STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
1250 W Alder St • Union Gap, WA 98903-0009 • (509) 575-2490

September 17, 2019

Mike Stringer
Maul Foster and Alongi, Inc.
2815 2nd Avenue, Suite 540
Seattle, WA 98121

RE: Ecology Comments on DRAFT High Resolution Site Characterization Report for Former Tiger Oil Site, Yakima

- **Site Name:** Tiger Oil
- **Site Address:** 2312 West Nob Hill Boulevard, Yakima
- **Facility/Site ID No.:** 469
- **Cleanup Site ID No.:** 4919

The Washington State Department of Ecology (Ecology) has reviewed the DRAFT High Resolution Site Characterization Report for the Former Tiger Oil Site in Yakima and has the following comments:

General Comments

The residual LNAPL is due to interbedded silt units in a gravelly substrate. Do you believe there is a need to decommission/relocate any existing groundwater monitoring wells that have breached through these interbedded silts in order to prevent vertical migration of LNAPL?

In order to assess the relationship of the OIP/MIP and soil and groundwater data, cross sections need to display both data together. More than one cross section is warranted for the OIP area and the MIP area. Both longitudinal and transverse cross sections are recommended. The inset index map should show the cross section line. Note that high and low water levels should be shown on all cross sections.

Lithologies are a critical component of the analysis. Boring logs were not found in the appendices and are a critical component of the report. Hydrostratigraphic cross sections are needed. In these cross sections, the HPT data should be shown along with the lithologies.

Please add the following ITRC NAPL definitions within Section 1 of the report (https://lnapl-3.itrcweb.org/glossary/):

Residual LNAPL is the fraction of an LNAPL body that will remain immobile and hydraulically unrecoverable under prevailing hydraulic conditions (i.e., will not flow into a well).

Mobile LNAPL is LNAPL that exists above residual saturation levels such that it may be observed in wells. Mobile LNAPL has the potential to migrate, but not all mobile LNAPL is migrating LNAPL.

Migrating LNAPL is an LNAPL body that is expanding laterally or vertically into areas previously un-impacted by LNAPL. The term 'migration' describes LNAPL movement on a macro or plume scale, which can occur only if the LNAPL driving mechanisms (e.g., LNAPL head) exceed the resistive mechanisms, and thus displace water in adjacent pore spaces. Natural and manmade preferential pathways may exist at a given site that could allow migration to occur where it would not otherwise be expected.

LNAPL Hydraulic Recoverability. Historically, a conceptual representation of hydraulic recovery/potential recovery. The concept of volume of LNAPL that can be hydraulically extracted under a particular pressure differential. Potential hydraulic recoverability reflects the volume of LNAPL above the residual saturation; however, due to inherent inefficiencies in extraction, recoverability typically reaches near zero values before residual saturations are attained. Not quantitative – points to metrics of recoverability.

Apparent NAPL Thickness is the gauged thickness of LNAPL in a well that is screened across the Mobile NAPL Interval. The Apparent NAPL Thickness may be equivalent to the Mobile NAPL Interval in a well at equilibrium under unconfined conditions. Under confined and perched conditions, the Apparent NAPL Thickness may be exaggerated compared to the Mobile NAPL Interval.

Please review **all** figures and update legends to include all of the information included in the figure.

Section 4.4 LNAPL Transmissivity Determination

Although this section is titled LNAPL Transmissivity Determination, Ecology did not see that any transmissivity determination was actually made during the investigation.

For clarity, does this report state that LNAPL transmissivity could not be determined? Please respond by amending this paragraph.

Section 4.5.1 Dissolved-Phase plume relative hydraulic conductivity measurements

What is the accuracy of the HPT software used to calculate the hydraulic conductivity? Please respond by amending this paragraph.

Section 4.6.1 Natural Source Zone Depletion Evaluation

Ecology requests addition of a new report section, Section 7 – Analysis of Natural Source Zone Depletion and Monitored Natural Attenuation. Conclusions and Recommendations would become Section 8. The NSZD analysis should include the following subsections:

- NSZD Analysis based on estimation of product thickness/volume over time.
- NSZD Analysis based on CO2 flux data.
- NSZD Analysis based on soil vapor data.
- Estimation of cleanup times based on the NSZD analyses. This should include an estimated range of achieving cleanup levels and discussion of uncertainties.

Please address all of these comments and resubmit the FINAL High Resolution Site Characterization Report for Former Tiger Oil within 90 days of the receipt of this letter. As always, I am available to discuss any questions and/or concerns you may have with these comments. You can reach me via telephone at (509) 454-7840 and via email at Mary.Monahan@ecy.wa.gov.

Regards,

Mary Monahan

Mary Monahan
Project Coordinator
Toxics Cleanup Program
Central Regional Office

By certified mail: 7014 3490 0001 5526 9316

cc: Joan Davenport, City of Yakima
Yen-Vy Van, Maul Foster & Alongi, Inc.
John Level, AAG

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits. TCP RL

1. Article Addressed to:

Mike Stringer
Maul Foster & Alonghi, Inc.
2815 2nd Avenue, Suite 540
Seattle, WA 98121

9590 9402 3667 7335 4344 23

2. Article Number *(Transfer from service label)*
7014 3490 0001 5526 9316

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☑ Agent ☐ Addressee

B. Received by *(Printed Name)* Emily Hendrickson
C. Date of Delivery 9/20/2019

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☑ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☑ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2015 PSN 7530-02-000-9053 ...stic Return Receipt

USPS TRACKING #

9590 9402 3667 7335 4344 23

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

United States Postal Service

RECEIVED
SEP 23 2019
Dept of Ecology
Central Regional Office

• Sender: Please print your name, address, and ZIP+4® in this box•

Department of Ecology
1250 W. Alder Street
Union Gap, WA 98903-0009