

Cleanup Action Plan

Darling-Tacoma Facility

(aka Darling Delaware Co., Inc. and Puget Sound By-Products)

Facility No.: 25455514, Cleanup Site No.: 8475, VCP Project No.: SW1317

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PRESENTED TO

Darling Ingredients, Inc.

5601 N. MacArthur Blvd.
Irving, TX 75038

PRESENTED BY

Tetra Tech, Inc.

2525 Palmer Street, Suite 2
Missoula, MT 59808

P +1-406-543-3045

tetrattech.com

Prepared by:



10-29-20

Natalie J. Morrow, LG, LHG
Project Manager/Sr. Env. Geologist

Date

Reviewed by:



10-29-20

Date



Jerold A. Armstrong, LG
Environmental Services Manager

Authorized by:
VP of Environmental Affairs, North America
Darling Ingredients, Inc.

Date

10/29/20

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
µg/L	Micrograms per liter
aka	Also known as
CAP	Cleanup Action Plan
DII	Darling Ingredients, Inc.
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
NFA	No further action
RZA	Rittenhouse, Zeman, & Associates, Inc.
SGT	Silica gel treatment
TPCHD	Tacoma-Pierce County Health Department
µg/L	Micrograms per liter
USTs	Underground storage tanks
VCP	Voluntary cleanup program

1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) has developed this Cleanup Action Plan (CAP) on behalf of Darling Ingredients, Inc. (DII) at the request of Washington Department of Ecology (Ecology) and the Port of Tacoma (the Port). This CAP was prepared as part of efforts to address residual petroleum hydrocarbons remaining in the subsurface at DII's Tacoma facility (the Facility) known as Darling Delaware Co., Inc. (aka Puget Sound By-Products). The Facility is located at 2041 Marc Avenue in Tacoma, Washington. This CAP presents a brief site location and description, and site operational and investigative history, and CAP requirements.

Sections 1.1 through 1.3 of this CAP provide a brief introduction, summarized from detailed information in Tetra Tech's Site Investigation Report (Tetra Tech 2019). The reader is referred to the Site Investigation Report for additional details. **Appendix A** includes figures and **Appendix B** includes site investigation data tables.

1.1 SITE LOCATION AND DESCRIPTION

DII's ingredients processing operation resides on an approximately 4-acre property owned by Port of Tacoma. The Facility is located at 2041 Marc Avenue in a primarily heavy industrial area of Tacoma (**Figure 1; Appendix A**). Properties surrounding the Facility include Tri Pack Transloading Warehouse on the north, Tacoma Rail followed by multiple industrial properties to the east, and undeveloped land on the south and west. Puyallup River flows from southeast to northwest approximately 1,300 feet west of the Facility. The Puyallup River enters Commencement Bay of the Puget Sound waterway approximately 1.5 mile not-northwest of the Facility.

Several structures comprise DII's operation including an office, office/storage room, workshop, office/shower/lunchroom with adjoining carport parking for motorcycles, truck shop, rendering plant, scrubbing room, wastewater room, an aboveground biological wastewater treatment reactor, finished product load-out building, chemical storage area, and multiple silos (**Figure 2; Appendix A**). The remaining portions of the property are used for vehicle and equipment parking and storage. The surface of the Facility is paved with asphalt, except for the southern equipment storage area.

1.2 SITE OPERATIONAL HISTORY

Since the early 70's the site has been used to operate a food processing by-products conversion plant, which collects and transforms these byproducts into valued fat and protein ingredients for use in the production of food, feed, fuel, and fertilizer products. The byproducts are of animal and vegetable origin. Darling began its operation of the processing facility in the mid 70's and still operates there today. Prior to the by-products conversion operations at the site, the City of Tacoma operated the property and greater surrounding properties as an unregulated and unsupervised landfill constructed over dredged tidal flat material. The landfill operated from the 1940s until approximately 1964.

1.3 SITE CLEANUP AND INVESTIGATION HISTORY

The by-products operation once used two 10,000-gallon underground storage tanks (USTs). One tank contained diesel for truck fueling and the other contained Bunker-C fuel oil for heating site buildings. The former tank location is beneath the present-day office/shower/lunchroom building (**Figure 2**). The two USTs were removed in 1989 along with approximately 1,000 gallons of wastewater from the tank excavation and 112 cubic yards of petroleum-contaminated soil. The water and soil were disposed off-site. Excavated soil was sampled for waste disposal characterization. Ecology sampled groundwater from the excavation and also sampled soil from the north and south excavation sidewalls. Groundwater and soil indicated petroleum hydrocarbon impacts from the USTs above cleanup levels. In a May 24, 1989 letter from Ecology, Ecology instructed Darling the excavation could be backfilled but left the case open.

Subsurface soil and groundwater investigations have been conducted at the Facility since 1989, following removal of the USTs and impacted soil. The following presents a very brief summary of the investigations. The Site Investigation Report (Tetra Tech 2019) provides details regarding each of the below investigations.

- **1989:** Rittenhouse, Zeman & Associates, Inc. (RZA) advanced three subsurface soil borings in the area adjoining the UST excavation area. RZA completed the boings as groundwater monitoring wells. Soil and groundwater analytical results from the investigation indicated residual petroleum hydrocarbons.
- **2002 - 2004:** Tetra Tech (formerly MFG, Inc.) installed four groundwater monitoring wells in 2002 to replace the three wells originally installed in 1989, plus one additional well (**Figure 2**, and **Table 1, Appendix B**). Soil results from 2002 indicated residual petroleum hydrocarbons in soil above Model Toxics Control Act (MTCA) Method A Soil Cleanup levels at a depth of 7 to 8.5 feet below grade, within the water table fluctuation zone (**Tables 2 and 3; Appendix A**). Quarterly groundwater monitoring results between 2002 and 2004 indicated a groundwater flow generally to the north-northwest, with some fluctuation likely due to precipitation and runoff events. Quarterly groundwater monitoring also indicated residual petroleum hydrocarbons above MTCA Method A Groundwater Cleanup Levels. However, the same groundwater samples analyzed after silica gel treatment (SGT) indicated petroleum hydrocarbons were either non-detect or well below the cleanup level of 500 micrograms per liter ($\mu\text{g/L}$) (**Table 3; Appendix B**). Darling requested site closure based on the results and risk assessment.
- **2012:** In 2012, the Facility entered Ecology's Voluntary Cleanup Program (VCP) by submitting a VCP application. Ecology recommended additional site investigation, which began in 2017.
- **2017 - 2019:** In 2017, a subsurface soil and groundwater investigation was conducted as per work requested by Ecology in response to the VCP application. One additional groundwater monitoring event was conducted in 2019. The 2017 investigation included abandonment of well MFG-3. Well MFG-4 was also proposed for abandonment but could not be found. The 2017 subsurface investigation indicated residual petroleum hydrocarbons above the MTCA Method A Soil Cleanup Levels in soil between 6.5 and 7.5 feet below grade, within the water table fluctuation zone (**Tables 2 and 3**), on the south sides of the former UST basin. Groundwater monitoring results for 2017 and 2019 indicated residual petroleum hydrocarbons above MTCA Method A Groundwater Cleanup Levels. However, the same groundwater samples analyzed after SGT indicated petroleum hydrocarbons were either non-detect or well below the cleanup level of 500 $\mu\text{g/L}$ (**Table 3, Appendix B**). The results also indicated that residual petroleum hydrocarbons did not appear to be migrating off site.

The Site Investigation Report also included evaluating the data by Mann-Kendall Statistical Analysis, comparison of non-SGT with SGT results, and a risk assessment. These are summarized below:

- **Mann-Kendall Statistical Analysis:** The Mann-Kendall Statistical Analysis was conducted on groundwater monitoring results between 2002 and 2019. The statistical results indicated confidence intervals of 97% to 99% for a decreasing trend for diesel range organics, 83% to 94% for decreasing heavy oil range organics, and 83% to 95% for decreasing mineral oil range organics. The decreasing trends are likely due to natural degradation of petroleum hydrocarbons in the subsurface.
- **SGT Evaluation:** Tetra Tech evaluated the groundwater data in relation to samples analyzed with and without SGT. SGT is used to separate the polar hydrocarbons (e.g., naturally occurring organics) from the non-polar hydrocarbons (e.g., petroleum hydrocarbons) within the same samples. The laboratory also noted elution patterns occurred both earlier and later than typical diesel fuel and that the peak profile present was atypical for hydrocarbons. Ecology's guidance document indicates that up to 10% of petroleum hydrocarbon constituents, such as Bunker-C, may be extracted during SGT; suggesting that SGT results should not be used in evaluating cleanup. However, the 2017 and 2019 total petroleum hydrocarbons (TPH) with SGT results indicates that one would need to increase polar hydrocarbon amounts in the samples by 417% to 1,299% before concentrations would meet or exceed the MTCA Method A Groundwater Cleanup

Level. So, the Ecology-estimated 10% of petroleum hydrocarbons lost during SGT is minimal compared to the amount needed to exceed the MTCA Method A Groundwater Cleanup Level for site sample results. Based on these calculations using the SGT data, Tetra Tech stated that it is reasonable to conclude that the majority of hydrocarbons observed in groundwater at the Facility are the result of dissolved and colloidal organic matter from sources such as degrading landfill and tideflat organic debris, and possibly even tallow or fats that may have migrated to subsurface soil prior to paving of the facility.

- Risk Assessment: Tetra Tech conducted risk assessments on facility data in 2002 and again in 2019. The 2002 risk assessment found that residual petroleum hydrocarbon constituents present in subsurface soil/landfill materials and groundwater at the Facility do not pose an adverse human health or ecological risk. The 2019 risk assessment: 1) indicated concentrations of TPH in subsurface soil (located at 6.5 to 7 feet below grade) at the Facility are well below the site-specific TPH cleanup level of 19,498 milligrams per kilogram (mg/kg) calculated as part of the 2019 risk assessment; 2) there are no unacceptable risks from contact with soil to industrial receptors based on the site-specific screening level; 3) concluded that based on analytical results, lack of a complete exposure pathway, and site-specific considerations, groundwater does not pose a threat to human health; and 4) TPH appears in equilibrium with groundwater and bound to subsurface soil materials. Therefore, TPH does not appear to be leaching to groundwater or migrating off site.

The 2019 Site Investigation Report (Tetra Tech 2019) presented a number of conclusions and requested facility closure based on analysis of the data collected between 2002 and 2019. The Site Investigation Report provides additional details.

- Statistical analysis completed on petroleum hydrocarbons for groundwater data available between 2002 and 2019 indicates that the concentrations of petroleum hydrocarbons have declined over the last 30 years and these declines are statistically significant. This implies that the residual hydrocarbon mass in the soil is tightly sorbed onto the highly organic subsurface materials and, as such, appear to be relatively immobile and in equilibrium with the groundwater.
- Groundwater TPH with SGT results indicate that the concentrations of petroleum hydrocarbons have been below MTCA Method A Groundwater Cleanup Levels since at least 2003. Improvements in analytical techniques has allowed quantification of the concentration of TPH after the SGT to concentrations that are well below the MTCA Method A Groundwater Cleanup Level, and support the conclusion that concentrations continue to decline.
- 2017 and 2019 groundwater TPH with SGT results for diesel range and heavy oil range hydrocarbons would require an and increase between 417% and 1,299% before the potential loss of polar organics from using SGT would result in hydrocarbon concentrations meeting or exceeding the MTCA Method A Groundwater Cleanup Levels of 500 µg/L.
- The 2002 and 2019 risk assessments both indicated acceptable levels of risk for human health and ecological receptors to subsurface soil and groundwater.
 - Concentrations of TPH in subsurface soil at the Facility are well below the site-specific TPH cleanup level of 19,498 mg/kg calculated as part of the 2019 risk assessment. Based on the site-specific screening level, there are no unacceptable risks from contact with soil to industrial receptors.
 - Risks from groundwater ingestion are close to and below the acceptable noncarcinogenic risk value of 1.0 for TPH without SGT and well below for results of TPH with SGT. TPH with SGT are also well below the groundwater cleanup level of 500 µg/L and are associated with noncarcinogenic risks well below 1.0. In addition, Concentrations of TPH in groundwater with and without SGT at the Facility are well below the site-specific TPH cleanup level of 74,000 µg/L for incidental ingestion exposure, which may be expected for construction workers.

2.0 CAP PURPOSE

While facility soil concentrations for petroleum hydrocarbons remain above MTCA Method A Soil Cleanup Levels, the site-specific human health risk assessment indicated acceptable risk to construction workers. In addition, the depth to impacted soil is at depths beginning at 6.5 to 7 feet below grade and within the water table fluctuation zone, depths at which are below the level of most utility and construction projects. In addition, petroleum hydrocarbons do not appear to be migrating off-site in groundwater based on the analyses presented above.

DII, the Port, Ecology, and Tetra Tech held a conference call during January 2020 to discuss current facility conditions and the potential for facility closure. During the call, Ecology and the Port expressed concern about the potential for human contact with subsurface soil in cases where excavation by construction workers may extend into subsurface soil zones where residual petroleum hydrocarbons are present. Based on these concerns, facility closure at the time of this CAP was not an option.

Also discussed was the current facility layout, in which the lunchroom structure resides above the former UST basin and thick asphalt is present beneath and surrounding the lunchroom structure (Figure 2). As such, access to the former UST basin is currently not available for investigation and/or soil removal efforts. The area adjoining the lunchroom and work shop are the main truck delivery areas for access to the rendering plant operation. Gaining access to the former UST Basin area for investigation and soil removal, if necessary, would be extremely costly for DII. This high cost to DII is due to 1) high material and labor costs for lunchroom structure and asphalt paving removal and replacement; and 2) restriction or elimination of raw material deliveries for processing during the downtime required to conduct the investigation and soil removal effort.

While restrictive covenants or deed restrictions are potential options for conditional site closure at some facilities, the Port stated that these are not viable options for them as owners of the property. Multiple other potential closure or no further action (NFA) options were discussed during the January 2020 call. One potential option that Ecology may agree to is an **NFA Likely** designation, which would require certain commitments on the part of DII.

An NFA Likely designation would be of benefit for the DII, the Port, and Ecology for the following reasons:

1. It provides a vehicle for which DII would commit to future site investigation and cleanup work at such time that access to the former UST basin area becomes available to satisfy the Port and Ecology requirements for cleanup; and
2. It may also allow for DII, with assistance from the Port, to request a variance from Tacoma Pierce County Health Department (TPCHD) for the yearly UST permit fee until such time that the former UST basin can be investigated and, if needed, impacted soil removed.

The purpose of this CAP is to outline the requirements that DII would need to commit to under an NFA Likely designation in order for Ecology to consider issuance of an NFA Likely designation or agreement, and by which the Port would be satisfied with a commitment that ensures eventual site cleanup, as necessary. The anticipated NFA Likely components would include the following commitments by DII:

1. Periodic maintenance and groundwater monitoring of downgradient wells MFG-1 and MFG-2.
2. Long-term maintenance of the existing asphaltic concrete driving surface and office/shower/lunchroom structure (hereinafter, "lunchroom" structure) that serves as temporary cap over petroleum hydrocarbon-impacted subsurface soil.
3. Future subsurface soil investigation and, as needed, removal and disposal of petroleum hydrocarbon-impacted subsurface soil in and adjacent to the former UST basin at such time that: 1) existing structure(s) over the former UST basin are removed; 2) asphalt over and/or adjoining the former UST basin is removed; and 3) DII's lease with the Port is discontinued and the Facility will be vacated.

3.0 CAP REQUIREMENTS

3.1 GROUNDWATER MONITORING

Two remaining wells (MFG-1 and MFG-2) exist at the Facility on the northern side of the work shop (MFG-1) and at the property boundary (MFG-2) in downgradient locations from the former UST basin. Groundwater monitoring will require that these wells be properly maintained and not paved over or destroyed during maintenance of the asphalt paving. Repairs to the wells will be required if wells become damaged, or replacement wells will be installed and the old wells abandoned should wells be destroyed or compromised.

Groundwater monitoring will occur at a frequency of once every 3 years during the period between January and March of the monitoring year; the period when hydrocarbons historically were typically at their highest concentration (**Table 4**). Based on the 3 year schedule, the next groundwater monitoring event would be conducted January-March of 2022, based on the most recent monitoring event conducted in January 2019.

DII will conduct the groundwater sampling for the purpose of evaluating site conditions for changes in petroleum hydrocarbon concentrations. The need for continuation of the monitoring program on a 3-year basis will be re-evaluated with DII, Ecology, and the Port after each monitoring period based on: 1) groundwater concentrations; 2) status of structures over the former UST basin in anticipation of petroleum-impacted soil removal; and 3) status of DII's property lease with the Port.

Groundwater monitoring will include recording water levels and sampling of the two remaining wells, MFG-1 and MFG-2, which are downgradient of the former UST basin and at and near the northern property line (**Figure 2**). The wells will be sampled using low-flow purging and sampling methods (e.g., peristaltic or bladder pump) using designated, disposable tubing and bladders, as applicable. Field personnel will purge wells at a consistent rate between 0.1 and 0.5 liters per minute such that drawdown is less than 0.3 feet. Purge water will be monitored using a multi-parameter meter with flow-through cell. Purging will continue until field parameters, recorded at approximately 5-minute increments, stabilize for three consecutive readings based on the following schedule, or until a minimum of 3 well volumes have been purged if parameters fail to stabilize:

- pH: ± 0.1 pH units
- Specific conductance: $\pm 3\%$
- Oxidation-Reduction Potential: ± 10 millivolts
- Temperature: $\pm 3\%$
- Dissolved oxygen: $\pm 10\%$ if > 0.5 mg/L or stable if three values less than 0.5 mg/L
- Turbidity: < 5 NTUs or $\pm 10\%$ when turbidity is 5 NTUs or greater

Once field parameters stabilize, field personnel will collect groundwater samples in laboratory-provided sample containers. The selected laboratory will analyze the samples for diesel-range petroleum hydrocarbons by method NWTPH-Dx, with SGT and without SGT. Field personnel will preserve the samples in coolers containing doubled re-sealable bags with ice and handle the samples under standard chain-of-custody procedures.

3.2 LONG-TERM FACILITY MAINTENANCE

Subsurface soil impacted by residual petroleum hydrocarbons resides at depths of 6.5 to 7 feet below grade, which is within the water table fluctuation zone. The existing asphaltic concrete driving surface provides a cap over the subsurface soil that may be impacted by petroleum hydrocarbons in and adjacent to the former UST basin area. The asphalt-paved areas are a critical component of the Facility due to truck traffic for deliveries. DII performs regular maintenance of the asphalt, which includes re-sealing the surface and, when needed, applying additional layers of asphalt. The lunchroom structure also serves as a cap over a portion of the former UST basin.

Long-term facility maintenance of these features is a CAP requirement to limit precipitation infiltration into the subsurface in the former UST basin area to limit migration of remaining contaminants. Secondly, the asphalt surface and structure acts as a barrier to potential inadvertent construction worker exposure to impacted subsurface soil. The only known subsurface utility (a drainpipe) near the former UST basin is in the corridor between the workshop and rendering plant buildings. This is the only area known where construction workers would have the potential to contact subsurface soil in the former UST basin area should the drainpipe require repair.

3.3 SUBSURFACE SOIL INVESTIGATION & DISPOSAL OF IMPACTED SOIL

DII's current lease on the property extends to September 30, 2028. At the time of this CAP, DII anticipates that near the end of the lease with the Port, that the lease will be extended and DII will continue operating at the 2041 Marc Avenue location for the foreseeable future. DII understands that, together, the CAP and an NFA Likely designation by Ecology constitutes an agreement that further investigation of subsurface soil and, potentially, a soil removal action will be required in the case that subsurface soil in the former UST basin area exhibits petroleum hydrocarbons impacts above the established Ecology cleanup Levels at the time of the investigation.

Implementation of a subsurface soil investigation, and potentially soil removal, will be triggered by one or both of the following:

1. Removal of the lunchroom structure and asphalt driving surface; and/or
2. Discontinuation of the lease with the Port and DII vacating the facility.

Site-specific investigation and cleanup work plans will be developed at the time that one or both of the above criteria are met. The work plan will provide for the lateral and vertical characterization of subsurface soil impacts such that cleanup will be effective to address the residual petroleum hydrocarbons associated with the former UST basin. The work plan(s) will specify the analytical parameters required and the soil screening/cleanup levels by which those parameters will be compared to evaluate which areas require soil removal. Soil removed during the effort will be properly characterized for disposal and disposed at an approved disposal facility.

4.0 REFERENCES

Tetra Tech, Inc. (Tetra Tech), 2019. Site Investigation Report, Darling-Tacoma Facility, Darling Delaware Co., Inc. (aka Puget Sound By-Products) Facility, 2041 Marc Avenue, Tacoma, WA. Facility No. 25455514; Cleanup Site No.: 8475; VCP Project No.: SW1317. Dated July 1, 2019. Prepared for Darling Ingredients Inc.

APPENDIX A – FIGURES

APPENDIX B - TABLES