.25 U | 0.50 U | 0.3 U |
| | 31-Aug-06 | 0.25 U | 0.50 U | 0.25 U |
| | 28-Dec-06 | 0.043 J | 0.035 J | 0.032 J |
| | 16-Feb-07 | 0.25 U | 0.50 U | 0.25 U |
| | 30-May-07 | 0.25 U | 0.50 U | 0.25 U |
| | 16-Aug-07 | 0.25 U | **0.640** Z | **0.31** Y |
| | 12-Nov-07 | **0.14** | 0.22 J | **0.62** |
| | 28-Feb-08 | **0.20** J3 | 0.25 UJ3 | 0.10 U |
| | 23-May-08 | 0.057 J | 0.25 U | 0.10 U |
| MW-4-Dup | 7-Jul-03 | 0.25 U | 0.50 U | 0.05 U |
| | 16-Oct-03 | 0.25 U | 0.50 U | **0.66** Y |
| | 16-Oct-03 | 0.25 U | 0.50 U | **0.66** Y |
| | 29-Oct-04 | **0.63** Z | **0.96** Z | 0.25 U |
| MW-5 | 30-Jan-04 | **0.62** L | 0.50 U | **1.4** H |
| | 5-May-05 | **1.3** L | 0.55 U | **5.2** Y |
| | 16-Feb-06 | 0.27 U | 0.54 U | **0.89** H |
| | 9-May-06 | **0.70** Z | 0.59 U | **2.8** Y |
| | 28-Dec-06 | **0.41** Y | 0.036 J | **2.1** Y |
| | 16-Feb-07 | **0.44** Z | 0.5 U | **1.8** Y |
| | 30-May-07 | **1.20** L | 0.5 U | **4.8** Y |
| | 28-Feb-08 | **0.25** J3 | 0.25 UJ3 | **0.35** |
| | 23-May-08 | **0.86** | 0.25 U | **0.79** |
| MW-5-Dup | 30-Jan-04 | **0.63** L | 0.50 U | **1.5** H |
| | 9-May-06 | **0.68** Z | 0.56 U | **3.0** Y |
| MW-6 | 7-Jul-03 | 0.25 U | 0.50 U | 0.05 U |
| | 16-Oct-03 | 0.27 U | 0.53 U | 0.05 U |
| | 30-Jan-04 | 0.25 U | 0.50 U | 0.05 U |
| | 29-Apr-04 | 0.25 U | 0.50 U | 0.05 U |

**Please refer to notes at end of table.**

**Table 2 - Total Petroleum Hydrocarbons in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well Identification | Sampling Date | Concentrations in Milligrams Per Liter (mg/L) | | |
|---|---|---|---|---|
| | | DRO | RRO | GRO |
| MW-6 - cont. | 26-Jul-04 | 0.25 U | 0.50 U | 0.25 U |
| | 29-Oct-04 | 0.25 U | 0.50 U | 0.25 U |
| | 5-May-05 | 0.28 U | 0.55 U | 0.25 U |
| | 22-Nov-05 | 0.28 U | **0.65** O | 0.25 U |
| | 9-May-06 | 0.27 U | 0.53 U | 0.25 U |
| | 28-Dec-06 | 0.036 J | 0.034 J | 0.25 U |
| | 16-Aug-07 | 0.25 U | 0.50 U | 0.25 U |
| | 12-Nov-07 | 0.10 U | 0.25 U | 0.10 U |
| | 23-May-08 | 0.10 U | 0.25 U | 0.10 U |
| MW-7 | 7-Jul-03 | 0.25 U | 0.50 U | 0.05 U |
| | 16-Oct-03 | 0.27 U | 0.53 U | 0.05 U |
| | 30-Jan-04 | 0.25 U | 0.50 U | 0.05 U |
| | 29-Apr-04 | 0.25 U | 0.50 U | 0.05 U |
| | 26-Jul-04 | 0.25 U | 0.50 U | 0.25 U |
| | 29-Oct-04 | 0.25 U | 0.50 U | 0.25 U |
| | 5-May-05 | 0.27 U | 0.54 U | 0.25 U |
| | 22-Nov-05 | 0.27 U | 0.53 U | 0.25 U |
| | 9-May-06 | 0.27 U | 0.53 U | 0.25 U |
| | 28-Dec-06 | 0.019 J | 0.036 J | 0.25 U |
| | 16-Aug-07 | 0.25 U | 0.5 U | 0.25 U |
| | 12-Nov-07 | 0.10 U | 0.25 U | 0.10 U |
| | 23-May-08 | 0.10 U | 0.25 U | 0.10 U |
| MW-8 | 25-Feb-05 | **1.0** Y | **1.3** O | 0.25 U |

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**Notes:**

1. DRO = Diesel range organics.
2. RRO = Residual range organics.
3. GRO = Gasoline range organics.
4. Reportable concentrations are shown in **Bold** type.
5. D = The reported result is from a dilution.
6. U = Analyte not detected at or above the indicated reporting limit.
7. J = Associated value is below the lowest calibration point and is estimated.
8. J3 = The associated QC batch was outside the control range for precision.
9. O = The fingerprint resembles oil, but does not match the calibration standard.
10. L = The fingerprint resembles a petroleum product, but the elution pattern indicates the presence of lighter weight constituents than the calibration standard.
11. H = The fingerprint resembles a petroleum product, but the elution pattern indicates the presence of heavier weight constituents than the calibration standard.
12. Y = The fingerprint resembles a petroleum product in the correct carbon range, but the elution pattern does not match the calibration standard.
13. Z = The chromatic fingerprint does not resemble a petroleum product.

**Table 3 - Polynuclear Aromatic Hydrocarbons in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Sample Location and Date | Concentrations in Micrograms per Liter (µg/L) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low Molecular Weight Polynuclear Aromatic Hydrocarbons | | | | | | | | | High Molecular Weight Polynuclear Aromatic Hydrocarbons | | | | | | | | | | |
| | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Dibenzofuran | Fluorene | Phenanthrene | Naphthalene | **Total LMPAHs** | Benz(a)anthracene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Benzo(g,h,i)pyrene | Dibenz(a,h)anthracene | Chrysene | Fluoranthene | Ideno(1,2,3-cd)pyrene | Pyrene | **Total HMPAHs** |
| ***MW-1*** | | | | | | | | | | | | | | | | | | | | |
| 28-Feb-03 | 9.0 | 0.43 | 0.19 | 0.53 | 0.120 | 0.36 | 1.8 | 23 D | 35 | 2.1 | 1.4 | 1.1 | 2.0 | 1.5 | 0.17 | 2.7 | 4.3 | 1.5 | 13.0 | 29.8 |
| 7-Jul-03 | 7.9 | 0.38 | 0.020 U | 0.11 | 0.067 | 0.27 | 0.56 | 23 D | 32 | 0.22 | 0.088 | 0.098 | 0.11 | 0.028 | 0.020 U | 0.27 | 0.5 | 0.023 | 1.2 | 2.5 |
| 16-Oct-03 | 42 D | 0.34 | 0.020 U | 0.065 | 0.085 | 0.24 | 0.42 | 160 D | 203 | 0.16 | 0.073 | 0.096 | 0.097 | 0.043 | 0.020 U | 0.24 | 0.3 | 0.036 | 0.9 | 1.9 |
| 30-Jan-04 | 40 D | 0.17 | 0.150 U | 0.073 | 0.032 | 0.11 | 0.16 | 110 D | 151 | 0.20 | 0.047 | 0.053 | 0.064 | 0.020 U | 0.020 U | 0.24 | 0.39 | 0.020 U | 1.6 | 2.59 |
| 29-Apr-04 | 46 D | 0.30 | 0.020 U | 0.079 | 0.062 | 0.19 | 0.34 | 170 D | 217 | 0.12 | 0.049 | 0.061 | 0.066 | 0.021 | 0.020 U | 0.16 | 0.33 | 0.020 U | 0.76 | 1.57 |
| 26-Jul-04 | 51 D | 0.34 | 0.190 U | 0.068 | 0.073 | 0.23 | 0.36 | 170 D | 222 | 0.13 | 0.044 | 0.047 | 0.056 | 0.019 U | 0.019 U | 0.15 | 0.31 | 0.019 U | 0.80 | 1.54 |
| 29-Oct-04 | 42 D | 0.33 | 0.020 U | 0.070 | 0.085 | 0.23 | 0.32 | 160 D | 203 | 0.130 | 0.084 | 0.082 | 0.110 | 0.055 | 0.020 U | 0.15 | 0.21 | 0.044 | 0.60 | 1.47 |
| 25-Feb-05 | 46 D | 0.33 | 0.10 | 0.090 | 0.093 | 0.28 | 0.44 | 150 D | 197 | 0.096 | 0.038 | 0.034 | 0.046 | 0.020 U | 0.020 U | 0.11 | 0.27 | 0.020 U | 0.50 | 1.09 |
| 5-May-05 | 56 D | 0.34 | 0.083 Ui | 0.061 | 0.075 | 0.25 | 0.34 | 210 D | 267 | 0.11 | 0.036 | 0.038 | 0.042 | 0.020 U | 0.020 U | 0.14 | 0.38 | 0.020 U | 0.69 | 1.44 |
| 2-Aug-05 | 46 D | 0.32 | 0.071 Ui | 0.062 | 0.084 | 0.26 | 0.35 | 180 D | 227 | 0.079 | 0.034 | 0.021 | 0.037 | 0.020 U | 0.020 U | 0.11 | 0.26 | 0.020 UJ | 0.54 | 1.14 |
| 22-Nov-05 | 69 D | 0.39 | 0.087 Ui | 0.056 | 0.086 | 0.29 | 0.43 | 200 D | 270 | 0.079 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.11 | 0.35 | 0.020 U | 0.65 | 1.19 |
| 16-Feb-06 | 52 D | 0.18 | 0.10 Ui | 0.150 | 0.041 | 0.21 | 0.61 | 200 D | 253 | 0.14 | 0.028 | 0.022 | 0.022 | 0.020 U | 0.020 U | 0.23 | 1.00 | 0.020 U | 2.70 | 4.14 |
| 9-May-06 | 57 D | 0.30 | 0.073 Ui | 0.036 | 0.048 | 0.19 | 0.43 | 220 D | 278 | 0.078 | 0.021 | 0.022 | 0.020 U | 0.020 U | 0.020 U | 0.13 | 0.37 | 0.020 U | 0.79 | 1.41 |
| 31-Aug-06 | 0.95 | 0.31 | 0.043 Ui | 0.082 | 0.061 | 0.25 | 0.46 | 2.1 | 4.2 | 0.13 | 0.044 | 0.043 | 0.051 | 0.020 U | 0.020 U | 0.17 | 0.38 | 0.020 U | 0.85 | 1.67 |
| 28-Dec-06 | 1.2 | 0.098 | 0.039 Ui | 0.12 | 0.020 U | 0.061 | 0.25 | 1.3 | 3.0 | 0.19 | 0.032 | 0.029 | 0.030 | 0.0061 J | 0.020 U | 0.25 | 0.85 | 0.0063 J | 2.5 | 3.88 |
| 16-Feb-07 | 0.70 | 0.10 | 0.020 U | 0.030 | 0.020 U | 0.060 | 0.24 | 2.4 | 3.5 | 0.12 | 0.050 | 0.051 | 0.020 U | 0.0200 U | 0.020 U | 0.16 | 0.27 | 0.020 U | 0.91 | 1.56 |
| 30-May-07 | 18 D | 0.37 | 0.041 Ui | 0.13 | 0.053 | 0.21 | 0.80 | 13 D | 32.6 | 0.21 | 0.21 | 0.079 | 0.19 | 0.099 | 0.020 U | 0.27 | 0.61 | 0.087 | 1.3 | 3.06 |
| 16-Aug-07 | 0.59 | 0.28 | 0.037 | 0.089 | 0.081 | 0.24 | 0.51 | 0.77 | 2.60 | 0.36 | 0.43 | 0.12 | 0.36 | 0.20 | 0.028 | 0.40 | 0.59 | 0.21 | 1.50 | 4.20 |
| 12-Nov-07 | 5.6 | 0.30 | 0.050 U | 0.084 | 0.050 U | 0.26 | 0.39 | 2.7 J4 | 9.33 | 0.059 | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.067 | 0.26 | 0.050 U | 0.63 | 1.02 |
| 28-Feb-08 | 0.27 | 0.023 J | 0.010 J | 0.040 J | -- | 0.015 J | 0.039 J | 0.65 | 0.92 | 0.090 | 0.032 J | 0.056 | 0.025 J | 0.0074 J | 0.0048 J | 0.096 | 0.10 | 0.0076 J | 0.81 | 1.15 |
| 23-May-08 | 5.4 | 0.25 | 0.041 J | 0.13 | -- | 0.15 | 0.45 | 4.0 | 10.4 | 0.10 | 0.026 J | 0.012 J | 0.023 J | 0.056 U | 0.056 U | 0.11 | 0.40 | 0.056 U | 0.74 | 1.35 |
| ***MW-1 Dup*** | | | | | | | | | | | | | | | | | | | | |
| 29-Apr-04 | 40 D | 0.23 | 0.020 U | 0.057 | 0.057 | 0.14 | 0.27 | 150 D | 191 | 0.084 | 0.029 | 0.036 | 0.038 | 0.20 U | 0.20 U | 0.11 | 0.24 | 0.20 U | 0.57 | 1.11 |
| 26-Jul-04 | 49 D | 0.33 | 0.019 Ui | 0.067 | 0.074 | 0.24 | 0.36 | 170 D | 220 | 0.13 | 0.041 | 0.043 | 0.052 | 0.019 U | 0.019 U | 0.15 | 0.33 | 0.019 U | 0.85 | 1.60 |
| 25-Feb-05 | 53 D | 0.38 | 0.088 Ui | 0.099 | 0.100 | 0.32 | 0.53 | 170 D | 224 | 0.11 | 0.038 | 0.044 | 0.048 | 0.020 U | 0.020 U | 0.12 | 0.31 | 0.020 U | 0.57 | 1.24 |
| 5-May-05 | 49 D | 0.31 | 0.072 Ui | 0.061 | 0.060 | 0.19 | 0.32 | 190 D | 240 | 0.081 | 0.020 U | 0.021 | 0.020 | 0.020 U | 0.020 U | 0.11 | 0.34 | 0.020 U | 0.64 | 1.21 |
| 31-Aug-06 | 1.3 | 0.32 | 0.044 Ui | 0.087 | 0.065 | 0.26 | 0.50 | 1.7 | 4.2 | 0.13 | 0.037 | 0.034 | 0.039 | 0.020 U | 0.020 U | 0.16 | 0.40 | 0.020 U | 0.88 | 1.68 |
| 28-Dec-06 | 1.2 | 0.091 | 0.043 Ui | 0.12 | 0.020 U | 0.077 | 0.24 | 1.3 | 3.0 | 0.18 | 0.031 | 0.030 | 0.030 | 0.0061 J | 0.0051 J | 0.24 | 0.83 | 0.0066 J | 2.4 | 3.74 |
| 16-Aug-07 | 2.4 | 0.370 | 0.045 | 0.12 | 0.090 | 0.29 | 0.67 | 1.5 | 5.5 | 0.57 | 0.800 | 0.270 | 0.740 | 0.45 | 0.057 | 0.60 | 0.78 | 0.45 | 1.8 | 6.52 |
| 12-Nov-07 | 2.1 | 0.28 | 0.050 U | 0.084 | 0.050 U | 0.19 | 0.37 | 1.5 | 4.5 | 0.087 | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.075 | 0.28 | 0.050 U | 0.62 | 1.06 |
| ***MW-2*** | | | | | | | | | | | | | | | | | | | | |
| 28-Feb-03 | 0.020 U | 0.020 U | 0.023 | 0.032 | 0.020 U | 0.020 U | 0.15 | 0.082 | 0.29 | 0.11 | 0.14 | 0.13 | 0.19 | 0.22 | 0.02 U | 0.17 | 0.29 | 0.20 | 0.42 | 1.87 |
| 7-Jul-03 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 D | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 16-Oct-03 | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.031 | 0.023 | 0.05 | 0.023 | 0.036 | 0.035 | 0.022 U | 0.090 | 0.022 U | 0.042 | 0.070 | 0.073 | 0.091 | 0.46 |
| 30-Jan-04 | 0.022 | 0.020 U | 0.110 UB | 0.034 | 0.020 U | 0.020 U | 0.020 U | 0.037 | 0.09 | 0.020 | 0.020 | 0.023 | 0.035 | 0.020 | 0.020 U | 0.020 U | 0.022 | 0.022 | 0.020 | 0.18 |
| 29-Apr-04 | 0.020 U | 0.020 U | 0.02 U | 0.036 | 0.019 U | 0.020 U | 0.020 U | 0.023 | 0.06 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 26-Jul-04 | 0.03 | 0.024 | 0.13 | 0.11 | 0.020 U | 0.023 | 0.31 | 0.18 | 0.81 | 0.31 | 0.48 | 0.42 | 0.73 | 1.10 J | 0.10 | 0.48 | 0.62 | 0.88 | 0.87 | 5.99 |
| 29-Oct-04 | 0.020 U | 0.020 U | 0.021 | 0.032 | 0.020 U | 0.020 U | 0.026 | 0.026 | 0.11 | 0.043 | 0.080 | 0.061 | 0.10 | 0.18 | 0.020 U | 0.060 | 0.084 | 0.14 | 0.090 | 0.84 |
| 5-May-05 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 D | 0.020 U | 0.022 | 0.030 | 0.022 | 0.042 | 0.059 | 0.020 U | 0.026 | 0.037 | 0.053 | 0.045 | 0.34 |
| 29-Sep-05 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 D | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.029 | 0.03 |
| 22-Nov-05 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 D | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 9-May-06 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 D | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 28-Dec-06 | 0.025 | 0.020 U | 0.0031 J | 0.020 U | 0.020 U | 0.020 U | 0.0066 J | 0.041 | 0.066 | 0.0064 J | 0.0051 J | 0.020 U | 0.0066 J | 0.0071 J | 0.0058 J | 0.0061 J | 0.012 J | 0.0064 J | 0.014 J | 0.020 U |
| 16-Aug-07 | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.023 | 0.023 | 0.0190 U | 0.0190 U | 0.019 U | 0.0190 U | 0.0190 U | 0.0190 U | 0.0190 U | 0.019 U | 0.0190 U | 0.077 | 0.077 |
| 12-Nov-07 | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.25 | 0.250 U | 0.0500 U | 0.0500 U | 0.0500 U | 0.0500 U | 0.0500 U | 0.0500 U | 0.0500 U | 0.0500 U | 0.0500 U | 0.0500 U | 0.050 U |
| 23-May-08 | 0.300 U | 0.061 U | 0.061 U | 0.061 U | -- | 0.061 U | 0.061 U | 0.029 J | 0.029 J | 0.061 U | 0.061 U | 0.061 U | 0.061 U | 0.061 U | 0.061 U | 0.061 U | 0.061 U | 0.061 U | 0.061 U | 0.061 U |

**Please refer to notes at end of table.**

**Table 3 - Polynuclear Aromatic Hydrocarbons in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Sample Location and Date | Concentrations in Micrograms per Liter (µg/L) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low Molecular Weight Polynuclear Aromatic Hydrocarbons | | | | | | | | | High Molecular Weight Polynuclear Aromatic Hydrocarbons | | | | | | | | | | |
| | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Dibenzofuran | Fluorene | Phenanthrene | Naphthalene | **Total LMPAHs** | Benz(a)anthracene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Benzo(g,h,i)pyrene | Dibenz(a,h)anthracene | Chrysene | Fluoranthene | Ideno(1,2,3-cd)pyrene | Pyrene | **Total HMPAHs** |
| ***MW-3*** | | | | | | | | | | | | | | | | | | | | |
| 30-Jul-02 | 0.28 | 0.26 | 0.020 U | 0.020 U | 0.025 | 0.09 | 0.11 | 0.36 | 1.13 | 0.020 U | 0.022 | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.020 U | 0.056 | 0.022 U | 0.058 | 0.14 |
| 28-Feb-03 | 1.8 | 1.3 | 0.22 | 0.55 | 0.11 | 1 | 2.9 | 0.75 | 8.63 | 2.1 D | 1.8 D | 1.7 D | 2.3 D | 1.9 D | 0.20 U | 2.3 D | 4.9 | 1.5 D | 7.6 D | 26.1 |
| 7-Jul-03 | 0.34 | 0.16 | 0.020 U | 0.039 | 0.020 U | 0.1 | 0.2 | 0.34 | 1.18 | 0.06 | 0.038 | 0.065 | 0.053 | 0.039 | 0.20 U | 0.071 | 0.22 | 0.041 | 0.22 | 0.81 |
| 16-Oct-03 | 0.31 | 0.21 | 0.020 U | 0.022 | 0.021 | 0.11 | 0.14 | 0.34 | 1.15 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.077 | 0.020 U | 0.082 | 0.16 |
| 30-Jan-04 | 0.15 | 0.04 | 0.140 UB | 0.032 | 0.020 U | 0.037 | 0.06 | 0.11 | 0.43 | 0.022 | 0.020 U | 0.020 U | 0.036 | 0.020 U | 0.020 U | 0.023 | 0.075 | 0.02 | 0.09 | 0.27 |
| 29-Apr-04 | 0.34 | 0.13 | 0.020 U | 0.034 | 0.035 | 0.082 | 0.12 | 0.35 | 1.09 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.08 | 0.020 U | 0.079 | 0.16 |
| 26-Jul-04 | 1.20 D | 0.89 D | 0.38 D | 0.96 D | 0.190 U | 0.84 D | 2.3 D | 0.28 D | 6.85 | 2.3 D | 1.90 U | 1.90 U | 3.0 D | 1.90 D | 1.90 U | 2.6 D | 5.8 D | 1.90 U | 7.2 D | 22.8 |
| 29-Oct-04 | 0.024 | 0.088 | 0.038 | 0.020 U | 0.02 | 0.039 | 0.020 U | 0.040 | 0.25 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.050 | 0.020 U | 0.057 | 0.11 |
| 25-Feb-05 | 0.22 | 0.12 | 0.022 | 0.029 | 0.022 | 0.063 | 0.072 | 0.17 | 0.72 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.06 | 0.020 U | 0.056 | 0.12 |
| 5-May-05 | 0.22 | 0.078 | 0.020 U | 0.021 | 0.021 | 0.054 | 0.068 | 0.082 | 0.54 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 UJ | 0.020 UJ | 0.020 U | 0.058 | 0.020 U | 0.06 | 0.12 |
| 2-Aug-05 | 0.17 | 0.110 | 0.0206 | 0.034 J | 0.024 | 0.071 | 0.092 J | 0.086 | 0.61 | 0.051 J | 0.030 J | 0.066 J | 0.050 J | 0.055 J | 0.020 UJ | 0.067 J | 0.180 J | 0.057 J | 0.210 J | 0.77 |
| 22-Nov-05 | 0.34 | 0.091 | 0.020 U | 0.020 | 0.024 | 0.070 | 0.098 | 0.084 | 0.73 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.053 | 0.020 U | 0.055 | 0.11 |
| 16-Feb-06 | 0.11 | 0.038 | 0.020 U | 0.029 | 0.020 U | 0.032 | 0.10 | 0.034 | 0.34 | 0.021 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.027 | 0.21 | 0.020 U | 0.35 | 0.61 |
| 9-May-06 | 0.30 | 0.070 | 0.020 U | 0.020 U | 0.020 U | 0.055 | 0.099 | 0.048 | 0.50 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.058 | 0.020 U | 0.061 | 0.119 |
| 28-Dec-06 | 0.21 | 0.070 | 0.016 J | 0.024 | 0.014 J | 0.043 | 0.058 | 0.047 | 0.45 | 0.020 J | 0.020 U | 0.020 U | 0.0048 J | 0.020 U | 0.0048 J | 0.025 | 0.11 | 0.020 U | 0.31 | 0.445 |
| 16-Feb-07 | 0.23 | 0.060 | 0.020 U | 0.020 U | 0.020 U | 0.042 | 0.073 | 0.038 | 0.44 | 0.020 U | 0.020 U | 0.020 U | 0.0200 U | 0.020 U | 0.0200 U | 0.020 U | 0.083 | 0.020 U | 0.11 | 0.193 |
| 30-May-07 | 0.39 | 0.076 | 0.020 U | 0.020 U | 0.020 U | 0.054 | 0.12 | 0.061 | 0.70 | 0.020 U | 0.020 U | 0.020 U | 0.0200 U | 0.020 U | 0.0200 U | 0.020 U | 0.065 | 0.020 U | 0.070 | 0.135 |
| 12-Nov-07 | 0.25 J | 0.10 | 0.050 U | 0.050 U | -- | 0.072 | 0.11 | 0.25 U | 0.28 | 0.050 U | 0.050 U | 0.050 U | 0.0500 U | 0.050 U | 0.0500 U | 0.050 U | 0.078 | 0.050 U | 0.095 | 0.173 |
| 28-Feb-08 | 0.11 J | 0.050 U | 0.050 U | 0.031 J | -- | 0.0039 J | 0.0031 J | 0.17 J | 0.32 J | 0.050 U | 0.059 J | 0.048 JJ3 | 0.0028 J | 0.0011 J | 0.0011 J | 0.025 J | 0.0099 J | 0.0029 J | 0.0092 J | 0.159 J |
| 23-May-08 | 0.41 | 0.15 | 0.042 J | 0.087 | -- | 0.11 | 0.28 | 0.10 J | 1.04 | 0.16 | 0.064 | 0.072 | 0.16 | 0.098 | 0.014 J | 0.17 | 0.40 | 0.072 | 0.34 | 1.54 |
| ***MW-3 Dup*** | | | | | | | | | | | | | | | | | | | | |
| 2-Aug-05 | 0.16 | 0.11 | 0.025 | 0.024 J | 0.024 | 0.066 | 0.053 J | 0.088 | 0.55 | 0.020 UJ | 0.020 UJ | 0.020 UJ | 0.020 UJ | 0.020 UJ | 0.020 UJ | 0.020 UJ | 0.056 J | 0.020 UJ | 0.064 J | 0.12 |
| 22-Nov-05 | 0.43 | 0.10 | 0.020 U | 0.025 | 0.027 | 0.072 | 0.11 | 0.086 | 0.85 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.065 | 0.020 U | 0.07 | 0.14 |
| 16-Feb-06 | 0.12 | 0.038 | 0.020 U | 0.03 | 0.020 U | 0.033 | 0.11 | 0.035 | 0.37 | 0.021 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.028 | 0.21 | 0.020 U | 0.36 | 0.62 |
| ***MW-4*** | | | | | | | | | | | | | | | | | | | | |
| 29-Jul-02 | 0.022 U | 0.022 U | 0.51 | 0.022 U | 0.022 U | 0.022 U | 0.043 | 0.039 | 0.59 | 0.022 U | 0.022 U | 0.02 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.033 | 0.022 U | 0.046 | 0.079 |
| 28-Feb-03 | 0.80 | 0.020 U | 0.6 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 18 D | 19.40 | 0.020 U | 0.020 U | 0.02 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.024 | 0.020 U | 0.055 | 0.079 |
| 7-Jul-03 | 0.020 U | 0.020 U | 0.11 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.16 | 0.27 | 0.020 U | 0.020 U | 0.02 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.021 | 0.021 |
| 16-Oct-03 | 0.020 U | 0.020 U | 0.36 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.11 | 0.47 | 0.020 U | 0.020 U | 0.02 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 30-Jan-04 | 0.020 U | 0.053 UB | 0.16 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.074 | 0.23 | 0.020 U | 0.020 U | 0.02 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 29-Apr-04 | 0.020 U | 0.020 U | 0.061 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.093 | 0.15 | 0.020 U | 0.020 U | 0.02 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 26-Jul-04 | 0.019 U | 0.019 U | 0.096 | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.024 | 0.12 | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U |
| 29-Oct-04 | 0.020 U | 0.027 | 0.86 | 0.024 | 0.020 U | 0.020 U | 0.880 Ui | 0.054 | 0.97 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 | 0.020 U | 0.038 | 0.058 |
| 25-Feb-05 | 0.020 U | 0.020 U | 0.11 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.11 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 5-May-05 | 0.020 U | 0.020 U | 0.046 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.05 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 2-Aug-05 | 0.038 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.074 | 0.11 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 22-Nov-05 | 0.020 U | 0.020 U | 0.21 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.21 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.031 U | 0.031 |
| 16-Feb-06 | 12 D | 0.032 Ui | 0.23 | 0.020 U | 0.020 U | 0.064 | 0.020 U | 72 D | 84.29 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 16-Mar-06 | 0.21 | 0.021 U | 0.087 | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 2.8 | 3.10 | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.020 U | 0.021 U |
| 9-May-06 | 0.093 | 0.020 U | 0.076 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.84 | 1.01 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 31-Aug-06 | 0.034 | 0.020 U | 0.029 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.10 | 0.16 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 | 0.020 |
| 28-Dec-06 | 0.010 J | 0.044 | 0.020 U | 0.020 U | 0.020 U | 0.0057 J | 0.0045 J | 0.025 | 0.07 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.0097 J | 0.020 U |
| 16-Feb-07 | 0.020 U | 0.20 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.30 | 0.5 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.023 | 0.023 |
| 30-May-07 | 0.020 U | 0.061 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.02 | 0.08 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.021 | 0.021 |
| 16-Aug-07 | 0.019 U | 0.810 | 0.019 U | 0.019 U | 0.030 | 0.019 U | 0.019 U | 0.049 | 0.89 | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.041 | 0.041 |
| 12-Nov-07 | 0.050 U | 1.0 | 0.050 U | 0.050 U | -- | 0.050 U | 0.050 U | 0.25 U | 1.0 | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U |
| 28-Feb-08 | 0.016 J | 0.021 J | 0.012 J | 0.0045 J | -- | 0.0047 J | 0.0044 J | 0.36 | 0.36 | 0.050 U | 0.0032 J | 0.044 J | 0.027 J | 0.050 U | 0.050 U | 0.022 J | 0.0031 J | 0.0013 J | 0.0097 J | 0.110 J |
| 23-May-08 | 0.10 J | 0.016 J | 0.014 J | 0.041 J | -- | 0.023 J | 0.10 | 0.037 J | 0.10 | 0.022 J | 0.056 U | 0.056 U | 0.056 U | 0.056 U | 0.056 U | 0.012 J | 0.10 | 0.056 U | 0.071 | 0.171 |

**Please refer to notes at end of table.**

**Table 3 - Polynuclear Aromatic Hydrocarbons in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Sample Location and Date | Concentrations in Micrograms per Liter (µg/L) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low Molecular Weight Polynuclear Aromatic Hydrocarbons | | | | | | | | | High Molecular Weight Polynuclear Aromatic Hydrocarbons | | | | | | | | | | |
| | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Dibenzofuran | Fluorene | Phenanthrene | Naphthalene | **Total LMPAHs** | Benz(a)anthracene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Benzo(g,h,i)pyrene | Dibenz(a,h)anthracene | Chrysene | Fluoranthene | Ideno(1,2,3-cd)pyrene | Pyrene | **Total HMPAHs** |
| ***MW-4 Dup*** | | | | | | | | | | | | | | | | | | | | |
| 7-Jul-03 | 0.022 U | **0.11** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | **0.12** | **0.23** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 16-Oct-03 | 0.022 U | **0.40** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | **0.12** | **0.52** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | **0.024** | **0.024** |
| 29-Oct-04 | 0.020 U | **1.100** | **0.023** | **0.030** | **0.020** | 0.020 U | 1.100 Ui | **0.047** | **1.22** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | **0.029** | **0.029** |
| ***MW-5*** | | | | | | | | | | | | | | | | | | | | |
| 28-Feb-03 | **31** D | **1.3** | **0.10** | **0.55** | **0.2** | **1.2** | **2.3** | **19** D | **56** | **0.72** J | **0.44** J | **0.42** J | **0.65** J | **0.52** J | **0.044** J | **0.96** J | **3.1** J | **0.49** J | **4.3** J | **11.6** |
| 30-Jan-04 | **1.5** | **0.6** | 0.02 U | **0.34** | **0.081** | **0.48** | **1.1** | **2.9** | **7.0** | **0.18** | **0.046** | **0.046** | **0.061** | **0.029** | 0.020 U | **0.22** | **1.5** | **0.03** | **1.8** J | **3.9** |
| 5-May-05 | **1.8** D | **2.1** | 0.71 Ui | **1.0** | **0.66** | **3.4** | **7.3** | **5.3** | **22** | **0.099** | **0.021** | **0.021** | **0.028** | **0.023** | 0.020 U | **0.15** | **2.2** | **0.022** | **2.0** | **4.6** |
| 16-Feb-06 | **0.3** | **0.49** | 0.77 Ui | **0.24** | **0.056** | **0.28** | **0.75** | **0.4** | **2.5** | **0.14** | **0.033** | **0.032** | **0.032** | 0.020 U | 0.020 U | **0.2** | **1.3** | 0.020 U | **1.9** | **3.6** |
| 9-May-06 | **0.42** | **1.7** | 0.32 Ui | **0.66** | **0.32** | **1.6** | **4.9** | 1.8 Ui | **9.6** | **0.086** | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | **0.14** | **2.8** | 0.021 U | **2.7** | **5.7** |
| 28-Dec-06 | 0.019 J | **0.34** | 0.058 Ui | **0.16** | **0.055** | **0.22** | **0.61** | 0.24 Ui | **1.4** | **0.077** | 0.018 J | 0.018 J | **0.023** | 0.0088 J | 0.0057 J | **0.11** | **0.85** | 0.0092 J | **1.0** | **2.1** |
| 16-Feb-07 | **0.042** | **1.0** | 0.16 Ui | **0.39** | **0.24** | **0.77** | **1.8** | 0.38 Ui | **4.2** | **0.21** | **0.058** | **0.045** | **0.057** | **0.023** | 0.020 U | **0.30** | **2.4** | 0.020 U | **2.8** | **5.9** |
| 30-May-07 | **0.15** | **4.4** | 0.79 Ui | **1.6** | **1.0** | **4.7** | **8.2** | **1.4** | **21** | **0.33** | **0.26** | **0.092** | **0.25** | **0.15** | 0.020 U | **0.45** | **2.8** | **0.13** | **2.7** | **7.2** |
| 28-Feb-08 | 0.023 J | **0.46** | 0.046 J | **0.34** | -- | **0.46** | **0.73** | 0.025 U | **2.0** | **0.12** | 0.016 J | 0.044 JJ3 | 0.011 J | 0.0037 J | 0.0024 J | **0.11** | **1.2** | 0.0019 J | **1.6** | **3.0** |
| 23-May-08 | 0.29 U | **3.0** | **0.54** | **1.8** | -- | **3.9** | **8.5** | 0.29 U | **17.7** | **0.14** | 0.016 J | 0.0085 J | 0.013 J | 0.057 U | 0.057 U | **0.14** | **4.2** | 0.057 U | **3.4** | **7.9** |
| ***MW-5 Dup*** | | | | | | | | | | | | | | | | | | | | |
| 28-Feb-03 | **31** D | **1.3** | **0.40** | **0.93** | **0.19** | **1.3** | **3.1** | **17** D | **55** | **2.8** J | **2.2** J | **1.9** J | **3.6** J | **2.7** J | **0.27** J | **3.4** J | **6.5** J | **2.5** J | **9.1** J | **35.0** |
| 30-Jan-04 | **1.1** | **0.5** | 0.020 U | **0.24** | **0.057** | **0.32** | **0.8** | **2.1** | **5.1** | **0.14** | **0.035** | **0.041** | **0.050** | **0.024** | 0.020 U | **0.17** | **1.1** | **0.022** | **1.4** | **3.0** |
| 9-May-06 | **0.43** | **1.7** | 0.330 Ui | **0.57** | **0.32** | **1.6** | **4.8** | 1.7 Ui | **9.4** | **0.086** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | **0.15** | **2.7** | 0.020 U | **2.6** | **5.5** |
| ***MW-6*** | | | | | | | | | | | | | | | | | | | | |
| 7-Jul-03 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 16-Oct-03 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 30-Jan-04 | 0.020 U | 0.020 U | **0.042** | 0.020 U | 0.020 U | 0.020 U | **0.025** | 0.020 U | **0.067** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 29-Apr-04 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 26-Jul-04 | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.020 U |
| 29-Oct-04 | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | **0.023** | **0.023** |
| 5-May-05 | **0.027** | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | **0.082** | **0.109** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 22-Nov-05 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 9-May-06 | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | 0.021 U | **0.060** | **0.060** |
| 28-Dec-06 | 0.016 J | **0.040** | 0.020 U | 0.020 U | 0.020 U | 0.011 J | **0.023** | **0.028** | **0.091** | 0.0051 J | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.0045 J | 0.0053 J | 0.020 U | 0.020 U | **0.099** | **0.099** |
| 16-Aug-07 | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | **0.020** | **0.020** | 0.0190 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U |
| 12-Nov-07 | 0.250 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.25 U | 0.250 U | 0.0500 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U |
| 23-May-08 | 0.020 J | 0.059 U | 0.049 J | 0.023 J | -- | 0.059 U | 0.020 J | 0.039 J | 0.151 J | 0.059 U | 0.059 U | 0.059 U | 0.059 U | 0.012 J | 0.059 U | 0.059 U | 0.059 U | 0.0067 J | 0.019 J | 0.0377 J |
| ***MW-7*** | | | | | | | | | | | | | | | | | | | | |
| 7-Jul-03 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 16-Oct-03 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 30-Jan-04 | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 29-Apr-04 | **0.040** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | **0.093** | **0.133** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 26-Jul-04 | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U |
| 29-Oct-04 | **0.041** | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | **0.083** | **0.124** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 5-May-05 | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | **0.047** | **0.047** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 22-Nov-05 | 0.020 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 9-May-06 | 0.021 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.022 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U |
| 28-Dec-06 | 0.014 J | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | **0.028** | **0.028** | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.020 U | 0.005 J | 0.020 U |
| 16-Aug-07 | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | **0.021** | **0.021** | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U | 0.019 U |
| 12-Nov-07 | 0.250 U | 0.500 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.25 UJ4 | 0.250 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U |
| 23-May-08 | 0.030 J | 0.053 U | 0.012 J | 0.0077 J | 0.053 U | 0.053 U | 0.019 J | 0.060 J | 0.129 J | 0.053 U | 0.053 U | 0.053 U | 0.053 U | 0.053 U | 0.053 U | 0.053 U | 0.053 U | 0.053 U | 0.053 U | 0.053 U |

**Please refer to notes at end of table.**

**Table 3 - Polynuclear Aromatic Hydrocarbons in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Sample Location and Date | Concentrations in Micrograms per Liter (µg/L) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low Molecular Weight Polynuclear Aromatic Hydrocarbons | | | | | | | | | High Molecular Weight Polynuclear Aromatic Hydrocarbons | | | | | | | | | | |
| | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Dibenzofuran | Fluorene | Phenanthrene | Naphthalene | **Total LMPAHs** | Benz(a)anthracene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Benzo(g,h,i)pyrene | Dibenz(a,h)anthracene | Chrysene | Fluoranthene | Ideno(1,2,3-cd)pyrene | Pyrene | **Total HMPAHs** |
| ***MW-8*** | | | | | | | | | | | | | | | | | | | | |
| 25-Feb-05 | **0.22** | **0.029** | 0.020 U | **0.037** | 0.020 U | **0.029** | **0.051** | **0.22** | **0.586** | 0.020 U | **0.020** | 0.020 U | **0.024** | **0.029** | 0.020 U | 0.020 U | **0.032** | **0.023** | **0.036** | **0.16** |

F:\DATA\Jobs\15634-00 Brix Maritime\Task 3 Progress Reports\2Q-2008 Rpt\Tables

**Notes:**
1. Reportable concentrations are shown in **Bold** type.
2. U = Analyte not detected at or above the indicated reporting limit.
3. i = The reporting limit is elevated due to matrix interference.
4. D = The reported result is from a dilution.
5. J = Associated value is below the lowest calibration point and is estimated.
6. J3/J4 = Associated batch QC outside the establich QC range for precision (J3) or accuracy (J4).

**Table 4 - Dectectable Volatile Organic Compounds in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Well Number | Sampling Date | Concentrations in Micrograms per Liter (µg/L) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Benzene | Toluene | Ethylbenzene | Total Xylenes | Isopropyl-benzene | n-Propylbenzene | 1,2,4-Trimethylbenzene | 1,3,5-Trimethylbenzene | n-Butylbenzene | sec-Butylbenzene | 4-Isopropyltoluene | tert-Butylbenzene | Naphthalene |
| MW-1 | 28-Feb-03 | 5.7 | 0.71 | 37 | 62 | 19 | 65 D | 140 D | 26 | 21 | 10 | 2.0 U | 2.0 U | 31 |
| MW-1 | 7-Jul-03 | 1.3 | 1.1 | 11 | 20 | 31 | 64 D | 46 | 9.3 | 14 | 8.2 | 2.0 U | 2.0 U | 22 |
| MW-1 | 16-Oct-03 | 32 D | 13 D | 270 D | 470 D | 75 D | 250 D | 1,200 D | 280 D | 150 Ui | 28 D | 10 U | 10 U | 460 D |
| MW-1 | 30-Jan-04 | 4.1 | 0.96 | 78 D | 151 | 36 | 140 D | 510 D | 100 D | 46 | 17 | 2.0 U | 2.0 U | 210 D |
| MW-1 | 29-Apr-04 | 5.3 D | 2.1 D | 120 D | 206 D | 54 D | 150 D | 590 D | 150 D | 43 D | 20 D | 4.0 U | 4.0 U | 250 D |
| MW-1 | 26-Jul-04 | 4.0 D | 1.3 U | 93 D | 149 D | 47 D | 160 D | 610 D | 130 D | 40 D | 18 D | 5.0 U | 5.0 U | 270 JD |
| MW-1 | 29-Oct-04 | 4.0 D | 1.3 U | 82 D | 112 D | 45 D | 140 D | 560 D | 110 D | 39 D | 16 D | 5.0 U | 5.0 U | 230 D |
| MW-1 | 25-Feb-05 | 31 D | 2.7 | 210 D | 246 D | 89 D | 350 D | 870 D | 160 D | 90 D | 39 D | 10 U | 10 U | 470 D |
| MW-1 | 5-May-05 | 16 D | 2.2 D | 170 D | 189 D | 87 D | 260 D | 530 D | 100 D | 140 Ui | 32 D | 8.0 U | 8.0 U | 280 D |
| MW-1 | 2-Aug-05 | 17 | 1.9 | 170 D | 200 D | 69 D | 220 D | 590 D | 140 D | 62 D | 28 D | 3.2 | 2.0 U | 330 D |
| MW-1 | 22-Nov-05 | 22 | 1.7 | 170 D | 190 D | 100 D | 400 D | 780 D | 160 D | 85 D | 50 | 4.0 | 2.2 | 380 D |
| MW-1 | 16-Feb-06 | 15 D | 5.0 U | 150 D | 173 D | 38 D | 170 D | 670 D | 150 D | 53 D | 20 U | 20 U | 20 U | 340 D |
| MW-1 | 9-May-06 | 19 D | 2.5 U | 220 D | 251 D | 78 D | 280 D | 940 D | 210 D | 82 D | 31 D | 10 U | 10 U | 440 D |
| MW-1 | 31-Aug-06 | 0.5 U | 0.5 U | 2.4 | 1.7 | 18 | 36 | 5.1 | 2.0 U | 22 | 11 | 2.0 U | 2.0 U | 2.6 |
| MW-1 | 28-Dec-06 | 0.41 J | 0.12 J | 1.7 | 0.78 | 5.3 | 22 | 1.3 J | 0.17 J | 14 | 5.5 | 2.0 U | 0.26 J | 2.1 |
| MW-1 | 16-Feb-07 | 1.1 | 0.12 J | 4.7 | 1.6 J | 3.6 | 12 | 4.8 | 0.59 J | 5.9 | 1.9 J | 2.0 U | 2.0 U | 2.5 |
| MW-1 | 30-May-07 | 0.5 U | 0.55 | 5.0 | 0.54 | 39 | 130 D | 2.2 | 2.0 U | 45 | 20 | 2.0 U | 2.0 U | 19 |
| MW-1 | 16-Aug-07 | 0.5 U | 0.58 | 2.1 | 1.0 U | 23 | 64 | 2.0 U | 2.0 U | 25 | 14 | 2.0 U | 2.0 U | 2.0 U |
| MW-1 | 12-Nov-07 | 0.39 J | 0.49 J | 6.4 | 3.2 | 27 | 65 | 8.9 | 1.5 | 22 | 13 | 1.0 U | 0.68 J | 8.0 |
| MW-1 | 28-Feb-08 | 0.60 J | 5.0 U | 2.1 | 3.0 U | 1.5 | 5.3 | 2.5 | 1.2 | 1.1 | 0.72 J | 1.0 U | 1.0 U | 2.7 J |
| MW-1 | 23-May-08 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-1Dup | 29-Apr-04 | 4.7 D | 1.9 D | 110 D | 192 D | 52 D | 150 D | 570 D | 140 D | 39 D | 18 D | 4.0 U | 4.0 U | 260 D |
| MW-1Dup | 26-Jul-04 | 3.9 D | 1.3 U | 89 D | 138 D | 46 D | 160 D | 640 D | 120 D | 40 D | 18 D | 5.0 U | 5.0 U | 280 JD |
| MW-1Dup | 5-May-05 | 14 D | 2.1 D | 160 D | 178 D | 88 D | 250 D | 490 D | 96 D | 140 Ui | 31 D | 8.0 U | 8.0 U | 250 D |
| MW-1Dup | 31-Aug-06 | 0.5 U | 0.5 U | 2.0 | 1.23 | 17 | 37 | 2.9 | 2.0 U | 17 | 11 | 2.0 U | 2.0 U | 2.0 U |
| MW-1Dup | 28-Dec-06 | 0.55 | 0.16 J | 2.0 | 0.8 | 6.3 | 26 | 1.3 J | 0.18 J | 17 | 6.7 | 2.0 U | 0.28 J | 2.4 |
| MW-1 Dup | 16-Aug-07 | 0.5 U | 0.5 U | 1.1 | 1.0 U | 17 | 44 | 2.0 U | 2.0 U | 20 | 11 | 2.0 U | 2.0 U | 2.0 U |
| MW-1 Dup | 12-Nov-07 | 1.0 U | 0.35 J | 1.7 | 0.88 J | 13 | 32 | 3.7 | 0.65 J | 12 | 7.2 | 1.0 U | 0.45 J | 2.8 J |
| MW-2 | 28-Feb-03 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 7-Jul-03 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 16-Oct-03 | 0.5 U | 0.5 U | 0.5 U | 0.86 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 30-Jan-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 29-Apr-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 26-Jul-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 29-Oct-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 5-May-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 UJ | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 22-Nov-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 9-May-06 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 28-Dec-06 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 16-Aug-07 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-2 | 12-Nov-07 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-2 | 23-May-08 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-3 | 30-Jul-02 | 0.73 | 14 | 0.51 | 5.5 | 0.5 U | 2.2 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 28-Feb-03 | 0.5 U | 0.63 | 0.5 U | 2.4 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 7-Jul-03 | 0.5 U | 0.80 | 0.5 U | 2.3 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 16-Oct-03 | 0.5 U | 1.9 | 0.51 | 4.0 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 30-Jan-04 | 0.5 U | 0.5 U | 0.5 U | 1.36 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 29-Apr-04 | 0.5 U | 0.5 U | 0.5 U | 2.3 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 26-Jul-04 | 0.5 U | 0.50 | 0.5 U | 2.0 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |

**Please refer to notes at end of table.**

**Table 4 - Dectectable Volatile Organic Compounds in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Well Number | Sampling Date | Concentrations in Micrograms per Liter (µg/L) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Benzene | Toluene | Ethylbenzene | Total Xylenes | Isopropyl-benzene | n-Propylbenzene | 1,2,4-Trimethylbenzene | 1,3,5-Trimethylbenzene | n-Butylbenzene | sec-Butylbenzene | 4-Isopropyltoluene | tert-Butylbenzene | Naphthalene |
| MW-3 | 29-Oct-04 | 0.5 U | 0.5 U | 0.5 U | **2.1** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 25-Feb-05 | 0.5 U | 0.5 U | 0.5 U | **2.3** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 5-May-05 | 0.5 U | 0.5 U | 0.5 U | **2.7** | 2.0 U | 2.0 U | 2.0 UJ | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 2-Aug-05 | 0.5 U | 0.5 U | 0.5 U | **2.4** | 2.0 U | 2.0 U | 2.0 UJ | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 22-Nov-05 | 0.5 U | 0.5 U | 0.5 U | **2.2** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 16-Jan-06 | 0.5 U | 0.5 U | 0.5 U | **1.2** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 9-May-06 | 0.5 U | 0.5 U | 0.5 U | **2.3** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 28-Dec-06 | 0.5 U | 0.11 J | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 16-Feb-07 | 0.5 U | 0.5 U | 0.5 U | **1.5** | 2.0 U | 0.11 J | 0.35 J | 0.15 J | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 30-May-07 | 0.5 U | 0.5 U | 0.5 U | **1.6** | 2.0 U | 2.00 U | 2.00 U | 2.00 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3 | 12-Nov-07 | 1.0 U | 5.0 U | 1.0 U | **1.8** J | 1.0 U | 1.0 U | **0.39** J | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | **0.35** J |
| MW-3 | 28-Feb-08 | 1.0 U | 0.34 J | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-3 | 23-May-08 | 1.0 U | 5.0 U | 1.0 U | 1.8 J | 1.0 U | 1.0 U | 0.57 J | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 0.53 J |
| MW-3Dup | 2-Aug-05 | 0.5 U | 0.5 U | 0.5 U | **2.4** | 2.0 U | 2.0 U | 2.0 UJ | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3Dup | 22-Nov-05 | 0.5 U | 0.5 U | 0.5 U | **2.1** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-3Dup | 16-Jan-06 | 0.5 U | 0.5 U | 0.5 U | **1.2** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 29-Jul-02 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | **2.3** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 28-Feb-03 | **0.76** | 0.5 U | **2.3** | **2.6** | **29** | **35** | **3.8** | **2.2** | **3.1** | 2.0 U | 2.0 U | 2.0 U | **45** |
| MW-4 | 7-Jul-03 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 16-Oct-03 | 0.5 U | 0.5 U | 0.5 U | **0.93** | **7.1** | **5.5** | 2.0 U | 2.0 U | 2.0 U | **4.4** | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 16-Aug-07 | 0.5 U | 0.5 U | 0.5 U | **0.94** | **6.2** | **8.7** | 2.0 U | 2.0 U | 2.0 U | **3.9** | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 30-Jan-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 29-Apr-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 26-Jul-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 29-Oct-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 5-May-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 UJ | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 2-Aug-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 UJ | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 22-Nov-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 16-Feb-06 | **4.0** | 0.5 U | **1.4** | **23** | **26** | **34** | **57** | **8.4** | **4.0** | **4.7** | 2.0 U | 2.0 U | **100** |
| MW-4 | 16-Mar-06 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | **2.9** | **2.2** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | **3.7** |
| MW-4 | 9-May-06 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 31-Aug-06 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | **4.7** | **2.1** | 2.0 U | 2.0 U | 2.0 U | **3.8** | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 28-Dec-06 | 0.34 J | 0.13 J | 0.18 J | **4.5** | 0.15 J | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 16-Feb-07 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 0.12 J | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 0.23 J | 2.0 U | 2.0 U | 0.57 J |
| MW-4 | 30-May-07 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 16-Aug-07 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | **6.2** | **8.7** | 2.0 U | 2.0 U | 2.0 U | **3.9** | 2.0 U | 2.0 U | 2.0 U |
| MW-4 | 12-Nov-07 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | **2.5** | **1.7** | **0.79** J | **0.83** J | **0.63** J | **1.7** | 1.0 U | **0.33** J | 5.0 U |
| MW-4 | 28-Feb-08 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 0.65 J |
| MW-4 | 23-May-08 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-4Dup | 7-Jul-03 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-4Dup | 16-Oct-03 | 0.5 U | 0.5 U | 0.5 U | **0.94** | **7.5** | **6.3** | 2.0 U | 2.0 U | 2.0 U | **4.8** | 2.0 U | 2.0 U | 2.0 U |
| MW-4Dup | 25-Feb-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-5 | 28-Feb-03 | 0.5 U | 0.5 U | **15** | **24** | **24** | **110** D | **75** D | **26** | **87** D | **27** | 2.0 U | 2.0 U | **23** |
| MW-5 | 30-Jan-04 | 0.5 U | 0.5 U | **1.8** | **9.7** | **9.7** | **49** | 2.0 U | 2.0 U | **82** D | **38** | 2.0 U | 2.0 U | **2.9** |
| MW-5 | 5-May-05 | 0.5 U | 0.5 U | **17** | **50** | **50** | **140** D | 2.0 U | 2.0 U | 120 Ui | **41** | 2.0 U | 2.0 U | **8.0** |
| MW-5 | 16-Feb-06 | 0.5 U | 0.5 U | **0.89** | **3.4** | **3.4** | **16** | 2.0 U | 2.0 U | **16** | **5.9** | 2.0 U | 2.0 U | **3.0** |
| MW-5 | 9-May-06 | 0.5 U | 0.5 U | **3.7** | **20** | **20** | **79** D | 2.0 U | 2.0 U | **67** | **23** | 2.0 U | 2.0 U | 2.0 U |
| MW-5 | 28-Dec-06 | 0.5 U | 0.5 U | 0.31 J | **9.0** | **9.0** | **34** | 2.0 U | 2.0 U | **41** | **17** | 2.0 U | 0.77 J | 1.1 J |

**Please refer to notes at end of table.**

**Table 4 - Dectectable Volatile Organic Compounds in Groundwater**
**Brix Maritime**
**Portland, Oregon**

| Well Number | Sampling Date | Concentrations in Micrograms per Liter (µg/L) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Benzene | Toluene | Ethylbenzene | Total Xylenes | Isopropyl-benzene | n-Propylbenzene | 1,2,4-Trimethylbenzene | 1,3,5-Trimethylbenzene | n-Butylbenzene | sec-Butylbenzene | 4-Isopropyltoluene | tert-Butylbenzene | Naphthalene |
| MW-5 | 16-Feb-07 | 0.17 J | 0.38 J | **0.61** | **11** | **11** | **37** | 2.0 U | 2.0 U | **36** | **12** | 2.0 U | 0.53 J | 2.0 U |
| MW-5 | 30-May-07 | 0.5 U | **0.60** | **6.0** | **53** | **53** | **210** D | 2.0 U | 2.0 U | **95** D | **40** | 2.0 U | 2.00 U | **2.2** |
| MW-5 | 28-Feb-08 | 1.0 U | 0.34 J | 1.0 U | 3.0 U | **1.1** | **3.8** | 1.0 U | 1.0 U | **6.0** | **2.3** | 1.0 U | 1.0 U | 0.73 J |
| MW-5 | 23-May-08 | 0.30 J | 0.63 J | **1.8** | 3.0 U | **30** | **93** | 0.47 J | 1.0 U | **64** | **26** | 1.0 U | **1.2** | 5.0 U |
| MW-5Dup | 28-Feb-03 | 0.5 U | 0.5 U | **16** | **25** | **25** | **110** D | **99** D | **30** | **110** D | **30** | **2.3** | 2.0 U | **25** |
| MW-5Dup | 30-Jan-04 | 0.5 U | 0.5 U | **2.0** | **11** | **11** | **56** | 2.0 U | 2.0 U | **84** D | **39** | 2.0 U | 2.0 U | **3.4** |
| MW-5Dup | 9-May-06 | 0.5 U | 0.5 U | **3.7** | **20** | **20** | **73** D | 2.0 U | 2.0 U | **66** | **23** | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 7-Jul-03 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 16-Oct-03 | 0.5 U | 0.5 U | 0.5 U | **0.74** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 30-Jan-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 29-Apr-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 26-Jul-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 29-Oct-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 5-May-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 UJ | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 22-Nov-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 9-May-06 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 16-Aug-07 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-6 | 12-Nov-07 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-6 | 23-May-08 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-7 | 7-Jul-03 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 16-Oct-03 | 0.5 U | 0.5 U | 0.5 U | **0.82** | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 30-Jan-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 29-Apr-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 26-Jul-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 29-Oct-04 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 5-May-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 UJ | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 22-Nov-05 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 9-May-06 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 28-Dec-06 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 16-Aug-07 | 0.5 U | 0.5 U | 0.5 U | 1.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| MW-7 | 12-Nov-07 | 1.0 U | 5.0 U | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-7 | 23-May-08 | 1.0 U | 0.58 J | 1.0 U | 3.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U |
| MW-8 | 25-Feb-05 | **0.54** | **5.8** | 0.5 U | **0.86** U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U | 2.0 U |

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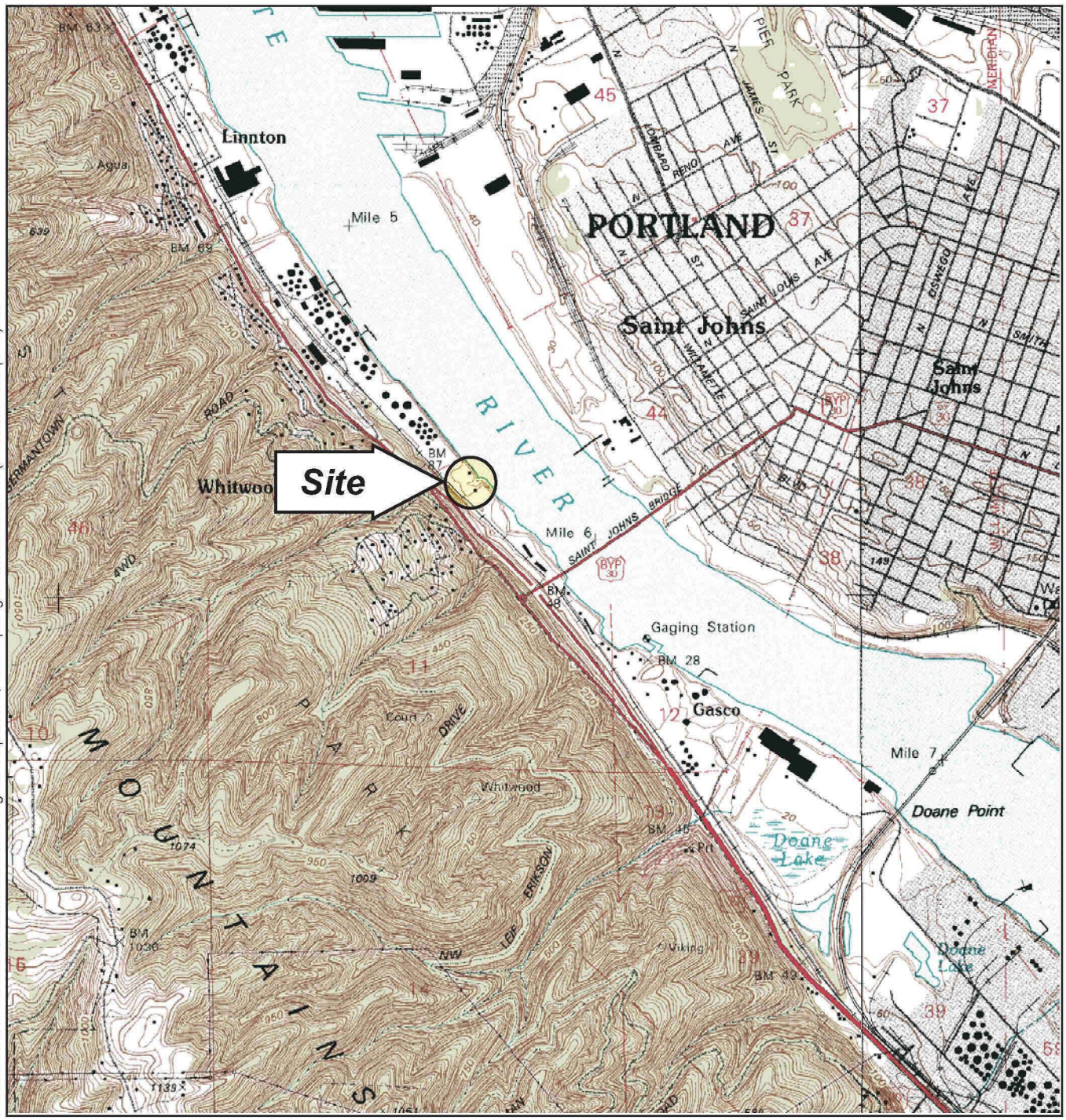
**Notes:**

1. U = Analyte not detected at or above the indicated reporting limi
2. Reportable concentrations are shown in **Bold** type.
3. i = The reporting limit is elevated due to matrix interference.
4. D = The reported result is from a dilution.
5. J = Associated value is below the lowest calibration point and is estimated.

# Site Location Map
## Brix Maritime Company
## 9030 NW St. Helens Road, Portland, Oregon




F:\Data\Jobs\15634-00 Brix Maritime\Task 3 Progress Reports\2Q-2008 Rpt\Figures\156340003 01 (Site Loc - 2nd qtr 08).cdr

***Source:*** Base map prepared from the USGS 7.5-minute quadrangle of Linnton, Oregon, dated 1990.

0 2,000 4,000

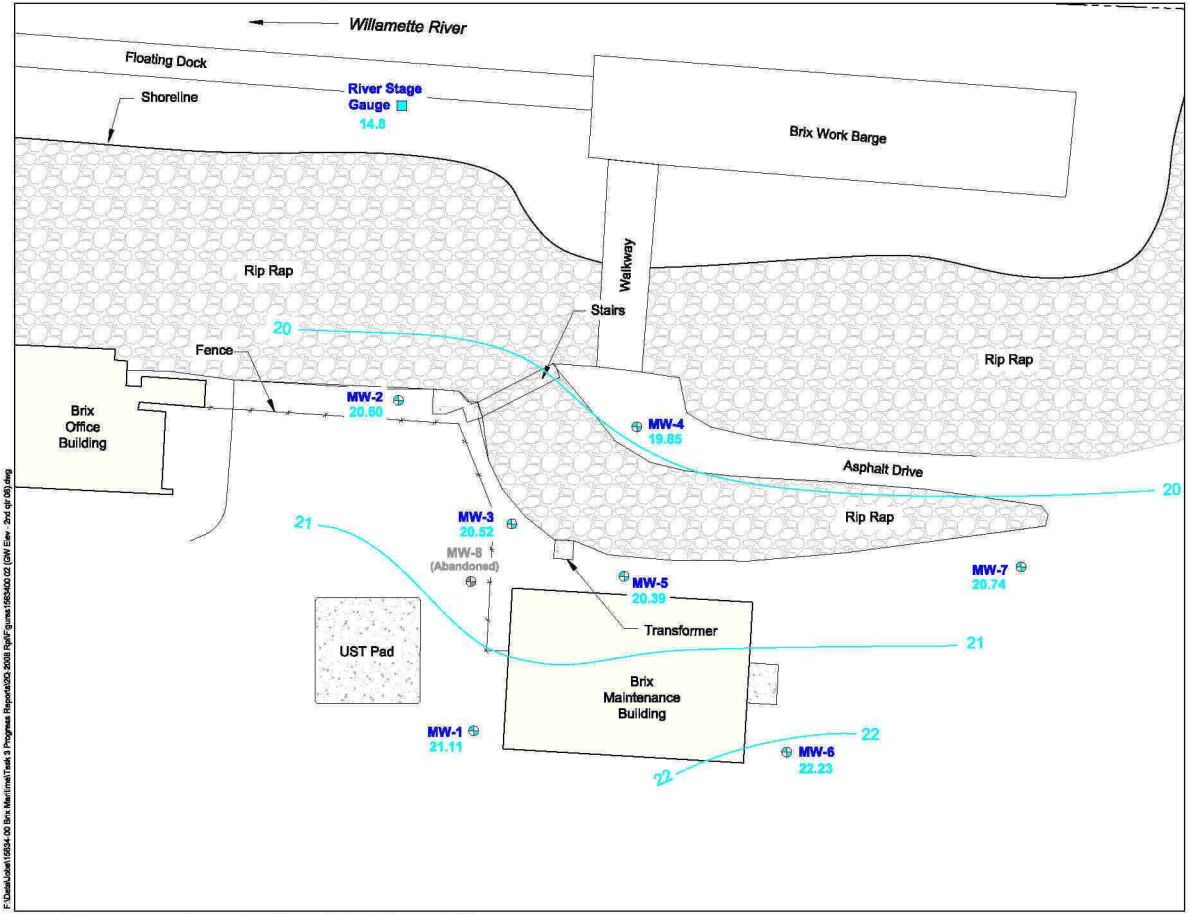
Scale in Feet
Contour Interval 10 Feet

N

HARTCROWSER

*15634-00/Task 3* *7/08*
*Figure 1*

***Well Locations and Potentiometric Surface (May 23, 2008)***
***Brix Maritime Company***
***9030 NW St. Helens Road, Portland, Oregon***




**River Stage Gauge** River Stage Gauge Location

**MW-1** **21.11** Monitoring Well Location and Number Groundwater Elevation in Feet (NAVD 88)

20 Potentiomnetric Groundwater Surface Contour in Feet

0 30 60
Scale in Feet

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*15634-00/Task 3* *7/08*
*Figure 2*

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***Source:*** An Anchor Environmental Well Location and Potentiometric Surface Map, dated 2/16/06.

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# APPENDIX A
# FIELD ACTIVITIES DOCUMENTATION



Confidential Business Information

# MEMORANDUM

**DATE:** June 12, 2008

**TO:** File 15634-00/Task 05

**FROM:** Chris Martin, EIT

**RE:** May 2008 Groundwater Sample Collection
Brix Maritime, Portland, Oregon

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On May 23, 2008, Chris Martin of Hart Crowser performed groundwater monitoring activities at the Brix Maritime site. Depth to groundwater was measured in monitoring wells MW-1 through MW-7 using an electronic oil/water interface probe, and the elevation of the river relative to the on-site staff gage was noted. No measurable (i.e., thickness greater than 0.01 foot) free phase product was present in the wells at the time of measurement. Groundwater samples were collected from monitoring wells MW-1 through MW-7 following the measurement activities. A slight petroleum-like sheen was observed in purge water from wells MW-1 and MW-3 and a biological-like residue was observed in well MW-3.

Prior to sample collection, the monitoring wells were purged until field parameters (temperature, pH, and specific conductivity) stabilized. The stabilized field sampling parameters are presented in Table A-1. Each well was purged using a peristaltic pump and dedicated tubing with the exception of MW-3 which was sampled with a disposable bailer. As field parameters stabilized and purging for each well was complete, pumping rates were reduced and samples were collected from the tubing or disposable bailer and transferred directly into laboratory-supplied sample containers.

The groundwater samples were placed in a cooled ice chest immediately following collection for field storage and transit to Hart Crowser's office. On May 27, 2008, the samples were shipped overnight under chain of custody documentation to Environmental Science Corp. Mt. Juliet, Tennessee, for chemical analyses. The groundwater samples were analyzed for the following compounds: total petroleum hydrocarbons (TPH) as gasoline by Northwest Method NWTHP-Gx, diesel and oil range TPH by Northwest Method NWTHP-Dx, polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270-SIM, and volatile organic compounds (VOCs) by EPA Method 8260B.

Attachments: Table A-1: Sample Identification and Field Parameter
Groundwater Sampling Data Field Form

**Table A-1 – Sample Identification and Field Parameters**
**Brix Maritime**
**Portland, Oregon**

| Monitoring Well | Blind Code Identification | Sampling Date | Depth to Water (in feet) | pH | Specific Conductance ($\mu$s) | Temperature ($^{o}$C) | Dissolved Oxygen (mg/L) | ORP (m/V) |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Wells** | | | | | | | | |
| MW-1 | BM-052308-04 | 23-May-08 | 20.70 | 6.3 | 418 | 14.7 | 0.8 | 22 |
| MW-2 | BM-052308-06 | 23-May-08 | 21.53 | 6.3 | 435 | 15.5 | 0.8 | -80 |
| MW-3 | BM-052308-05 | 23-May-08 | 21.43 | 6.4 | 438 | 15.2 | 1.5 | 24 |
| MW-4 | BM-052308-01 | 23-May-08 | 3.70 | 6.7 | 409 | 15.4 | 0.7 | -26 |
| MW-5 | BM-052308-07 | 23-May-08 | 21.27 | 6.4 | 554 | 15.1 | 0.8 | -3 |
| MW-6 | BM-052308-03 | 23-May-08 | 19.43 | 6.4 | 339 | 14.2 | 0.8 | 32 |
| MW-7 | BM-052308-02 | 23-May-08 | 20.21 | 6.5 | 219 | 14.4 | 0.7 | 60 |

**Notes:**

1. $\mu$s = Microsiemens.
2. $^{o}$C = Degrees Celsius.
3. mg/L = Milligrams per Liter.
4. ORP = Oxidation Reduction Potential.
5. m/V = millivolts.

# Groundwater Sampling Data

Project: Brix maritime  Job No.: 15634-00 Ka

Field Rep.: CWM  Date: 5-23-08

| WELL NUMBER | DATE (TIME) 5-23-08 | WELL DEPTH IN FEET | DEPTH TO WATER IN FEET | DEPTH TO PRODUCT IN FEET | PRODUCT THICKNESS IN FEET | METHOD OF SAMPLING | COMMENTS (color, sheen, sediment, odor, bubbles) | Liters | Temp °C | pH | EC ~~µMHOS~~ | ORP mV | DO mg/L | TIME | CASING VOL. GALS | PURGE VOLUME GALS (EST) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | [illegible] | | 20.70 | | | Purge and sample with a small peristaltic pump through a YSI 600XL flowcell | water [illegible] | ~~INT~~ | ~~15.00~~ | ~~6.65~~ | ~~0.341~~ | ~~113.2~~ | ~~0.77~~ | ~~9:50~~ | cm | |
| MW-2 | [illegible] | | 21.53 | | | | | | | | | | | 9:53 | | |
| MW-3 | [illegible] | | 21.43 | Badness | [illegible] | | | | | | | | | 9:56 | | |
| MW-4 | [illegible] | | 3.70 | | | | | | | | | | | 9:59 | | |
| MW-5 | [illegible] | | 21.27 | | | w/610D display (purge only) using new ¼" poly tubing Using a low flow | | | | | | | | | | |
| MW-6 | [illegible] | | 19.43 | | | | | | | | | | | | | |
| MW-7 | [illegible] | | 20.21 | | | | | | | | | | | | | |
| River level 9:27 | | | 14.8 | | | | 15 / 14 | | | | | | | | | |
| MW-4 BM0523-01 | (10:05) | | | | | technique of <500 ml/min | Lots of thick orange floc, turbid (orange) No odor No sheen | INT | 15.00 | 6.65 | 0.341 | 113.2 | 0.77 | 9:50 | | |
| | | | | | | | | 1 | 15.00 | 6.45 | 0.340 | 121.4 | 0.55 | 9:53 | | |
| | | | | | | | | 2 | 15.02 | 6.34 | 0.338 | 125.4 | 0.60 | 9:56 | | |
| | | | | | | | | 3 | 15.02 | 6.32 | 0.337 | 125.0 | 0.57 | 9:59 | | |
| MW-7 -02 | (10:40) | | | | | | Slightly turbid (orange) No odor No sheen | INT | 14.40 | 6.59 | 0.222 | 75.0 | 1.56 | 10:25 | | |
| | | | | | | | | 1 | 14.42 | 6.52 | 0.220 | 67.2 | 0.80 | 10:28 | | |
| | | | | | | | | 2 | 14.42 | 6.52 | 0.219 | 61.3 | 0.69 | 10:31 | | |
| | | | | | | | | 3 | 14.43 | 6.52 | 0.219 | 59.8 | 0.68 | 10:34 | | |
| MW-6 -03 | (11:15) | | | | | | Clear No odor No sheen | INT | 14.16 | 6.35 | 0.336 | 49.4 | 1.95 | 11:00 | | |
| | | | | | | | | 1 | 14.15 | 6.38 | 0.337 | 38.5 | 1.30 | 11:03 | | |
| | | | | | | | | 2 | 14.15 | 6.40 | 0.338 | 34.0 | 0.85 | 11:06 | | |
| | | | | | | | | 3 | 14.17 | 6.40 | 0.339 | 31.9 | 0.80 | 11:09 | | |
| MW-1 -04 | (12:15) | | | | | | Strong petroleum odor Sheen Clear | INT | 14.71 | 6.46 | 0.403 | 10.7 | 2.49 | 12:00 | | |
| | | | | | | | | 1 | 14.72 | 6.29 | 0.414 | 22.0 | 0.90 | 12:13 | | |
| | | | | | | | | 2 | 14.73 | 6.28 | 0.416 | 22.2 | 0.84 | 12:06 | | |
| | | | | | | | | 3 | 14.72 | 6.27 | 0.418 | 22.4 | 0.81 | 12:09 | | |

(15:00)

Hart Crowser, Inc.

Confidential Business Information

00035461

# Groundwater Sampling Data

Project: Brix Maritime  Job No. 15634.00 / 1a+b5

Field Rep. CWM  Date 5-23-08

| WELL NUMBER | DATE (TIME) | WELL DEPTH IN FEET | DEPTH TO WATER IN FEET | DEPTH TO PRODUCT IN FEET | PRODUCT THICKNESS IN FEET | METHOD OF SAMPLING | COMMENTS (color, sheen, sediment, odor, bubbles) | Liters | Temp °C | pH | EC ~~µmhos~~ | ORP mV | DO mg/L | TIME | CASING VOL. GALS | PURGE VOLUME GALS (EST) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-3 | (1320) | | | | Sampled using bailer [illegible] | Purge and sample with a small peristaltic pump through a YSI 600XL flowcell | [illegible] | INT | 15.16 | 6.40 | 0.438 | 28.9 | 2.15 | 13:10 | | |
| | | | | | | | | 1 | 15.14 | 6.44 | 0.434 | 30.0 | 1.69 | 13:13 | | |
| | | | | | | | | 2 | 15.14 | 6.40 | 0.434 | 22.8 | 1.60 | 13:16 | | |
| | | | | | | | | 3 | 15.15 | 6.44 | 0.435 | 24.0 | 1.53 | 13:19 | | |
| MW-2 | (1400) | | | | | w/ 610D display (purge only) using new 1/4" poly tubing Using a low flow | Clear NO odor NO sheen | INT | 15.33 | 6.60 | 0.427 | 16.3 | 1.09 | 13:46 | | |
| | | | | | | | | 1 | 15.26 | 6.65 | 0.420 | -23.1 | 0.92 | 13:48 | | |
| | | | | | | | | 2 | 15.44 | 6.66 | 0.413 | -25.1 | 0.70 | 13:51 | | |
| | | | | | | | | 3 | 15.36 | 6.66 | 0.409 | -25.6 | 0.67 | 13:54 | | |
| [illegible] | (1450) | | | | | technique at 500 ml/min | | INT | 15.05 | 6.56 | 0.563 | 12.8 | 1.09 | 14:15 | | |
| | | | | | | | | 1 | 15.11 | 6.45 | 0.560 | 3.0 | 0.86 | 14:18 | | |
| | | | | | | | | 2 | 15.06 | 6.42 | 0.554 | -2.4 | 0.80 | 14:21 | | |
| | | | | | | | | 3 | 15.06 | 6.42 | 0.554 | -3.2 | 0.76 | 14:24 | | |
| | | | | | | | | | | | | | | | | |
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Hart Crowser, Inc.

# APPENDIX B
# ANALYTICAL TESTING PROGRAM, QUALITY ASSURANCE REVIEW, AND ANALYTICAL LABORATORY REPORT



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# APPENDIX B
# ANALYTICAL TESTING PROGRAM, QUALITY ASSURANCE REVIEW, AND ANALYTICAL LABORATORY REPORT

## 1.0 INTRODUCTION

This appendix describes the analytical testing program for this investigation and documents the results of the analytical data quality assurance (QA) review. The groundwater samples were collected by Hart Crowser Inc., on May 23, 2008, and received by Environmental Science Corp. (ESC) in Mt. Juliet, Tennessee, on May 28, 2008, for chemical analyses. A copy of the analytical laboratory report is included with this appendix.

The QA review included examination and validation of the laboratory's summary reports, including:

- Analytical methods;
- Reporting limits;
- Holding times;
- Surrogates, spikes, and blanks;
- Initial and continuing calibration verification;
- Custody records; and
- Laboratory duplicates.

The QA review did not include a review of raw data.

## 2.0 ANALYTICAL METHODS

Eight groundwater samples (MW-1 through MW-7 and MW-5-Dup) were analyzed for the following compounds:

- Total petroleum hydrocarbons (TPH) as gasoline by Northwest Method NWTPH-Gx;
- TPH as diesel and oil by Northwest Method NWTPH-Dx;
- Polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270M-SIM; and
- Volatile organic compounds (VOCs) by EPA Method 8260B.



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## 3.0 QUALITY ASSURANCE OBJECTIVES AND REVIEW

The general QA objectives for this project are to develop and implement procedures for obtaining and evaluating data of a specified quality that can be used to assess the site conditions and evaluate risk to human health and the environment. To collect such information, analytical data must have an appropriate degree of accuracy and reproducibility, samples collected must be representative of actual field conditions, and samples must be collected and analyzed using unbroken chain of custody procedures.

Reporting limits and analytical results are used to assess the quantity of each chemical of concern in media. Precision, accuracy, representatives, completeness, and comparability parameters are used to evaluate data quality. These parameters are defined and discussed below.

### *3.1 Reporting Limits*

Reporting limits are set by the laboratory and are based on instrumentation abilities, sample matrix, and suggested detection limits by the U.S. Environmental Protection Agency (EPA) or the Oregon Department of Environmental Quality (DEQ). Reporting limits may be raised due to high concentrations of analytes in the samples, matrix interferences, or insufficient sample volume. All method reporting limits were met.

### *3.2 Holding Times*

Collection dates for all samples submitted are documented on the chain of custody form. Collection and analysis dates are indicated in the laboratory report. Holding times required by EPA CLP protocols were met for all analyses.

### *3.3 Accuracy*

Accuracy is the measure of error between the reported test results and the true sample concentration. "Perfect" accuracy is 100 percent recovery. True sample concentration is never known due to analytical limitations and error. Consequently, accuracy is inferred from the recovery data from surrogates, matrix spike samples, and laboratory samples.

**Surrogates.** In a surrogate analysis, a known amount of a compound similar to the constituent of interest is added to a sample and measured. The surrogate analysis assesses the accuracy of a chemical measurement by comparing the measured value to the actual spiked value. Surrogate recoveries were within control limits for all analyzed samples with the exception of toluene-d8 andnitrobenzene-d5 in sample MW-3 (L347487-05), which were flagged with a "J2" qualifier, but are



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acceptable for the purposes of this investigation. The associated surrogates were within control limits and the data were not flagged.

**Matrix Spike Samples.** Matrix spike (MS) analyses are performed on samples submitted to the laboratory that are of the same matrix as the actual sample. The MS sample is spiked with known levels of the constituents of interest. These analyses are used to assess the potential for matrix interference with recovery or detection of the constituents of interest and the accuracy of the determination. The spiked sample results are compared to the expected result (i.e., sample concentration plus spike amount) and are reported as percent recovery. All matrix spike analyses were within control limits.

**Laboratory Control Samples.** The laboratory also analyzes a laboratory control sample (LCS) to assess the accuracy of the analytical equipment. The sample is prepared from the analyte-free matrix, which is then spiked with known levels of the constituents of interest (i.e., a standard). The concentrations are measured, and the results are compared to the known spiked levels. This comparison is expressed as percent recovery. Analyses of LCSs were included with the all the analyses. The percent recoveries of the LCS sample were within control limits.

## *3.4 Precision*

Precision measures the reproducibility of data under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values. Analytical precision is measured by preparing and analyzing duplicate samples, and comparing the original and duplicate sample results to assess the precision of the analytical method. This comparison is quantitatively expressed as the relative percent difference (RPD) between the original and duplicate samples. Data quality can be evaluated based on RPDs when the sample concentration is at least five times the reporting limit. RPDs up to 50 percent are considered to be acceptable.

**Laboratory Duplicates.** A laboratory duplicate is a second laboratory sample taken from a submitted sample. The duplicate is then prepared along with the original. It is analyzed and compared to the first to assess the precision of the analytical method and the potential variability of the sample matrix. This comparison is reported as the RPD. Due to the low number of samples submitted for analyses, no laboratory duplicates were prepared and analyzed.

**Matrix Spike Duplicates.** A second matrix spike sample (i.e., matrix spike duplicate [MSD]) is prepared as above and analyzed. The MSD is compared to the initial matrix spike to assess the precision of the analytical method (i.e., RPD). For this method, both a percent recovery and an RPD are reported. MS/MSD RPDs for the associated QC batches were outside the established control limits



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for chloromethane in submitted samples MW-1 through MW-6 and MW-5-Dup (L347487-01, L347487-03 through -08). The associated values have been flagged with a "J3" qualifier, but are acceptable for the purposes of this investigation.

**LCS Duplicates.** A duplicate is a second analysis of an LCS. The duplicate is then prepared along with the original. It is analyzed and compared to the first to assess the precision of the analytical method and the potential variability of the sample matrix. An LCS duplicate (LCSD) was analyzed for all analyses. For this method, both a percent recovery and an RPD are reported. QC results were within control limits.

## *3.5 Representativeness*

Representativeness is a measure of how closely the results reflect the actual concentration of the parameters in the medium sampled. It is not possible to measure this directly, so representativeness is controlled and ensured by using standard sampling procedures, as well as sample-handling protocols for storage, preservation, and transportation are designed to preserve the representativeness of the samples collected. Field, trip, and laboratory method blanks are run in accordance with established laboratory protocols.

**Sample Handling and Custody.** Samples were collected in general accordance with industry standards. This included requirements for collection, containers, labeling, packaging, shipping, and storage. Compliance with these procedures is documented on chain of custody forms. Copies of chain of custody forms are included with the laboratory report.

**Blanks.** Laboratory method blanks were analyzed for all requested analytical tests. No analyzed compounds were detected in the laboratory method blanks.

## *3.6 Completeness*

Completeness is defined as the percentage of measurements made which are judged to be valid measurements. The completeness of the data is the number of acceptable data points divided by the total number of data points multiplied by 100. The completeness goal is essentially that a sufficient amount of valid data be generated to allow for the evaluation of the site investigation. The data completeness for the samples is 100 percent for all requested analyses.



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### 3.7 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. All samples from this and previous investigations were analyzed in general accordance with accepted methods of the EPA or DEQ. Because similar or the same methods were used, the quality of the data collected are consistent for all data sets and are therefore comparable.

### 3.8 Conclusion

The overall QA objectives have been met and the data are suitable for the purposes of this investigation.



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Est. 1970

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240

Lake Oswego, OR 97035

# Report Summary

Wednesday June 04, 2008

Report Number: L347487
Samples Received: 05/28/08
Client Project: 15634-00/Task 05

Description: Brix Maritime

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Jarred Willis, ESC Representative

*Laboratory Certification Numbers*

A2LA - 1461-01, AIHA - 09227, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140
NJ - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-01

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-01

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 10:05

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | U | 33. | 100 | ug/l | | NWTPHGX | 06/01/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| a,a,a-Trifluorotoluene(FID) | 95.3 | | | % Rec. | | NWTPHGX | 06/01/08 | 1 |
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Benzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Butylbenzene | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| sec-Butylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| tert-Butylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | J3 | 8260B | 06/02/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |

U = ND (Not Detected)
RDL = Reported Detection Limit = LOQ = PQL = EQL
MDL = Minimum Detection Limit = LOD = SQL(TRRP)
Note:
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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-01

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-01

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 10:05

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Ethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Isopropylbenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| p-Isopropyltoluene | U | 0.21 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Naphthalene | U | 0.17 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Propylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Toluene | U | 0.27 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trimethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3,5-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Xylenes, Total | U | 0.86 | 3.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 87.9 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Dibromofluoromethane | 86.0 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| 4-Bromofluorobenzene | 91.6 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Diesel Range Organics (DRO) | 57. | 33. | 100 | ug/l | J | NWTPHDX | 05/30/08 | 1 |
| Residual Range Organics (RRO) | U | 82. | 250 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| o-Terphenyl | 79.3 | | | % Rec. | | NWTPHDX | 05/30/08 | 1 |
| Polynuclear Aromatic Hydrocarbons | | | | | | | | |
| Anthracene | 0.041 | 0.00050 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Acenaphthene | 0.016 | 0.0020 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Acenaphthylene | 0.014 | 0.0016 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |

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MDL = Minimum Detection Limit = LOD = SQL(TRRP)
Note:
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REPORT OF ANALYSIS

Leon Lahiere
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Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-01

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-01

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 10:05

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 0.022 | 0.0011 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Benzo(a)pyrene | U | 0.0012 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Benzo(b)fluoranthene | U | 0.0012 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Benzo(g,h,i)perylene | U | 0.0012 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Benzo(k)fluoranthene | U | 0.0024 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Chrysene | 0.012 | 0.00075 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Dibenz(a,h)anthracene | U | 0.0011 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Fluoranthene | 0.10 | 0.00072 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Fluorene | 0.023 | 0.0012 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Indeno(1,2,3-cd)pyrene | U | 0.0013 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Naphthalene | 0.037 | 0.012 | 0.28 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Phenanthrene | 0.10 | 0.00081 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Pyrene | 0.071 | 0.00092 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| 1-Methylnaphthalene | 0.010 | 0.0021 | 0.28 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| 2-Methylnaphthalene | 0.010 | 0.0022 | 0.28 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| 2-Chloronaphthalene | U | 0.092 | 0.28 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Surrogate Recovery | | | | | | | | |
| Nitrobenzene-d5 | 62.0 | | | % Rec. | | 8270C-S | 05/29/08 | 1.11 |
| 2-Fluorobiphenyl | 69.0 | | | % Rec. | | 8270C-S | 05/29/08 | 1.11 |
| p-Terphenyl-d14 | 78.9 | | | % Rec. | | 8270C-S | 05/29/08 | 1.11 |

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MDL = Minimum Detection Limit = LOD = SQL(TRRP)
Note:
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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-02

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-02

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 10:40

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | U | 33. | 100 | ug/l | | NWTPHGX | 06/01/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| a,a,a-Trifluorotoluene(FID) | 94.5 | | | % Rec. | | NWTPHGX | 06/01/08 | 1 |
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/04/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/04/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/04/08 | 1 |
| Benzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/04/08 | 1 |
| n-Butylbenzene | U | 0.23 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| sec-Butylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| tert-Butylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/04/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | | 8260B | 06/04/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |

U = ND (Not Detected)
RDL = Reported Detection Limit = LOQ = PQL = EQL
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Est. 1970

REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-02

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-02

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 10:40

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Ethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Isopropylbenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| p-Isopropyltoluene | U | 0.21 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/04/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/04/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Naphthalene | U | 0.17 | 5.0 | ug/l | | 8260B | 06/04/08 | 1 |
| n-Propylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Toluene | 0.58 | 0.27 | 5.0 | ug/l | J | 8260B | 06/04/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2,4-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,2,3-Trimethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| 1,3,5-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Xylenes, Total | U | 0.86 | 3.0 | ug/l | | 8260B | 06/04/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 99.8 | | | % Rec. | | 8260B | 06/04/08 | 1 |
| Dibromofluoromethane | 104. | | | % Rec. | | 8260B | 06/04/08 | 1 |
| 4-Bromofluorobenzene | 99.2 | | | % Rec. | | 8260B | 06/04/08 | 1 |
| Diesel Range Organics (DRO) | U | 33. | 100 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Residual Range Organics (RRO) | U | 82. | 250 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| o-Terphenyl | 84.6 | | | % Rec. | | NWTPHDX | 05/30/08 | 1 |
| Polynuclear Aromatic Hydrocarbons | | | | | | | | |
| Anthracene | 0.0077 | 0.00047 | 0.053 | ug/l | J | 8270C-S | 05/29/08 | 1.05 |
| Acenaphthene | U | 0.0018 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Acenaphthylene | 0.012 | 0.0015 | 0.053 | ug/l | J | 8270C-S | 05/29/08 | 1.05 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-02

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-02

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 10:40

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | U | 0.0011 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Benzo(a)pyrene | U | 0.0011 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Benzo(b)fluoranthene | U | 0.0011 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Benzo(g,h,i)perylene | U | 0.0012 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Benzo(k)fluoranthene | U | 0.0022 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Chrysene | U | 0.00071 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Dibenz(a,h)anthracene | U | 0.0010 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Fluoranthene | U | 0.00068 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Fluorene | U | 0.0011 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Indeno(1,2,3-cd)pyrene | U | 0.0012 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Naphthalene | 0.060 | 0.011 | 0.26 | ug/l | J | 8270C-S | 05/29/08 | 1.05 |
| Phenanthrene | 0.019 | 0.00077 | 0.053 | ug/l | J | 8270C-S | 05/29/08 | 1.05 |
| Pyrene | U | 0.00087 | 0.053 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| 1-Methylnaphthalene | 0.014 | 0.0020 | 0.26 | ug/l | J | 8270C-S | 05/29/08 | 1.05 |
| 2-Methylnaphthalene | 0.030 | 0.0020 | 0.26 | ug/l | J | 8270C-S | 05/29/08 | 1.05 |
| 2-Chloronaphthalene | U | 0.087 | 0.26 | ug/l | | 8270C-S | 05/29/08 | 1.05 |
| Surrogate Recovery | | | | | | | | |
| Nitrobenzene-d5 | 71.3 | | | % Rec. | | 8270C-S | 05/29/08 | 1.05 |
| 2-Fluorobiphenyl | 87.1 | | | % Rec. | | 8270C-S | 05/29/08 | 1.05 |
| p-Terphenyl-d14 | 101. | | | % Rec. | | 8270C-S | 05/29/08 | 1.05 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-03

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-03

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 11:15

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | U | 33. | 100 | ug/l | | NWTPHGX | 06/03/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| a,a,a-Trifluorotoluene(FID) | 93.5 | | | % Rec. | | NWTPHGX | 06/03/08 | 1 |
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Benzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Butylbenzene | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| sec-Butylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| tert-Butylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | J3 | 8260B | 06/02/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-03

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-03

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 11:15

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Ethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Isopropylbenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| p-Isopropyltoluene | U | 0.21 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Naphthalene | U | 0.17 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Propylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Toluene | U | 0.27 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trimethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3,5-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Xylenes, Total | U | 0.86 | 3.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 87.7 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Dibromofluoromethane | 86.3 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| 4-Bromofluorobenzene | 85.3 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Diesel Range Organics (DRO) | U | 33. | 100 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Residual Range Organics (RRO) | U | 82. | 250 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| o-Terphenyl | 75.5 | | | % Rec. | | NWTPHDX | 05/30/08 | 1 |
| Polynuclear Aromatic Hydrocarbons | | | | | | | | |
| Anthracene | 0.023 | 0.00053 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| Acenaphthene | U | 0.0021 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Acenaphthylene | 0.049 | 0.0017 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |

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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-03

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-03

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 11:15

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | U | 0.0012 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Benzo(a)pyrene | U | 0.0012 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Benzo(b)fluoranthene | U | 0.0012 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Benzo(g,h,i)perylene | 0.012 | 0.0013 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| Benzo(k)fluoranthene | U | 0.0025 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Chrysene | U | 0.00080 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Dibenz(a,h)anthracene | U | 0.0011 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Fluoranthene | U | 0.00077 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Fluorene | U | 0.0013 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Indeno(1,2,3-cd)pyrene | 0.0067 | 0.0014 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| Naphthalene | 0.039 | 0.013 | 0.30 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| Phenanthrene | 0.020 | 0.00086 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| Pyrene | 0.019 | 0.00098 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| 1-Methylnaphthalene | 0.010 | 0.0022 | 0.30 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| 2-Methylnaphthalene | 0.020 | 0.0023 | 0.30 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| 2-Chloronaphthalene | U | 0.097 | 0.30 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Surrogate Recovery | | | | | | | | |
| Nitrobenzene-d5 | 73.6 | | | % Rec. | | 8270C-S | 05/29/08 | 1.18 |
| 2-Fluorobiphenyl | 79.9 | | | % Rec. | | 8270C-S | 05/29/08 | 1.18 |
| p-Terphenyl-d14 | 101. | | | % Rec. | | 8270C-S | 05/29/08 | 1.18 |

U = ND (Not Detected)
RDL = Reported Detection Limit = LOQ = PQL = EQL
MDL = Minimum Detection Limit = LOD = SQL(TRRP)
Note:
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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-04

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-04

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 12:15

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | U | 33. | 100 | ug/l | | NWTPHGX | 06/03/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| a,a,a-Trifluorotoluene(FID) | 93.7 | | | % Rec. | | NWTPHGX | 06/03/08 | 1 |
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Benzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Butylbenzene | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| sec-Butylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| tert-Butylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | J3 | 8260B | 06/02/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-04

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-04

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 12:15

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Ethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Isopropylbenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| p-Isopropyltoluene | U | 0.21 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Naphthalene | U | 0.17 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Propylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Toluene | U | 0.27 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trimethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3,5-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Xylenes, Total | U | 0.86 | 3.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 87.8 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Dibromofluoromethane | 86.0 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| 4-Bromofluorobenzene | 84.8 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Diesel Range Organics (DRO) | 110 | 33. | 100 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Residual Range Organics (RRO) | U | 82. | 250 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| o-Terphenyl | 73.5 | | | % Rec. | | NWTPHDX | 05/30/08 | 1 |
| Polynuclear Aromatic Hydrocarbons | | | | | | | | |
| Anthracene | 0.13 | 0.00050 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Acenaphthene | 0.25 | 0.0020 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Acenaphthylene | 0.041 | 0.0016 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-04

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-04

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 12:15

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 0.10 | 0.0011 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Benzo(a)pyrene | 0.023 | 0.0012 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Benzo(b)fluoranthene | 0.026 | 0.0012 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Benzo(g,h,i)perylene | U | 0.0012 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Benzo(k)fluoranthene | 0.012 | 0.0024 | 0.056 | ug/l | J | 8270C-S | 05/29/08 | 1.11 |
| Chrysene | 0.11 | 0.00075 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Dibenz(a,h)anthracene | U | 0.0011 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Fluoranthene | 0.40 | 0.00072 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Fluorene | 0.15 | 0.0012 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Indeno(1,2,3-cd)pyrene | U | 0.0013 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Naphthalene | 4.0 | 0.012 | 0.28 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Phenanthrene | 0.45 | 0.00081 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Pyrene | 0.74 | 0.00092 | 0.056 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| 1-Methylnaphthalene | 5.5 | 0.0021 | 0.28 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| 2-Methylnaphthalene | 5.4 | 0.0022 | 0.28 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| 2-Chloronaphthalene | U | 0.092 | 0.28 | ug/l | | 8270C-S | 05/29/08 | 1.11 |
| Surrogate Recovery | | | | | | | | |
| Nitrobenzene-d5 | 76.3 | | | % Rec. | | 8270C-S | 05/29/08 | 1.11 |
| 2-Fluorobiphenyl | 80.6 | | | % Rec. | | 8270C-S | 05/29/08 | 1.11 |
| p-Terphenyl-d14 | 97.0 | | | % Rec. | | 8270C-S | 05/29/08 | 1.11 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-05

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-05

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 13:25

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | U | 33. | 100 | ug/l | | NWTPHGX | 06/03/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| a,a,a-Trifluorotoluene(FID) | 93.5 | | | % Rec. | | NWTPHGX | 06/03/08 | 1 |
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Benzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Butylbenzene | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| sec-Butylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| tert-Butylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | J3 | 8260B | 06/02/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |

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RDL = Reported Detection Limit = LOQ = PQL = EQL
MDL = Minimum Detection Limit = LOD = SQL(TRRP)
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L347487-05 (SV8270PAHSIM) - Previous run also had low IS/SURR recovery. Matrix effect.



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Est. 1970

REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-05

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-05

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 13:25

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Ethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Isopropylbenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| p-Isopropyltoluene | U | 0.21 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Naphthalene | 0.53 | 0.17 | 5.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| n-Propylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Toluene | U | 0.27 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trimethylbenzene | 0.57 | 0.20 | 1.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| 1,2,3-Trimethylbenzene | 0.34 | 0.22 | 1.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| 1,3,5-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Xylenes, Total | 1.8 | 0.86 | 3.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 86.5 | | | % Rec. | J2 | 8260B | 06/02/08 | 1 |
| Dibromofluoromethane | 85.7 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| 4-Bromofluorobenzene | 83.3 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Diesel Range Organics (DRO) | 1100 | 33. | 100 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Residual Range Organics (RRO) | 7100 | 410 | 1300 | ug/l | | NWTPHDX | 05/31/08 | 5 |
| Surrogate Recovery | | | | | | | | |
| o-Terphenyl | 66.3 | | | % Rec. | | NWTPHDX | 05/30/08 | 1 |
| Polynuclear Aromatic Hydrocarbons | | | | | | | | |
| Anthracene | 0.087 | 0.00046 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Acenaphthene | 0.15 | 0.0018 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Acenaphthylene | 0.042 | 0.0014 | 0.052 | ug/l | J | 8270C-S | 05/31/08 | 1.03 |

U = ND (Not Detected)
RDL = Reported Detection Limit = LOQ = PQL = EQL
MDL = Minimum Detection Limit = LOD = SQL(TRRP)
Note:
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Reported: 06/04/08 16:18 Printed: 06/04/08 16:59
L347487-05 (SV8270PAHSIM) - Previous run also had low IS/SURR recovery. Matrix effect.



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Est. 1970

REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-05

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-05

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 13:25

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 0.16 | 0.0010 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Benzo(a)pyrene | 0.16 | 0.0011 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Benzo(b)fluoranthene | 0.064 | 0.0011 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Benzo(g,h,i)perylene | 0.098 | 0.0011 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Benzo(k)fluoranthene | 0.072 | 0.0022 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Chrysene | 0.17 | 0.00070 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Dibenz(a,h)anthracene | 0.014 | 0.00099 | 0.052 | ug/l | J | 8270C-S | 05/31/08 | 1.03 |
| Fluoranthene | 0.40 | 0.00067 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Fluorene | 0.11 | 0.0011 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Indeno(1,2,3-cd)pyrene | 0.072 | 0.0012 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Naphthalene | 0.10 | 0.011 | 0.26 | ug/l | J | 8270C-S | 05/31/08 | 1.03 |
| Phenanthrene | 0.28 | 0.00075 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Pyrene | 0.34 | 0.00085 | 0.052 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| 1-Methylnaphthalene | 0.39 | 0.0020 | 0.26 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| 2-Methylnaphthalene | 0.41 | 0.0020 | 0.26 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| 2-Chloronaphthalene | U | 0.085 | 0.26 | ug/l | | 8270C-S | 05/31/08 | 1.03 |
| Surrogate Recovery | | | | | | | | |
| Nitrobenzene-d5 | 1.06 | | | % Rec. | J2 | 8270C-S | 05/31/08 | 1.03 |
| 2-Fluorobiphenyl | 62.8 | | | % Rec. | | 8270C-S | 05/31/08 | 1.03 |
| p-Terphenyl-d14 | 49.6 | | | % Rec. | | 8270C-S | 05/31/08 | 1.03 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-06

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-06

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 14:00

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | U | 33. | 100 | ug/l | | NWTPHGX | 06/03/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| a,a,a-Trifluorotoluene(FID) | 93.7 | | | % Rec. | | NWTPHGX | 06/03/08 | 1 |
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Benzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Butylbenzene | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| sec-Butylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| tert-Butylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | J3 | 8260B | 06/02/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-06

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-06

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 14:00

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Ethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Isopropylbenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| p-Isopropyltoluene | U | 0.21 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Naphthalene | U | 0.17 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Propylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Toluene | U | 0.27 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trimethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3,5-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Xylenes, Total | U | 0.86 | 3.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 87.2 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Dibromofluoromethane | 86.3 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| 4-Bromofluorobenzene | 85.7 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Diesel Range Organics (DRO) | U | 33. | 100 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Residual Range Organics (RRO) | 110 | 82. | 250 | ug/l | J | NWTPHDX | 05/30/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| o-Terphenyl | 87.3 | | | % Rec. | | NWTPHDX | 05/30/08 | 1 |
| Polynuclear Aromatic Hydrocarbons | | | | | | | | |
| Anthracene | U | 0.00054 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Acenaphthene | U | 0.0021 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Acenaphthylene | U | 0.0017 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |

U = ND (Not Detected)
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REPORT OF ANALYSIS

Leon Lahiere
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Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-06

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-06

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 14:00

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | U | 0.0012 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Benzo(a)pyrene | U | 0.0013 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Benzo(b)fluoranthene | U | 0.0012 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Benzo(g,h,i)perylene | U | 0.0013 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Benzo(k)fluoranthene | U | 0.0026 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Chrysene | U | 0.00082 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Dibenz(a,h)anthracene | U | 0.0012 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Fluoranthene | U | 0.00079 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Fluorene | U | 0.0013 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Indeno(1,2,3-cd)pyrene | U | 0.0014 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Naphthalene | 0.029 | 0.013 | 0.30 | ug/l | J | 8270C-S | 05/29/08 | 1.21 |
| Phenanthrene | U | 0.00088 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Pyrene | U | 0.0010 | 0.061 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| 1-Methylnaphthalene | U | 0.0023 | 0.30 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| 2-Methylnaphthalene | U | 0.0024 | 0.30 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| 2-Chloronaphthalene | U | 0.10 | 0.30 | ug/l | | 8270C-S | 05/29/08 | 1.21 |
| Surrogate Recovery | | | | | | | | |
| Nitrobenzene-d5 | 74.6 | | | % Rec. | | 8270C-S | 05/29/08 | 1.21 |
| 2-Fluorobiphenyl | 78.6 | | | % Rec. | | 8270C-S | 05/29/08 | 1.21 |
| p-Terphenyl-d14 | 98.5 | | | % Rec. | | 8270C-S | 05/29/08 | 1.21 |

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RDL = Reported Detection Limit = LOQ = PQL = EQL
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Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-07

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-07

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 14:30

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | 790 | 33. | 100 | ug/l | | NWTPHGX | 06/03/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| a,a,a-Trifluorotoluene(FID) | 94.1 | | | % Rec. | | NWTPHGX | 06/03/08 | 1 |
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Benzene | 0.30 | 0.29 | 1.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Butylbenzene | 64. | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| sec-Butylbenzene | 26. | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| tert-Butylbenzene | 1.2 | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | J3 | 8260B | 06/02/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |

U = ND (Not Detected)
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Est. 1970

REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-07

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-07

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 14:30

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Ethylbenzene | 1.8 | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Isopropylbenzene | 30. | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| p-Isopropyltoluene | U | 0.21 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Naphthalene | U | 0.17 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Propylbenzene | 93. | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Toluene | 0.63 | 0.27 | 5.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trimethylbenzene | 0.47 | 0.20 | 1.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| 1,2,3-Trimethylbenzene | 0.68 | 0.22 | 1.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| 1,3,5-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Xylenes, Total | U | 0.86 | 3.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 88.6 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Dibromofluoromethane | 85.2 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| 4-Bromofluorobenzene | 85.0 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Diesel Range Organics (DRO) | 860 | 33. | 100 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Residual Range Organics (RRO) | U | 82. | 250 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| o-Terphenyl | 86.4 | | | % Rec. | | NWTPHDX | 05/30/08 | 1 |
| Polynuclear Aromatic Hydrocarbons | | | | | | | | |
| Anthracene | 1.8 | 0.00051 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Acenaphthene | 3.0 | 0.0020 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Acenaphthylene | 0.54 | 0.0016 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-07

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-07

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 14:30

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 0.14 | 0.0012 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Benzo(a)pyrene | 0.013 | 0.0012 | 0.057 | ug/l | J | 8270C-S | 05/29/08 | 1.14 |
| Benzo(b)fluoranthene | 0.016 | 0.0012 | 0.057 | ug/l | J | 8270C-S | 05/29/08 | 1.14 |
| Benzo(g,h,i)perylene | U | 0.0012 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Benzo(k)fluoranthene | 0.0085 | 0.0024 | 0.057 | ug/l | J | 8270C-S | 05/29/08 | 1.14 |
| Chrysene | 0.14 | 0.00078 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Dibenz(a,h)anthracene | U | 0.0011 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Fluoranthene | 4.2 | 0.00074 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Fluorene | 3.9 | 0.0012 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Indeno(1,2,3-cd)pyrene | U | 0.0013 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Naphthalene | U | 0.012 | 0.29 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Phenanthrene | 8.5 | 0.00083 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Pyrene | 3.4 | 0.00095 | 0.057 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| 1-Methylnaphthalene | 11. | 0.0022 | 0.29 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| 2-Methylnaphthalene | U | 0.0022 | 0.29 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| 2-Chloronaphthalene | U | 0.094 | 0.29 | ug/l | | 8270C-S | 05/29/08 | 1.14 |
| Surrogate Recovery | | | | | | | | |
| Nitrobenzene-d5 | 34.4 | | | % Rec. | | 8270C-S | 05/29/08 | 1.14 |
| 2-Fluorobiphenyl | 86.7 | | | % Rec. | | 8270C-S | 05/29/08 | 1.14 |
| p-Terphenyl-d14 | 101. | | | % Rec. | | 8270C-S | 05/29/08 | 1.14 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-08

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-08

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 15:00

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | 1200 | 33. | 100 | ug/l | | NWTPHGX | 06/03/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| a,a,a-Trifluorotoluene(FID) | 94.5 | | | % Rec. | | NWTPHGX | 06/03/08 | 1 |
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Benzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Butylbenzene | 48. | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| sec-Butylbenzene | 24. | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| tert-Butylbenzene | 1.2 | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/02/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | J3 | 8260B | 06/02/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |

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REPORT OF ANALYSIS

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Five Centerpointe Dr, Ste 240
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June 04, 2008

ESC Sample # : L347487-08

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-08

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 15:00

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Ethylbenzene | 5.0 | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Isopropylbenzene | 50. | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| p-Isopropyltoluene | 0.30 | 0.21 | 1.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/02/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Naphthalene | 20. | 0.17 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| n-Propylbenzene | 130 | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Toluene | 0.55 | 0.27 | 5.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,4-Trimethylbenzene | 6.0 | 0.20 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,2,3-Trimethylbenzene | 10. | 0.22 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| 1,3,5-Trimethylbenzene | 0.60 | 0.20 | 1.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/02/08 | 1 |
| Xylenes, Total | 1.4 | 0.86 | 3.0 | ug/l | J | 8260B | 06/02/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 88.4 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Dibromofluoromethane | 84.0 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| 4-Bromofluorobenzene | 83.3 | | | % Rec. | | 8260B | 06/02/08 | 1 |
| Diesel Range Organics (DRO) | 130 | 33. | 100 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Residual Range Organics (RRO) | U | 82. | 250 | ug/l | | NWTPHDX | 05/30/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| o-Terphenyl | 89.3 | | | % Rec. | | NWTPHDX | 05/30/08 | 1 |
| Polynuclear Aromatic Hydrocarbons | | | | | | | | |
| Anthracene | 0.14 | 0.00053 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Acenaphthene | 0.26 | 0.0021 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Acenaphthylene | 0.042 | 0.0017 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |

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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-08

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : BM052308-08

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 15:00

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 0.14 | 0.0012 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Benzo(a)pyrene | 0.027 | 0.0012 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| Benzo(b)fluoranthene | 0.036 | 0.0012 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| Benzo(g,h,i)perylene | U | 0.0013 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Benzo(k)fluoranthene | 0.014 | 0.0025 | 0.059 | ug/l | J | 8270C-S | 05/29/08 | 1.18 |
| Chrysene | 0.13 | 0.00080 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Dibenz(a,h)anthracene | U | 0.0011 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Fluoranthene | 0.38 | 0.00077 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Fluorene | 0.16 | 0.0013 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Indeno(1,2,3-cd)pyrene | U | 0.0014 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Naphthalene | 2.1 | 0.013 | 0.30 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Phenanthrene | 0.41 | 0.00086 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Pyrene | 0.88 | 0.00098 | 0.059 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| 1-Methylnaphthalene | 4.0 | 0.0022 | 0.30 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| 2-Methylnaphthalene | 2.4 | 0.0023 | 0.30 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| 2-Chloronaphthalene | U | 0.097 | 0.30 | ug/l | | 8270C-S | 05/29/08 | 1.18 |
| Surrogate Recovery | | | | | | | | |
| Nitrobenzene-d5 | 62.8 | | | % Rec. | | 8270C-S | 05/29/08 | 1.18 |
| 2-Fluorobiphenyl | 89.1 | | | % Rec. | | 8270C-S | 05/29/08 | 1.18 |
| p-Terphenyl-d14 | 108. | | | % Rec. | | 8270C-S | 05/29/08 | 1.18 |

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REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-09

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : TRIPBLANK

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 00:00

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics | | | | | | | | |
| Acetone | U | 8.9 | 50. | ug/l | | 8260B | 06/03/08 | 1 |
| Acrolein | U | 14. | 50. | ug/l | | 8260B | 06/03/08 | 1 |
| Acrylonitrile | U | 1.7 | 10. | ug/l | | 8260B | 06/03/08 | 1 |
| Benzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Bromobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Bromodichloromethane | U | 0.37 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Bromoform | U | 0.51 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Bromomethane | U | 0.89 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| n-Butylbenzene | U | 0.23 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| sec-Butylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| tert-Butylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Carbon tetrachloride | U | 0.31 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Chlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Chlorodibromomethane | U | 0.42 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Chloroethane | U | 0.86 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 2-Chloroethyl vinyl ether | U | 1.4 | 50. | ug/l | | 8260B | 06/03/08 | 1 |
| Chloroform | U | 0.33 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Chloromethane | U | 0.25 | 2.5 | ug/l | | 8260B | 06/03/08 | 1 |
| 2-Chlorotoluene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 4-Chlorotoluene | U | 0.16 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2-Dibromo-3-Chloropropane | U | 0.48 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2-Dibromoethane | U | 0.48 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Dibromomethane | U | 0.28 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2-Dichlorobenzene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,3-Dichlorobenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,4-Dichlorobenzene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Dichlorodifluoromethane | U | 0.54 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,1-Dichloroethane | U | 0.31 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2-Dichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,1-Dichloroethene | U | 0.50 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| cis-1,2-Dichloroethene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| trans-1,2-Dichloroethene | U | 0.30 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2-Dichloropropane | U | 0.52 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,1-Dichloropropene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,3-Dichloropropane | U | 0.23 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| cis-1,3-Dichloropropene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| trans-1,3-Dichloropropene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 2,2-Dichloropropane | U | 0.25 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Di-isopropyl ether | U | 0.25 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Ethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Hexachlorobutadiene | U | 0.49 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Isopropylbenzene | U | 0.19 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |

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Est. 1970

REPORT OF ANALYSIS

Leon Lahiere
Hart Crowser - Portland, OR
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

June 04, 2008

ESC Sample # : L347487-09

Date Received : May 28, 2008
Description : Brix Maritime

Site ID :

Sample ID : TRIPBLANK

Project # : 15634-00/Task 05

Collected By : Chris Martin
Collection Date : 05/23/08 00:00

| Parameter | Result | MDL | RDL | Units | Q | Method | Date | Dil. |
|---|---|---|---|---|---|---|---|---|
| p-Isopropyltoluene | U | 0.21 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 2-Butanone (MEK) | U | 4.5 | 10. | ug/l | | 8260B | 06/03/08 | 1 |
| Methylene Chloride | U | 0.30 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 4-Methyl-2-pentanone (MIBK) | U | 1.4 | 10. | ug/l | | 8260B | 06/03/08 | 1 |
| Methyl tert-butyl ether | U | 0.19 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Naphthalene | U | 0.17 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| n-Propylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Styrene | U | 0.38 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,1,1,2-Tetrachloroethane | U | 0.40 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,1,2,2-Tetrachloroethane | U | 0.22 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoro | U | 0.22 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Tetrachloroethene | U | 0.29 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Toluene | U | 0.27 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2,3-Trichlorobenzene | U | 0.24 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2,4-Trichlorobenzene | U | 0.26 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,1,1-Trichloroethane | U | 0.27 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,1,2-Trichloroethane | U | 0.45 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Trichloroethene | U | 0.37 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Trichlorofluoromethane | U | 0.29 | 5.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2,3-Trichloropropane | U | 0.36 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2,4-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,2,3-Trimethylbenzene | U | 0.22 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| 1,3,5-Trimethylbenzene | U | 0.20 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Vinyl chloride | U | 0.27 | 1.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Xylenes, Total | U | 0.86 | 3.0 | ug/l | | 8260B | 06/03/08 | 1 |
| Surrogate Recovery | | | | | | | | |
| Toluene-d8 | 104. | | | % Rec. | | 8260B | 06/03/08 | 1 |
| Dibromofluoromethane | 106. | | | % Rec. | | 8260B | 06/03/08 | 1 |
| 4-Bromofluorobenzene | 108. | | | % Rec. | | 8260B | 06/03/08 | 1 |

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Attachment A
List of Analytes with QC Qualifiers

| Sample # | Analyte | Qualifier |
|---|---|---|
| L347487-01 | Diesel Range Organics (DRO) | J |
| | Chloromethane | J3 |
| | Anthracene | J |
| | Acenaphthene | J |
| | Acenaphthylene | J |
| | Benzo(a)anthracene | J |
| | Chrysene | J |
| | Fluorene | J |
| | Naphthalene | J |
| | 1-Methylnaphthalene | J |
| | 2-Methylnaphthalene | J |
| L347487-02 | Toluene | J |
| | Anthracene | J |
| | Acenaphthylene | J |
| | Naphthalene | J |
| | Phenanthrene | J |
| | 1-Methylnaphthalene | J |
| | 2-Methylnaphthalene | J |
| L347487-03 | Chloromethane | J3 |
| | Anthracene | J |
| | Acenaphthylene | J |
| | Benzo(g,h,i)perylene | J |
| | Indeno(1,2,3-cd)pyrene | J |
| | Naphthalene | J |
| | Phenanthrene | J |
| | Pyrene | J |
| | 1-Methylnaphthalene | J |
| | 2-Methylnaphthalene | J |
| L347487-04 | Chloromethane | J3 |
| | Acenaphthylene | J |
| | Benzo(a)pyrene | J |
| | Benzo(b)fluoranthene | J |
| | Benzo(k)fluoranthene | J |
| L347487-05 | Chloromethane | J3 |
| | Naphthalene | J |
| | 1,2,4-Trimethylbenzene | J |
| | 1,2,3-Trimethylbenzene | J |
| | Xylenes, Total | J |
| | Toluene-d8 | J2 |
| | Acenaphthylene | J |
| | Dibenz(a,h)anthracene | J |
| | Naphthalene | J |
| | Nitrobenzene-d5 | J2 |
| L347487-06 | Residual Range Organics (RRO) | J |
| | Chloromethane | J3 |
| | Naphthalene | J |
| L347487-07 | Benzene | J |
| | Chloromethane | J3 |
| | Toluene | J |
| | 1,2,4-Trimethylbenzene | J |
| | 1,2,3-Trimethylbenzene | J |
| | Benzo(a)pyrene | J |
| | Benzo(b)fluoranthene | J |
| | Benzo(k)fluoranthene | J |
| L347487-08 | Chloromethane | J3 |
| | p-Isopropyltoluene | J |
| | Toluene | J |
| | 1,3,5-Trimethylbenzene | J |
| | Xylenes, Total | J |
| | Acenaphthylene | J |
| | Benzo(a)pyrene | J |
| | Benzo(b)fluoranthene | J |
| | Benzo(k)fluoranthene | J |



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Attachment B
Explanation of QC Qualifier Codes

| Qualifier | Meaning |
|---|---|
| J | (EPA) - Estimated value below the lowest calibration point. Confidence correlates with concentration. |
| J2 | Surrogate recovery limits have been exceeded; values are outside lower control limits |
| J3 | The associated batch QC was outside the established quality control range for precision. |

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC.
Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods,it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable unless qualified as 'R' (Rejected).

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Differrence.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromotography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.



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Summary of Remarks For Samples Printed
06/04/08 at 16:59:42

TSR Signing Reports: 358

Sample: L347487-01 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

Sample: L347487-02 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

Sample: L347487-03 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

Sample: L347487-04 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

Sample: L347487-05 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

Sample: L347487-06 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

Sample: L347487-07 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

Sample: L347487-08 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

Sample: L347487-09 Account: HARCROPOR Received: 05/28/08 09:00 Due Date: 06/04/08 00:00 RPT Date: 06/04/08 16:18

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Est. 1970

Hart Crowser - Portland, OR
Leon Lahiere
Five Centerpointe Dr, Ste 240

Lake Oswego, OR 97035

Quality Assurance Report
Level II

L347487

June 04, 2008

Laboratory Blank

| Analyte | Result | Units | Date Analyzed | Batch |
|---|---|---|---|---|
| 1-Methylnaphthalene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| 2-Chloronaphthalene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| 2-Methylnaphthalene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Acenaphthene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Acenaphthylene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Anthracene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Benzo(a)anthracene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Benzo(a)pyrene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Benzo(b)fluoranthene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Benzo(g,h,i)perylene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Benzo(k)fluoranthene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Chrysene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Dibenz(a,h)anthracene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Fluoranthene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Fluorene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Indeno(1,2,3-cd)pyrene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Naphthalene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Phenanthrene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Pyrene | < .01 | ppm | 05/30/08 14:20 | WG363550 |
| Diesel Range Organics (DRO) | < .1 | ppm | 05/30/08 16:04 | WG363578 |
| 1-Methylnaphthalene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| 2-Chloronaphthalene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| 2-Methylnaphthalene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Acenaphthene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Acenaphthylene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Anthracene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Benzo(a)anthracene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Benzo(a)pyrene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Benzo(b)fluoranthene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Benzo(g,h,i)perylene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Benzo(k)fluoranthene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Chrysene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Dibenz(a,h)anthracene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Fluoranthene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Fluorene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Indeno(1,2,3-cd)pyrene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Naphthalene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Phenanthrene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Pyrene | < .01 | ppm | 05/31/08 17:50 | WG363909 |
| Gasoline Range Organics-NWTPH | < .1 | mg/l | 05/31/08 20:19 | WG364087 |
| 1,1,1,2-Tetrachloroethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,1,1-Trichloroethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,1,2,2-Tetrachloroethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,1,2-Trichloroethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,1-Dichloroethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,1-Dichloroethene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,1-Dichloropropene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,2,3-Trichlorobenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,2,3-Trichloropropane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,2,3-Trimethylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,2,4-Trichlorobenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,2,4-Trimethylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,2-Dibromo-3-Chloropropane | < .005 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,2-Dibromoethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,2-Dichlorobenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |



Confidential Business Information

00035499

ENVIRONMENTAL SCIENCE CORP.

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Tax I.D. 62-0814289

Est. 1970

Hart Crowser - Portland, OR
Leon Lahiere
Five Centerpointe Dr, Ste 240

Lake Oswego, OR 97035

Quality Assurance Report
Level II

L347487

June 04, 2008

| | | | | |
|---|---|---|---|---|
| 1,2-Dichloroethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |

Laboratory Blank

| Analyte | Result | Units | Date Analyzed | Batch |
|---|---|---|---|---|
| 1,2-Dichloropropane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,3,5-Trimethylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,3-Dichlorobenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,3-Dichloropropane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 1,4-Dichlorobenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 2,2-Dichloropropane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 2-Butanone (MEK) | < .01 | mg/l | 06/02/08 09:02 | WG364159 |
| 2-Chloroethyl vinyl ether | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 2-Chlorotoluene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 4-Chlorotoluene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| 4-Methyl-2-pentanone (MIBK) | < .01 | mg/l | 06/02/08 09:02 | WG364159 |
| Acetone | < .05 | mg/l | 06/02/08 09:02 | WG364159 |
| Acrolein | < .05 | mg/l | 06/02/08 09:02 | WG364159 |
| Acrylonitrile | < .01 | mg/l | 06/02/08 09:02 | WG364159 |
| Benzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Bromobenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Bromodichloromethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Bromoform | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Bromomethane | < .005 | mg/l | 06/02/08 09:02 | WG364159 |
| Carbon tetrachloride | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Chlorobenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Chlorodibromomethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Chloroethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Chloroform | < .005 | mg/l | 06/02/08 09:02 | WG364159 |
| Chloromethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| cis-1,2-Dichloroethene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| cis-1,3-Dichloropropene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Di-isopropyl ether | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Dibromomethane | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Dichlorodifluoromethane | < .005 | mg/l | 06/02/08 09:02 | WG364159 |
| Ethylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Hexachlorobutadiene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Isopropylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Methyl tert-butyl ether | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Methylene Chloride | < .005 | mg/l | 06/02/08 09:02 | WG364159 |
| n-Butylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| n-Propylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Naphthalene | < .005 | mg/l | 06/02/08 09:02 | WG364159 |
| p-Isopropyltoluene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| sec-Butylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Styrene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| tert-Butylbenzene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Tetrachloroethene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Toluene | < .005 | mg/l | 06/02/08 09:02 | WG364159 |
| trans-1,2-Dichloroethene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| trans-1,3-Dichloropropene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Trichloroethene | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Trichlorofluoromethane | < .005 | mg/l | 06/02/08 09:02 | WG364159 |
| Vinyl chloride | < .001 | mg/l | 06/02/08 09:02 | WG364159 |
| Xylenes, Total | < .003 | mg/l | 06/02/08 09:02 | WG364159 |
| Gasoline Range Organics-NWTPH | < .1 | mg/l | 06/02/08 19:31 | WG364190 |
| 1,1,1,2-Tetrachloroethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,1,1-Trichloroethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,1,2,2-Tetrachloroethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,1,2-Trichloroethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,1-Dichloroethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |



Confidential Business Information

00035500

ENVIRONMENTAL SCIENCE CORP.

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Lake Oswego, OR 97035

Quality Assurance Report
Level II

June 04, 2008

L347487

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|---|---|---|---|---|
| 1,1-Dichloroethene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |

Laboratory Blank

| Analyte | Result | Units | Date Analyzed | Batch |
|---|---|---|---|---|
| 1,1-Dichloropropene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2,3-Trichlorobenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2,3-Trichloropropane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2,3-Trimethylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2,4-Trichlorobenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2,4-Trimethylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2-Dibromo-3-Chloropropane | < .005 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2-Dibromoethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2-Dichlorobenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2-Dichloroethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,2-Dichloropropane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,3,5-Trimethylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,3-Dichlorobenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,3-Dichloropropane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 1,4-Dichlorobenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 2,2-Dichloropropane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 2-Butanone (MEK) | < .01 | mg/l | 06/03/08 04:45 | WG364286 |
| 2-Chloroethyl vinyl ether | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 2-Chlorotoluene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 4-Chlorotoluene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| 4-Methyl-2-pentanone (MIBK) | < .01 | mg/l | 06/03/08 04:45 | WG364286 |
| Acetone | < .05 | mg/l | 06/03/08 04:45 | WG364286 |
| Acrolein | < .05 | mg/l | 06/03/08 04:45 | WG364286 |
| Acrylonitrile | < .01 | mg/l | 06/03/08 04:45 | WG364286 |
| Benzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Bromobenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Bromodichloromethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Bromoform | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Bromomethane | < .005 | mg/l | 06/03/08 04:45 | WG364286 |
| Carbon tetrachloride | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Chlorobenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Chlorodibromomethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Chloroethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Chloroform | < .005 | mg/l | 06/03/08 04:45 | WG364286 |
| Chloromethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| cis-1,2-Dichloroethene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| cis-1,3-Dichloropropene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Di-isopropyl ether | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Dibromomethane | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Dichlorodifluoromethane | < .005 | mg/l | 06/03/08 04:45 | WG364286 |
| Ethylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Hexachlorobutadiene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Isopropylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Methyl tert-butyl ether | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Methylene Chloride | < .005 | mg/l | 06/03/08 04:45 | WG364286 |
| n-Butylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| n-Propylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Naphthalene | < .005 | mg/l | 06/03/08 04:45 | WG364286 |
| p-Isopropyltoluene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| sec-Butylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Styrene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| tert-Butylbenzene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Tetrachloroethene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Toluene | < .005 | mg/l | 06/03/08 04:45 | WG364286 |
| trans-1,2-Dichloroethene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| trans-1,3-Dichloropropene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Trichloroethene | < .001 | mg/l | 06/03/08 04:45 | WG364286 |
| Trichlorofluoromethane | < .005 | mg/l | 06/03/08 04:45 | WG364286 |
| Vinyl chloride | < .001 | mg/l | 06/03/08 04:45 | WG364286 |



Confidential Business Information

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Lake Oswego, OR 97035

Quality Assurance Report
Level II

L347487

June 04, 2008

| | | | | |
|---|---|---|---|---|
| Xylenes, Total | < .003 | mg/l | 06/03/08 04:45 | WG364286 |

Laboratory Blank

| Analyte | Result | Units | Date Analyzed | Batch |
|---|---|---|---|---|
| Gasoline Range Organics-NWTPH | < .1 | mg/l | 06/03/08 12:07 | WG364332 |
| 1,1,1,2-Tetrachloroethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,1,1-Trichloroethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,1,2,2-Tetrachloroethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,1,2-Trichloroethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,1-Dichloroethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,1-Dichloroethene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,1-Dichloropropene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2,3-Trichlorobenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2,3-Trichloropropane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2,3-Trimethylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2,4-Trichlorobenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2,4-Trimethylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2-Dibromo-3-Chloropropane | < .005 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2-Dibromoethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2-Dichlorobenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2-Dichloroethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,2-Dichloropropane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,3,5-Trimethylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,3-Dichlorobenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,3-Dichloropropane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 1,4-Dichlorobenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 2,2-Dichloropropane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 2-Butanone (MEK) | < .01 | mg/l | 06/04/08 07:23 | WG364471 |
| 2-Chloroethyl vinyl ether | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 2-Chlorotoluene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 4-Chlorotoluene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| 4-Methyl-2-pentanone (MIBK) | < .01 | mg/l | 06/04/08 07:23 | WG364471 |
| Acetone | < .05 | mg/l | 06/04/08 07:23 | WG364471 |
| Acrolein | < .05 | mg/l | 06/04/08 07:23 | WG364471 |
| Acrylonitrile | < .01 | mg/l | 06/04/08 07:23 | WG364471 |
| Benzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Bromobenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Bromodichloromethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Bromoform | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Bromomethane | < .005 | mg/l | 06/04/08 07:23 | WG364471 |
| Carbon tetrachloride | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Chlorobenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Chlorodibromomethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Chloroethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Chloroform | < .005 | mg/l | 06/04/08 07:23 | WG364471 |
| Chloromethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| cis-1,2-Dichloroethene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| cis-1,3-Dichloropropene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Di-isopropyl ether | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Dibromomethane | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Dichlorodifluoromethane | < .005 | mg/l | 06/04/08 07:23 | WG364471 |
| Ethylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Hexachlorobutadiene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Isopropylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Methyl tert-butyl ether | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Methylene Chloride | < .005 | mg/l | 06/04/08 07:23 | WG364471 |
| n-Butylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| n-Propylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Naphthalene | < .005 | mg/l | 06/04/08 07:23 | WG364471 |
| p-Isopropyltoluene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| sec-Butylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |



Confidential Business Information

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Lake Oswego, OR 97035

Quality Assurance Report
Level II

L347487

June 04, 2008

| | | | | |
|---|---|---|---|---|
| Styrene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |

Laboratory Blank

| Analyte | Result | Units | Date Analyzed | Batch |
|---|---|---|---|---|
| tert-Butylbenzene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Tetrachloroethene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Toluene | < .005 | mg/l | 06/04/08 07:23 | WG364471 |
| trans-1,2-Dichloroethene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| trans-1,3-Dichloropropene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Trichloroethene | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Trichlorofluoromethane | < .005 | mg/l | 06/04/08 07:23 | WG364471 |
| Vinyl chloride | < .001 | mg/l | 06/04/08 07:23 | WG364471 |
| Xylenes, Total | < .003 | mg/l | 06/04/08 07:23 | WG364471 |

Laboratory Control Sample

| Analyte | Units | Known Val | Result | % Rec | Limit | Batch |
|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | ppm | .001 | 0.000806 | 80.6 | 30-123 | WG363550 |
| 2-Chloronaphthalene | ppm | .001 | 0.000815 | 81.5 | 34-120 | WG363550 |
| 2-Methylnaphthalene | ppm | .001 | 0.000780 | 78.0 | 29-116 | WG363550 |
| Acenaphthene | ppm | .001 | 0.000946 | 94.6 | 40-113 | WG363550 |
| Acenaphthylene | ppm | .001 | 0.000869 | 86.9 | 36-115 | WG363550 |
| Anthracene | ppm | .001 | 0.00101 | 101. | 45-118 | WG363550 |
| Benzo(a)anthracene | ppm | .001 | 0.00115 | 115. | 36-129 | WG363550 |
| Benzo(a)pyrene | ppm | .001 | 0.00116 | 116. | 44-124 | WG363550 |
| Benzo(b)fluoranthene | ppm | .001 | 0.00111 | 111. | 43-126 | WG363550 |
| Benzo(g,h,i)perylene | ppm | .001 | 0.00118 | 118. | 39-128 | WG363550 |
| Benzo(k)fluoranthene | ppm | .001 | 0.000986 | 98.6 | 44-127 | WG363550 |
| Chrysene | ppm | .001 | 0.00114 | 114. | 36-137 | WG363550 |
| Dibenz(a,h)anthracene | ppm | .001 | 0.00116 | 116. | 39-129 | WG363550 |
| Fluoranthene | ppm | .001 | 0.00112 | 112. | 45-123 | WG363550 |
| Fluorene | ppm | .001 | 0.000961 | 96.1 | 41-118 | WG363550 |
| Indeno(1,2,3-cd)pyrene | ppm | .001 | 0.00117 | 117. | 39-129 | WG363550 |
| Naphthalene | ppm | .001 | 0.000850 | 85.0 | 26-111 | WG363550 |
| Phenanthrene | ppm | .001 | 0.00107 | 107. | 41-116 | WG363550 |
| Pyrene | ppm | .001 | 0.00104 | 104. | 32-136 | WG363550 |
| Diesel Range Organics (DRO) | mg/l | .75 | 0.479 | 63.9 | 50-150 | WG363578 |
| Residual Range Organics (RRO) | mg/l | 1.5 | 0.510 | 34.0 | 0-0 | WG363578 |
| 1-Methylnaphthalene | ppm | .001 | 0.000558 | 55.8 | 30-123 | WG363909 |
| 2-Chloronaphthalene | ppm | .001 | 0.000615 | 61.5 | 34-120 | WG363909 |
| 2-Methylnaphthalene | ppm | .001 | 0.000535 | 53.5 | 29-116 | WG363909 |
| Acenaphthene | ppm | .001 | 0.000807 | 80.7 | 40-113 | WG363909 |
| Acenaphthylene | ppm | .001 | 0.000763 | 76.3 | 36-115 | WG363909 |
| Anthracene | ppm | .001 | 0.00101 | 101. | 45-118 | WG363909 |
| Benzo(a)anthracene | ppm | .001 | 0.00122 | 122. | 36-129 | WG363909 |
| Benzo(a)pyrene | ppm | .001 | 0.00123 | 123. | 44-124 | WG363909 |
| Benzo(b)fluoranthene | ppm | .001 | 0.00119 | 119. | 43-126 | WG363909 |
| Benzo(g,h,i)perylene | ppm | .001 | 0.00125 | 125. | 39-128 | WG363909 |
| Benzo(k)fluoranthene | ppm | .001 | 0.000997 | 99.7 | 44-127 | WG363909 |
| Chrysene | ppm | .001 | 0.00120 | 120. | 36-137 | WG363909 |
| Dibenz(a,h)anthracene | ppm | .001 | 0.00126 | 126. | 39-129 | WG363909 |
| Fluoranthene | ppm | .001 | 0.00108 | 108. | 45-123 | WG363909 |
| Fluorene | ppm | .001 | 0.000917 | 91.7 | 41-118 | WG363909 |
| Indeno(1,2,3-cd)pyrene | ppm | .001 | 0.00125 | 125. | 39-129 | WG363909 |
| Naphthalene | ppm | .001 | 0.000511 | 51.1 | 26-111 | WG363909 |
| Phenanthrene | ppm | .001 | 0.00104 | 104. | 41-116 | WG363909 |
| Pyrene | ppm | .001 | 0.00110 | 110. | 32-136 | WG363909 |
| Gasoline Range Organics-NWTPH | mg/l | 5.5 | 5.67 | 103. | 70-124 | WG364087 |
| 1,1,1,2-Tetrachloroethane | mg/l | .05 | 0.0503 | 101. | 75-134 | WG364159 |



Confidential Business Information

00035503

ENVIRONMENTAL
SCIENCE CORP.

12065 Lebanon Rd.
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(615) 758-5858
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Tax I.D. 62-0814289

Est. 1970

Hart Crowser - Portland, OR
Leon Lahiere
Five Centerpointe Dr, Ste 240
Lake Oswego, OR 97035

Quality Assurance Report
Level II

L347487

June 04, 2008

| | | | | | | |
|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | mg/l | .05 | 0.0496 | 99.3 | 67-137 | WG364159 |

| Analyte | Units | Laboratory Control Sample Known Val | Result | % Rec | Limit | Batch |
|---|---|---|---|---|---|---|
| 1,1,2,2-Tetrachloroethane | mg/l | .05 | 0.0583 | 117. | 72-128 | WG364159 |
| 1,1,2-Trichloroethane | mg/l | .05 | 0.0545 | 109. | 79-123 | WG364159 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | mg/l | .05 | 0.0669 | 134. | 51-149 | WG364159 |
| 1,1-Dichloroethane | mg/l | .05 | 0.0471 | 94.1 | 67-133 | WG364159 |
| 1,1-Dichloroethene | mg/l | .05 | 0.0483 | 96.6 | 60-130 | WG364159 |
| 1,1-Dichloropropene | mg/l | .05 | 0.0533 | 107. | 68-132 | WG364159 |
| 1,2,3-Trichlorobenzene | mg/l | .05 | 0.0500 | 99.9 | 63-138 | WG364159 |
| 1,2,3-Trichloropropane | mg/l | .05 | 0.0526 | 105. | 68-130 | WG364159 |
| 1,2,3-Trimethylbenzene | mg/l | .05 | 0.0501 | 100. | 70-127 | WG364159 |
| 1,2,4-Trichlorobenzene | mg/l | .05 | 0.0511 | 102. | 65-137 | WG364159 |
| 1,2,4-Trimethylbenzene | mg/l | .05 | 0.0504 | 101. | 72-135 | WG364159 |
| 1,2-Dibromo-3-Chloropropane | mg/l | .05 | 0.0566 | 113. | 55-134 | WG364159 |
| 1,2-Dibromoethane | mg/l | .05 | 0.0556 | 111. | 75-126 | WG364159 |
| 1,2-Dichlorobenzene | mg/l | .05 | 0.0519 | 104. | 75-122 | WG364159 |
| 1,2-Dichloroethane | mg/l | .05 | 0.0472 | 94.4 | 63-137 | WG364159 |
| 1,2-Dichloropropane | mg/l | .05 | 0.0551 | 110. | 74-122 | WG364159 |
| 1,3,5-Trimethylbenzene | mg/l | .05 | 0.0506 | 101. | 73-134 | WG364159 |
| 1,3-Dichlorobenzene | mg/l | .05 | 0.0495 | 98.9 | 73-131 | WG364159 |
| 1,3-Dichloropropane | mg/l | .05 | 0.0512 | 102. | 77-119 | WG364159 |
| 1,4-Dichlorobenzene | mg/l | .05 | 0.0511 | 102. | 70-121 | WG364159 |
| 2,2-Dichloropropane | mg/l | .05 | 0.0513 | 103. | 46-151 | WG364159 |
| 2-Butanone (MEK) | mg/l | .25 | 0.269 | 108. | 53-132 | WG364159 |
| 2-Chloroethyl vinyl ether | mg/l | .25 | 0.298 | 119. | 0-171 | WG364159 |
| 2-Chlorotoluene | mg/l | .05 | 0.0495 | 99.0 | 74-128 | WG364159 |
| 4-Chlorotoluene | mg/l | .05 | 0.0515 | 103. | 74-130 | WG364159 |
| 4-Methyl-2-pentanone (MIBK) | mg/l | .25 | 0.306 | 122. | 60-142 | WG364159 |
| Acetone | mg/l | .25 | 0.254 | 101. | 48-134 | WG364159 |
| Acrolein | mg/l | .25 | 0.232 | 92.8 | 6-182 | WG364159 |
| Acrylonitrile | mg/l | .25 | 0.298 | 119. | 60-140 | WG364159 |
| Benzene | mg/l | .05 | 0.0507 | 101. | 67-126 | WG364159 |
| Bromobenzene | mg/l | .05 | 0.0495 | 99.1 | 76-123 | WG364159 |
| Bromodichloromethane | mg/l | .05 | 0.0533 | 107. | 68-133 | WG364159 |
| Bromoform | mg/l | .05 | 0.0611 | 122. | 60-139 | WG364159 |
| Bromomethane | mg/l | .05 | 0.0354 | 70.7 | 45-175 | WG364159 |
| Carbon tetrachloride | mg/l | .05 | 0.0489 | 97.8 | 64-141 | WG364159 |
| Chlorobenzene | mg/l | .05 | 0.0515 | 103. | 77-125 | WG364159 |
| Chlorodibromomethane | mg/l | .05 | 0.0555 | 111. | 73-138 | WG364159 |
| Chloroethane | mg/l | .05 | 0.0397 | 79.4 | 49-155 | WG364159 |
| Chloroform | mg/l | .05 | 0.0472 | 94.4 | 66-126 | WG364159 |
| Chloromethane | mg/l | .05 | 0.0278 | 55.6 | 45-152 | WG364159 |
| cis-1,2-Dichloroethene | mg/l | .05 | 0.0502 | 100. | 72-128 | WG364159 |
| cis-1,3-Dichloropropene | mg/l | .05 | 0.0566 | 113. | 73-131 | WG364159 |
| Di-isopropyl ether | mg/l | .05 | 0.0585 | 117. | 63-139 | WG364159 |
| Dibromomethane | mg/l | .05 | 0.0527 | 105. | 73-125 | WG364159 |
| Dichlorodifluoromethane | mg/l | .05 | 0.0328 | 65.6 | 39-189 | WG364159 |
| Ethylbenzene | mg/l | .05 | 0.0521 | 104. | 76-129 | WG364159 |
| Hexachlorobutadiene | mg/l | .05 | 0.0510 | 102. | 67-135 | WG364159 |
| Isopropylbenzene | mg/l | .05 | 0.0524 | 105. | 73-132 | WG364159 |
| Methyl tert-butyl ether | mg/l | .05 | 0.0563 | 113. | 51-142 | WG364159 |
| Methylene Chloride | mg/l | .05 | 0.0379 | 75.8 | 64-125 | WG364159 |
| n-Butylbenzene | mg/l | .05 | 0.0575 | 115. | 63-142 | WG364159 |
| n-Propylbenzene | mg/l | .05 | 0.0523 | 105. | 71-132 | WG364159 |
| Naphthalene | mg/l | .05 | 0.0519 | 104. | 56-145 | WG364159 |
| p-Isopropyltoluene | mg/l | .05 | 0.0519 | 104. | 68-138 | WG364159 |
| sec-Butylbenzene | mg/l | .05 | 0.0528 | 106. | 70-135 | WG364159 |
| Styrene | mg/l | .05 | 0.0577 | 115. | 78-130 | WG364159 |
| tert-Butylbenzene | mg/l | .05 | 0.0512 | 102. | 72-134 | WG364159 |
| Tetrachloroethene | mg/l | .05 | 0.0542 | 108. | 67-135 | WG364159 |
| Toluene | mg/l | .05 | 0.0533 | 107. | 72-122 | WG364159 |



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