Analysis of Brownfields Cleanup Alternatives

34 Mile Haines Highway Stockpile, Lot 15 Big Boulder Creek Subdivision
Haines, AK

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1.0 EXECUTIVE SUMMARY

The Alaska Department of Environmental Conservation (DEC) with assistance from NORTECH, Chilkat Indian Village-Tribal Response Program (CIV-TRP), and the Haines Borough completed this Analysis of Brownfield Cleanup Alternatives (ABCA) for the contaminated soil stockpile located at 34 Mile Haines Highway in Haines, Alaska. The site is tracked on DEC's Contaminated Sites Program (CSP) database under Hazard ID 27892 (https://dec.alaska.spar/csp).

In 2000, the stockpile was excavated and transported from the Haines Sawmill contaminated site to its current location. An attempt to incorporate the soil into asphalt for a Haines Highway reconstruction project were reported to be unsuccessful due to sawdust and woodchips in the stockpile. Onsite treatments including fertilizer and introduction of native Alaskan plant species were proposed for the stockpile. A local source indicated some treatment of the stockpile had occurred. The stockpile was sampled most recently in 2023, which confirmed that diesel range organics (DRO) and residual range organics (RRO) are the remaining contaminants of concern.

In 2024, the Haines Borough applied for a DEC Brownfield Assessment and Cleanup (DBAC) services to develop an ABCA and implement the selected cleanup alternative. The primary goal of this effort is to remediate the stockpile so that it can be managed without further risk or restriction on future site activities due to the presence of contaminated material.

Four cleanup alternatives were considered as part of this ABCA:

- **Alternative 1:** No Action
- **Alternative 2:** Landfarm Onsite to Levels Acceptable for Landfill Beneficial Use
- **Alternative 3**: Landfarm Onsite to Levels Acceptable for Unrestricted Use
- **Alternative 4:** Offsite Treatment at Bicknell Landfarm in Juneau

Evaluation factors included effectiveness, ease of implementation, and cost. Each option was evaluated based on these factors to identify a preferred remedy for the contaminated soil stockpile.

Only one option, No Action, was evaluated that did not meet site cleanup and reuse goals. If successfully implemented, the remaining three options are expected to meet site cleanup and reuse goals.

Landfarming onsite (Alternative 3) is DEC's preferred alternative for the stockpile. This option is considered easy to implement and provides an economically viable pathway to reduce contaminant concentrations in soil.

2.0 INTRODUCTION AND BACKGROUND

The 34 Mile Haines Highway stockpile is located on an approximately 4.8-acre parcel owned by

the Haines Borough and contains an estimated 1,300-cubic yards of petroleum-contaminated soil.

In the summer of 2000, the material was relocated from the Haines Sawmill to be incorporated into asphalt for a Haines Highway reconstruction project. However, after the soil was moved, it was reported to DEC that the soil did not meet the required specifications for use in the asphalt mix due to the sawdust and woodchip content. The material was subsequently stockpiled in its present location and has been tested periodically. The most recent testing results from 2023 indicate that DRO and RRO exceed the applicable 18 Alaska Administrative Code (AAC) 75.341 Table B2 cleanup levels with concentrations of 3280 milligram per kilogram (mg/kg) and 11,900 (mg/kg), respectively.

In 2024, the Haines Borough applied for and was awarded DBAC services to conduct site characterization and cleanup planning activities for the stockpile. The purpose of this ABCA is to summarize the data collected from previous site research, assessments, sampling efforts, and discussions and to evaluate potential remediation alternatives.

2.1 Site Location

The 34 Mile Haines Highway Stockpile is located at Mile 34 of the Haines Highway in Haines, Alaska, approximately seven miles west of Mosquito Lake, six miles east of the Canadian border, and 90 miles from Juneau. The 34 Mile Haines Highway Stockpile is listed as an active DEC Contaminated Site (Hazard ID 27892 and File No. 1508.38.034), and the legal description for the stockpile (herein referred to as "site") is described as:

- 34 Mile Haines Highway, Haines, Alaska
- Lot 15 Big Boulder Creek Subdivision
- 59.432828º north, -136.196657º west (WGS84), around 400 feet above sea level

2.2 Local Geology and Climate

Haines has a continental subarctic climate marked by long, cold winters and short, cool to mild summers. Haines has an average yearly low temperature of 35° F, with an average low of 18° F in January. The yearly average high temperature is 46.8° F, with an average high of 64° F in July. Haines receives an average rainfall of 48.51 inches annually. Based on this climatic information, the site is classified by DEC as in the "Over 40-inch zone" for cleanup purposes.

Metamorphosed bedrock underlies the area around Haines. Unconsolidated surficial deposits in the area include beach deposits, marine clay, alluvial deposits, and glacial outwash. The most common surficial deposit is glacial outwash consisting of gravel, sand, silt and clay at least three feet thick, with layered clay and gravel below.

According to the *Soil Stockpile Sampling Report*, prepared by CSP in January 2024, the

groundwater flow direction at the site is unknown, but depth to groundwater is assumed to be approximately 6 feet below ground surface (ft bgs) based on drinking water well boring logs in the vicinity of the site. The closest surface water body is Boulder Creek, located approximately 300 feet east of the stockpile. Permafrost is not known to exist at or near the site.

2.3 Site Use and History

The Haines Borough owns the property, which is currently vacant. The property has historically been used as a gravel pit and for staging road building equipment. Haines Borough residents also access the site for recreational activities, such as dog walking and snowmachining. Property adjacent to the site is used as privately owned residences.

After it was determined that the soil could not be used for the highway reconstruction project, the Chilkoot Lumber Company developed a work plan to treat the stockpiled soil in place.

The *Operations Plan for the Offsite Treatment of Petroleum Hydrocarbon Contaminated Soil from the Haines Sawmill* was approved in 2002 and outlined the use of a top and bottom liner, a leachate collection system, and the addition of fertilizer and native Alaskan plant species to enhance biodegradation. A local source stated that the stockpile was tilled and fertilizer added for several years; however, DEC does not have written documentation of these activities in its file. Currently, a top liner is not present on the stockpile and it is unclear if a bottom liner is still present.

2.4 Previous Site Assessment Findings

In 2009, the stockpile was sampled to evaluate contaminant concentrations. At that time, the soil was analyzed for DRO, RRO, and polychlorinated biphenyls (PCBs). Analytical results did not detect the presence of PCBs in any soil samples. The remaining contaminants of concern, DRO and RRO, tested above DEC cleanup levels.

In 2023, CSP staff, in coordination with the Haines Borough and CIV-TRP, collected soil samples at various depths and conducted analysis for DRO, RRO, and polycyclic aromatic hydrocarbons (PAHs). Sampling indicated that DRO and RRO are still present in surface and subsurface stockpile soils, with concentrations generally increasing with depth. DRO concentrations exceed the most stringent cleanup level throughout the stockpile while RRO concentrations only exceed the most stringent cleanup levels at depth. No PAHs were found at concentrations that exceed their respective most stringent cleanup levels.

Reports for both the 2009 and 2023 sampling events are available on the CSP database at https://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/SiteReport/27892

2.5 Project Goal and Site Reuse

Cleanup of the soil stockpile is essential to make the property available for any use, such as further residential development or community development. No specific reuse has been identified at this time.

3.0 APPLICABLE REGULATIONS AND CLEANUP LEVELS

3.1 Cleanup Oversight Responsibility

Cleanup oversight is managed by the CSP in accordance with 18 AAC 75.325 - .390, the Site Cleanup Rules.

Work is expected to be conducted in accordance with the Site Cleanup Rules, DEC *Field Sampling Guidance for Contaminated Sites and Leaking Underground Storage Tanks Sites* (2024), and specific work plan(s) developed for the selected cleanup alternative.

3.2 Cleanup Requirements for Contaminants of Concern

For unrestricted use, contaminant concentrations in soil must meet the most stringent DEC Method Two Cleanup Levels for the Over 40-inch zone as defined in 18 AAC 75.341, Table B2, as amended through October 18, 2023.

Table 3-1 – Cleanup Levels

Contaminant of Concern	Analysis	Soil Cleanup Level* (mg/kg)
RRO	AK103	8300
DRO	AK102	230

Notes:
*Table B2, Method Two – most stringent soil cleanup levels for over 40-inch zone
mg/kg = milligrams per kilogram

Beneficial use of polluted soil in a permitted landfill facility must additionally comply with Solid Waste Regulations 18 AAC 60. Beneficial reuse must also be approved by the DEC Solid Waste Program and the landfill operator.

If contamination exceeding the cleanup levels is detected in the soil or groundwater under the stockpile, additional site characterization or cleanup activities will be required.

3.3 Conceptual Site Model / Exposure Management

DEC developed a Conceptual Site Model (CSM) for this site as part of the *Soil Stockpile Sampling Report, 34 Mile Haines Highway Stockpile* (2024). The objective of a CSM is to identify potentially impacted media and potential exposure pathways to current or future receptors as part of site management and remediation activities. Potential current receptors were identified as residents,

site visitors, and recreational users. Commercial and industrial workers were identified as potential future receptors. Potential contaminant transport mechanisms include volatilization, runoff and erosion, sedimentation, uptake by plants and animals, and migration to subsurface soil, groundwater, surface water, and sediment.

As the DRO and RRO concentrations at the top of the stockpile met their respective cleanup levels based on the ingestion and inhalation exposure pathways, DEC does not believe that direct contact with the top portion of the stockpile poses an immediate health risk.

4.0 CLEANUP ALTERNATIVES

This section presents a range of reasonable and proven cleanup alternatives, based on contaminant concentrations, site characteristics, current and potential site use, potential exposure pathways and associated risks, and overall cleanup goals.

Four potential cleanup alternatives are identified below and described in further detail in the following subsections.

- **Alternative 1:** No Action
- **Alternative 2**: Landfarm Onsite to Levels Acceptable for Landfill Beneficial Use
- **Alternative 3**: Landfarm Onsite to Levels Acceptable for Unrestricted Reuse
- **Alternative 4**: Offsite Treatment at Bicknell Landfarm in Juneau

To satisfy the Brownfields Program's requirements, the criteria of effectiveness, ease of implementation, and cost of each alternative is considered.

4.1 Alternative 1: No Action

The no action alternative is included as a basis for comparing active remediation techniques. It assumes no cleanup will be undertaken at the site. Under this approach, the stockpile would remain on the site in its current configuration.

Effectiveness:
This alternative is not considered effective or viable. Soil contaminants detected above the applicable cleanup levels remain on-site and are not in compliance with regulatory requirements. Overall project goals and the interests of stakeholders would not be met with the no action alternative.

Implementability:
This alternative is easy to implement as no action is required.

Cost:
There is no cost associated with this alternative.

4.2 Alternative 2: Landfarm Onsite to Levels Acceptable for Landfill Beneficial Use

This alternative includes the following activities:

- Workplan development
- Soil sampling/assessment (baseline, interim, and closeout)
- Design and Implementation of Landfarm
- Transport soil to Landfill
- Landfill transfer and acceptance

This alternative will utilize a landfarm to bring petroleum hydrocarbon concentrations in the soil down to levels acceptable to the DEC and the landfill. Contaminated soil must have a beneficial use for landfill operations, generally used as cover material. The Community Waste Solutions' landfill in Haines is currently operating an unlined balefill style landfill and is open to future discussions about accepting the treated soil at no cost once it meets acceptable contamination levels.

After the soil is treated and transferred to the landfill, the Haines Borough would work with DEC on closure of the site. The site would be considered remediated and ready for future use and development. Unrestricted reuse of the site will be possible once the site has been closed by DEC.

This alternative requires close coordination with the DEC, the Haines Borough, and the landfill operator. For the landfill to accept the contaminated soil from the landfarm, there must be a beneficial use for the soil at the landfill and it must meet any additional testing requirements for disposal approval required by DEC Solid Waste regulation 18 AAC 60.

Effectiveness:
Landfarm treatment is expected to reduce the toxicity, mobility, and volume of contamination in the stockpile to meet landfilling requirements. The soil would then be transferred off site eliminating the exposure risks.

Implementability:
This alternative requires a high level of coordination and is dependent upon the landfarm treatment of the soil reaching acceptance criteria and approval from the DEC Solid Waste Program and the landfill operator. This alternative is expected to require a minimum of two years of treatment in the landfarm with annual tilling and treatment of the soil. Trucking the soil to the landfill can be arranged with a local company. Once the soil is accepted by the landfill it becomes the landfill's responsibility to manage remaining contamination risks. The landfarm would be dismantled.

Cost:
Total cost for this alternative is estimated at $285,440. The cost estimate is based on the recent

discussion with the local landfill operator and their acceptance of the soil at no cost. Loading and transportation of the soil from the current site to the landfill was based on an estimate from a local trucking company in Haines. A cost breakdown is provided in Table 4-2.

Table 4-2: Alternative 2 Estimated Cost

Work Task	**Estimated Cost**
Workplan development	$15,000
Design of treatment processes	$25,000
Treatment infrastructure	$75,000
Ongoing long-term treatment	$80,000
Soil sampling/assessment and reporting	$40,000
Haines landfill acceptance	$0
Transport of soil within Haines	$50,440
Total Cost:	**$285,440**

4.3 Alternative 3: Landfarm Onsite to Levels Acceptable for Unrestricted Use

This alternative includes the following activities:

- Workplan development
- Soil sampling/assessment (baseline, interim, and closeout)
- Design and Implementation of Landfarm
- Final soil sampling and landfarm closure

Under this alternative, the stockpile would be treated onsite in a project-constructed landfarm. Once soil concentration levels reach the 18 AAC 75 cleanup levels, the landfarm would be closed and the soil could remain onsite or be available for reuse in construction projects, as fill material, or in other uses as determined. The Haines Borough could then use the site in the future without additional restrictions stemming from the presence of contaminated soil on the property.

Effectiveness:
Soil in the landfarm would be treated to the extent needed to meet regulatory cleanup levels and achieve site closure. Given adequate time and treatment in the landfarm the soil could be incorporated into future site reuse plans as they become available.

Implementability:
In this alternative, a landfarm will be designed and installed on site to remediate the soil. The landfarm will require ongoing management to ensure timely remediation of the soil. Landfarm treatment would include covering and uncovering the soil each spring and fall along with annual tilling to ensure maximum oxygenation. Treatment must be routinely administered in

order for the soil to reach acceptable cleanup levels. A qualified environmental professional is required to conduct the sampling and assessment of the landfarm.

Cost:
Total cost for this alternative is estimated at $255,000. It includes design and construction of a landfarm on site with a minimum of two years treatment and sampling. A cost breakdown is provided in Table 4-3.

Table 4-3: Alternative 3 Estimated Cost

Work Task	**Alternative 3 Estimated Cost**
Workplan development	$15,000
Design of treatment processes	$25,000
Treatment infrastructure	$75,000
Ongoing long-term treatment	$100,000
Soil sampling/assessment	$40,000
Total Cost:	**$255,000**

4.4 Offsite Treatment at Bicknell Landfarm in Juneau

This alternative includes the following activities:

- Workplan development
- Soil sampling/assessment (baseline, interim, and closeout)
- Transport of soil within Haines
- Transport and Treatment at the Bicknell Landfarm in Juneau

Under this alternative, the soil stockpile would be removed from the site and treated at the Bicknell Landfarm located in Juneau, Alaska. The Bicknell Landfarm, operated by Bicknell Inc., is a DEC-approved soil treatment facility. Once the soil is removed and transferred to the treatment facility, the site could be closed.

After the soil is in Bicknell's custody, all responsibility for the soil is removed from the Haines Borough, and Bicknell is now responsible for the treatment, remediation, and subsequent sampling of the soil.

Effectiveness:
This alternative would reduce the toxicity, mobility, and volume of the contaminated soils. The contaminated soil would be removed from the site and treated at a dedicated offsite treatment facility. If implemented, this alternative would protect human health, safety, and welfare at the site. There is potential for additional contamination risk as the soil is transported within

Haines, over water, and through Juneau to the treatment facility.

Implementability:
This alternative is administratively feasible but cost prohibitive. A barge dock must be available for use to transport the soil onto the barge, and for the purposes of this alternative the SECON dock is assumed to be utilized.

Cost:
The estimated cost for this alternative of $622,500 was provided by NORTECH. A cost breakdown is provided in Table 4-4.

Table 4-4: Alternative 4 Estimated Cost

Work Task	**Estimated Cost**
Workplan development	$15,000
Soil sampling/assessment	$60,000
Transport of soil within Haines	$97,500
Transport and Treatment at the Bicknell Landfarm	$450,000
Total Cost:	**$622,500**

5.0 RECOMMENDED CLEANUP ALTERNATIVE

5.1 Preferred Alternative Analysis

Based on evaluation of the alternatives, Alternative 3 is the most favorable cleanup option for the site. Alternatives 2 is considered unviable due to its heavier workload for the same outcome at higher costs. Alternative 4 has a significantly higher cost than the other options.

Alternative 3 has achievable implementation, has no potential risk of contamination associated with transport, and is the most cost-effective option. It accomplishes the desired results effectively and can be accomplished at a reasonable cost. The success of this alternative depends on the resources from the DEC and coordination with the Haines Borough.

5.2 Climate Adaptation Considerations

This remediation project does not have many significant items related to climate change and/or adaptation. The material is not in an area that appears to be subject to significant flooding or erosion potential and none of the alternatives will move it to a location with greater climate risk factor(s). The potential redevelopment of the site has not been confirmed and is considered the same for all alternatives.

Alternatives 2 through 4 each ultimately include remediation of the stockpile to reduce

contaminant concentrations with varied carbon footprints due to treatment methods. Alternative 3 will potentially have the lowest carbon footprint due to no transportation needs whereas Alternative 4 would have the highest.