RESPONSE TO TECHNICAL REVIEW COMMENTS
Biosparge Pilot Study Work Plan
For the 1987 Hot Oil Pipeline Release
Tesoro Alaska Company, LLC. Kenai, Alaska

11/9/2021

EPA Comment / Recommendations	Response
EPA agrees generally with Tesoro's proposal for a pilot test of bio-sparge technology to treat the 1987 Hot Oil Release and enhance natural source zone depletion. EPA understands that the pilot test includes installing and operating one bio-sparge well. Existing monitoring wells and three new vapor points will be monitoring for effectiveness performance during the pilot test. A full-scale bio-sparge system will be proposed in spring 2022 if the pilot test shows bio-sparge technology is effective.	Noted.
Alaska Department of Environmental Conservation (ADEC) and EPA had a tele-conference on October 8, 2021 to discuss issues regarding the bluff face erosion and the recent beach seep sheen releases in late September 2021. EPA and ADEC are concerned that the bluff face erosion will continue and oil product releases from bluff (perched water zone) and beach seep sheen (deeper water table zone) may become more frequent in the future. It is urgent that Tesoro take additional measures to protect the bluff from further erosion and future beach seep releases. In a review of Tesoro's "Updated Conceptual Site Model and Remedial Alternative Evaluation for the 1987 Hot Oil Pipeline Release" Report, EPA commented that a sheet pile wall extension will likely be needed to protect bluff shoreline and prevent further bluff erosion (specific comment #13, EPA comments dated August 17, 2020). The benefit of a physical containment remedy must be reconsidered by Tesoro.	Tesoro, EPA, and ADEC had a tele-conference on October 14, 2021, to discuss a rock wall to fulfill this request of erosion protection. The proposal was accepted by EPA and ADEC and a workplan submitted on October 26, 2021. Tesoro will submit a report summarizing the installation within 60 days of completion of the work.
ADEC and EPA are concerned that the beach seep sheen releases may be connected with the PIRM Area LNAPL and benzene plume and must be further evaluated and addressed. Based on groundwater flow direction and locations of beach seep sheen and LNAPL plume within the A-Aquifer in the PIRM Area, the beach seep sheen release could be traced to the PIRM LNAPL plume within the A-aquifer. Further groundwater sampling and chemical analysis, including benzene, toluene, ethylbenzene, xylenes (BTEX), gasoline range organics (GRO), diesel range organics (DRO), must be conducted from several upgradient wells near the 1987 Hot Oil Pipeline. Well E-128/129, E-168, E-250, E-152, and E-189, as well as beach pore water samples must be collected. Pore water quality from the beach seep sheen location must be compared with groundwater samples from upgradient A-aquifer wells. This additional groundwater and pore water sampling must be incorporated into baseline sampling for this pilot study or the next quarterly sampling event.	The CSM/RAE report identifies multiple lines of evidence suggesting the petroleum sheen and impacts identified at the bluff and beach is related to the Hot Oil Pipeline release and separate from the Refinery plume as follows: • The 1987 diesel fuel release and subsequent excavation and pipeline replacement, and historical remediation work described in Section 2.1, identified this area as the source of petroleum impacts at the downgradient beach area. • The 2020 CSM Report identifies differences in constituents between beach/bluff samples and PRM area samples as follows: - Groundwater collected from bluff wells E-257A, E-257B, B-1 and B-2 contain DRO concentrations greater than 1,000 ug/L up to 12,500 ug/L, whereas PRM wells (E-128, E-129, E-163, E-187B, E-196R) are non-detect for DRO. - Benzene is not-detected in bluff wells (E-257B, E-258, B-1, B-2, E-128, E-163, E187B, and E196R); although it is present at low levels in E-257A (perched) which suggests that benzene was not absent from the hot oil source (attenuation of benzene between low level source areas and the beach is a reasonable conclusion). In contrast, the PRM plume benzene concentrations range from above 100 ug/L to 1,000 ug/L in the A-aquifer and B-aquifers behind treatment systems, respectively. • Well E-152 is currently (and historically has been) a delineating well between the PRM plume and the beach based on the absence of DRO and benzene. • Groundwater elevations at the beach seep wells (E-257A, B-1) are greater than at upgradient well E-152. This suggests that groundwater flow is likely not occurring between wells E-152 and B-1 or E-257A. • The requested sampling of porewater at the beach (as practical and accessible) and groundwater from upgradient wells will be added to the next quarterly or baseline event.
A soil vapor extraction (SVE) system may be needed for the full-scale bio-sparge system based on the results of vapor monitoring for the pilot test. Extracted soil vapor may also need treatment before discharge to ambient air.	Text in Section 2.1 was revised to clarify the purpose of vapor monitoring would to evaluate if there is a vapor migration concern that would need mitigated.
Effectiveness monitoring for the pilot test (as shown in Table 1) needs to be further clarified and revised accordingly. See specific comment #6 below for questions and comments regarding monitoring location, sample type and schedule.	Table 1 updated as specified in comment 6.
SPECIFIC COMMENTS	
1. Page 2-2, Section 2.2, Background Monitoring bullets continued on page 2-3:	
Well B-1 must be added to the background monitoring well list for soil gas and groundwater field screening as well as groundwater analytical sampling, in addition to the new air-sparge well BSB-01, monitoring well pair E-257A/B and E-258.	The document was been updated to include B-1 for soil gas screening, groundwater field screening, and analytical groundwater sampling.

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2. Page 2-3, section 2.2, Monitoring immediately following operation of BSB-01 for 24 to 48 hours. Well B-1 must be added for soil gas and groundwater field parameter measurements and groundwater analytical sampling for BTEX, GRO, DRO, and natural attenuation parameters. Data from well B-1 will show how far the bio-sparge well operation at BSB-01 can impact to the south.	Section 2.2 has been updated to include B-1 in post pilot test sampling.
3. Page 3-1, Section 3.1.2, last paragraph. EPA understands that total depth, screen intervals, and construction details for the bio-sparge well BSB-01 will be determined after soil logging of the boring. The estimated total depth of 60-70 feet is reasonable. However, the total depth of the three vapor monitoring points should be specified in this paragraph. Based on Figure 2, the depth of vapor monitoring points appears to be approximately six to seven feet.	The paragraph has been edited to clarify construction of BSV wells and BSB well(s). Additional text has been added, consistent with Figure 2, to state the screen depth of the vapor monitoring points will be 5-6 ft bgs
4. Page 3-2, Section 3.1.3. The Work Plan states that analytical soil samples will be collected as needed. This statement must be further specified. What criteria will be used to determine soil samples need to be collected? How many soil samples will be collected? What physical and chemical analyses will need to be conducted? EPA recommends that at least two soil samples be collected from BSB-01 boring. The two soil samples must be collected at the tops of perched groundwater and underlying water table. Soil samples must be analyzed for grain size (sieve analysis), BTEX, GRO and DRO. Two drilling methods (direct push [DP] and hollow stem auger [HAS]) were proposed for BSB-01. Based on the well design for BSB-01 in Figure 2, direct push rig cannot be used for 10-in diameter boring. Two separate DP borings may be needed for the two well screens if a DP rig is used for drilling. The Work Plan must also specify if pre-packed well screen has to be used for DP drilling method. Pre-packed well screen and sand pack may be less efficient than regular well screen and installed sand pack. Therefore, HAS drilling methods should be used to install BSB-01.	Data collected from borings E-257A and E-257B during the 2019 investigation included DRO, GRO, BTEX; and sieve analysis at E-257-B which were referenced as rationale for the biosparge pilot test location. The intent of the statement in the text was to collect additional data based on professional judgement of the field lead, if conditions appeared different. However, two soil samples from BSB-01 will be collected as recommended to confirm subsurface conditions in the pilot biosparge well. Drilling techniques will be based on availability of contractor and equipment. Direct push is preferred based on the scope of work, but drilling can be effectively completed with a hollow stem auger rig as well. The text has been updated to specify the pilot study will consist of one five-foot well screen at the known water table depth of approximately 50-60 ft bgs. Figure 2 has been edited to be consistent with the text.
5. Page 3-5, Section 3.4.4: The rationale for adjusting bio-sparge well air flow to make PID readings at the three vapor sampling ports equal to the pre-startup levels must further be explained. The text should also specify if other soil gas monitoring (O2, CO2, and CH4) will also be conducted at the three vapor monitoring points. In addition, the text must also specify vapor analytical sampling for BTEX analysis using Suma canisters if PID readings are greater than 10 parts per million (ppm), as discussed in Section 2.2 of the Work Plan.	Section 3.3 and 3.4.4 were updated based on the comment. The intent of adjusting injection pressures was because that the pilot test will inject at slightly higher than typical biosparging pressures in order to achieve dissolved oxygen increases in groundwater and monitor effects. However, the document has been adjusted to indicate pressures will injected at slightly hire pressures (5-10 PSI), but Section 3.4.4 was revised to state only that vapor analytical samples will be collected from vapor points based on PID screening results (pressures will not be decreased).
6. Table 1: This table includes all pre- and post-pilot test monitoring schedule and locations. The information presented in this table is confusing. The table must be checked and revised according the following comments: • B-1 must be added to the "Groundwater Field Screening and Analytical (BTEX, GRO, DRO, NSZD)" column for both pre- and post-pilot test. • It is unclear what the "Dissolved Oxygen" column refers to. What is the difference between this column and the groundwater field measurement of "DO" in the first column? • It is unclear what the "Dissolved Oxygen" column refers to. What is the difference between this column and the groundwater field measurement of "DO" in the first column? • Dissolved oxygen should be removed for BSV-1 because it is a vapor sampling port and no water sample can be collected. • It is assumed that soil gas screening using multi-gas meter (O2, CO2, and CH4) can be conducted on both monitoring wells and vapor sampling ports. It is unclear why multi-gas screening will only be conducted at BSV-01, not BSV-02 and BSV-03. Soil gas screening must be conducted at BSV-02 and BSV-03 pre-and post-pilot test. • VOC screening using PID and Suma canister vapor sampling (last column) was proposed only for BSV-02 and BSV-03. BSV-01 must be added to the VOC screening and vapor sampling.	Table 1 corrections and clarifications completed including: - Added B-1 to groundwater collection - Clarified DO collection differences - Removed BSV-01 from DO monitoring - BSV gas sampling expanded to all BSV wells - BSV PID screening and possible sampling added to BSV-1