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October 17, 2024

Washington State Department of Ecology
Southwest Regional Office
PO Box 47775
Olympia, Washington 98504-7775

Attention: Thomas Praisewater, Site Manager

Subject: Request for Extension of Well MW-5 Area Pilot Study implementation and Engineering Design Report Submittal
NuStar Terminals Operations Partnership L.P. Vancouver Annex Terminal
Agreed Order No. DE 19602
Vancouver, Washington
File No. 19001-008-13

This letter requests an extension for implementation of the well MW-5 area pilot study and the submittal date for the Engineering Design Report (EDR). The EDR is required pursuant to Agreed Order No. DE 19602 (the Order) for the NuStar Terminals Operations Partnership L.P. (NuStar) Vancouver Annex Terminal (the Site). The Site is located at 5420 NW Fruit Valley Road in Vancouver, Washington.

The Order requires implementation of a Cleanup Action Plan (CAP), which is Appendix B of the Order. An EDR for the recirculation systems is due on December 31, 2024, pursuant to the schedule in Appendix C of the Order and Washington Department of Ecology (Ecology) approval of a prior extension request that allowed for completion of a groundwater recirculation system pilot study in the MW-5 area before designing the full-scale systems for the well MW-5 and MW-6 areas. Ecology approved the Groundwater Recirculation System Pilot Study Work Plan[1] and the EDR extension in April 2024[2] and December 2023[3], respectively.

[1] Aquifer Testing Results Report and Recirculation System Pilot Study Work Plan, Vancouver Annex Terminal, prepared by GeoEngineers, dated February 1, 2024.

[2] Letter regarding Ecology Approval—Extension of Submittal Date for Engineering Design Report, NuStar Vancouver Annex Terminal Site, from Andrew Smith of Ecology to Renee Robinson of NuStar Energy dated December 26, 2023.

[3] Letter regarding Ecology Approval—Recirculation System Pilot Study Work Plan, NuStar Vancouver Annex Terminal Site, FSID 61862781, from Andrew Smith of Ecology to Renee Robinson of NuStar Energy dated April 8, 2024.

As discussed during a site walk on September 12, 2024, attended by the Ecology Site Manager, GeoEngineers, and terminal staff, we are requesting that the selection of the MW-5 area remedial technology be delayed for multiple reasons, including:

- Complications with the electrical hookup required to operate the recirculation system while also meeting the Facility's health and safety requirements;
- Uncertainty about the effectiveness of the groundwater recirculation system in the less permeable shallow water bearing zone in the well MW-5 area; and,
- The initial favorable results of the PetroFix® (a proprietary solution comprised of activated carbon and electron acceptors manufactured by Regenesis) injections in the well MW-11 area, suggesting it would be valuable to conduct continued evaluation of the MW-11 pilot study prior to selecting a pilot study approach for the MW-5 area.

Each of these elements is discussed further below followed by our recommended approach, consistent with discussions in our meeting on September 12, 2024.

Recirculation Pilot Study Implementaton Complications

Implementation of the recirculation pilot study requires a power source near the pilot study area to operate the extraction and injection pumps and treatment unit that comprise the recirculation system. A power source is not present in the pilot study area and an electrical hookup would need to be installed. In addition, the vendor's treatment unit needs to meet electrical safety specifications of the Facility or be located outside of the operational areas. The treatment unit developed by the recirculation vendor, ETEC, does not meet these specifications and therefore would need to be located outside of the operational area, requiring significant additional logistical and cost elements to implement.

Well MW-5 Area Pilot Study Effectiveness

GeoEngineers' initial remedial technology screening performed for the Feasibility Study[4] supported that implementation of a recirculation system would be equally effective and less costly than conducting in situ injections such as PetroFix. However, a pilot study for recirculation technology was proposed prior to implementing a full-scale system due to the potential that the low permeability soil in the shallow water bearing zone in this area would limit the implementability of the system; preliminary cost analysis suggested that a pilot study could be conducted in a cost-efficient manner. However, the implementation complications encountered and detailed above have increased the pilot study costs such that other remedial technologies might be more cost effective.

[4] Supplemental Remedial Investigation and Revised Feasibility Study, Vancouver Annex Terminal, prepared by Cascadia Associates, LLC., dated October 20, 2020,

Well MW-11 Area PetroFix Pilot Study Evaluation

A pilot study of in-situ bioremediation/stabilization product injections was initiated in the well MW-11 area in November 2023 and is detailed in the Aquifer Testing Results Report[5]. The pilot study consisted of injecting PetroFix in the shallow water bearing zone in the vapor recovery unit (VRU) area around well MW-11. Three quarters of groundwater sampling in and around well MW-11 have been conducted since the injections were completed and show that gasoline and diesel-range petroleum hydrocarbon concentrations have been reduced to below laboratory detection limits. Benzene, toluene, ethylbenzene, and xylenes (BTEX) were not detected in the first two sampling events following the injections; however, benzene was detected during the most recent event although well below the cleanup goals for the Site. Toluene, ethylbenzene, and xylenes remain below the laboratory detection limit.

Recommendations

Based on the complications and significant cost to implement the recirculation pilot study in the well MW-5 area, and the apparent effectiveness of PetroFix in the well MW-11 area, we recommend that the recirculation system pilot study be placed on hold while additional data from the well MW-11 area is obtained to further evaluate the PetroFix technology and its potential efficacy in the MW-5 area. Despite the initial results indicating that the PetroFix injections have lowered hydrocarbon concentrations around MW-11, contaminant rebound is a known concern with in-situ bioremediation/stabilization products such as PertroFix. As such, we recommend collecting four more quarters of groundwater data from MW-11 to allow further assessment for potential rebound. If the evaluation finds that petroleum hydrocarbon concentrations in MW-11 remain below cleanup levels, we anticipate recommending that a pilot study using PetroFix be conducted in the MW-5 area.

Concurrently with the ongoing quarterly monitoring of MW-11, we propose conducting an injection feasibility test in the MW-5 area. The injection feasibility test will include advancing two injection points adjacent to MW-5 and pumping approximately 250 gallons of water (which has a similar viscosity to PetroFix) into the injection depth interval (e.g., 10 to 25 feet below ground surface). The PetroFix injections will be considered potentially applicable for the MW-5 area if the prescribed volume of water can be successfully injected into the shallow water bearing zone within an 8-hour work day without appreciable daylighting.

Extension Request

On behalf of NuStar Terminals Operations Partnership L.P., GeoEngineers requests an extension for the submittal of the EDR until further evaluation of the well MW-11 area pilot study results can be completed and a remedial technology pilot study can be conducted in the well MW-5 area (either recirculation or PetroFix injections depending upon the results of the MW-11 pilot study results and the proposed injection study in the well MW-5 area). Following completion of four additional groundwater sampling events in the well MW-11 area, Ecology will be consulted with our recommended remedial technology for the MW-5 area. A Revised MW-5 Area Pilot Study Plan will be submitted to Ecology for review and approval by September 30, 2025, prior to conducting the MW-5 Area pilot study.

[5] Aquifer Testing Results Report and Recirculation System Pilot Study Work Plan, Vancouver Annex Terminal, prepared by GeoEngineers, dated February 1, 2024.

We also request that the submittal date for the EDR be revised to December 31, 2026, to allow for four quarters of monitoring following implementation of the well MW-5 area pilot study.

As we discussed, this proposed approach will not result in any additional risk to surrounding receptors given that the long-term groundwater monitoring shows that petroleum hydrocarbon concentrations are stable and not migrating off site. Furthermore, the selected pilot study remedial technology will promote groundwater recovery while allowing development of longer-term design parameters once implemented.

If you have any questions about this proposed extension request, please do not hesitate to call Phil Cordell at (503) 603-6676 or Victoria Wark with Evergreen at (210) 918-2257.

Sincerely,
GeoEngineers, Inc.

Phil Cordell
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Amanda Spencer
Senor Principal Hydrogeologist

PC:ALS:jm

cc: Victoria Wark, Evergreen Resources Management Operations (electronic deliverable)
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